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IN THE UNITED STATES DISTRICT COURT FOR THE
DISTRICT OF UTAH, CENTRAL DIVISION

UNITED STATES OF AMERICA, Plaintiff, vs. RAPOWER-3, LLC, INTERNATIONAL AUTOMATED SYSTEMS, INC., LTB1, LLC, R. GREGORY SHEPARD, NELDON JOHNSON, and ROGER FREEBORN, Defendants.	Civil No. 2:15-cv-00828-DN-EJF **UNITED STATES' NOTICE OF DEPOSITION OF DEFENDANT INTERNATIONAL AUTOMATED SYSTEMS, INC.** Judge David Nuffer Magistrate Judge Evelyn J. Furse

Pursuant to Fed. R. Civ. P. 30, please take notice that the United States will take the deposition of Defendant International Automated Systems, Inc., in this matter, at the at the United States Attorney's Office at 111 South Main Street, Suite 1800, Salt Lake City, Utah,

844111-2176, on May 24, 2017, at 9:00 a.m. The deposition will be recorded by stenographic means; will continue from day-to-day until completed, without further notice; and will be used for discovery, the preservation of testimony, and any other permissible purpose under the Federal Rules of Civil Procedure in the above-captioned matter.

Pursuant to Fed. R. Civ. P. 30(b)(6), Defendant International Automated Systems, Inc., is required to designate one or more officers, directors, or managing agents, or other persons who consent to testify on its behalf about the matters set forth below. Please note that Rule 30(b)(6) requires the designated witness(es) to "testify about information known or reasonably available to the organization."

Definitions

1. "Shepard" refers to Defendant R. Gregory Shepard, and to any of his employees or agents, unless otherwise stated.

2. "Johnson" refers to Defendant Neldon Johnson, and to any of his employees or agents, unless otherwise stated.

3. "Freeborn" refers to Defendant Roger Freeborn, and to any of his employees or agents, unless otherwise stated.

4. "RaPower-3" refers to Defendant RaPower-3, LLC, and to any of its employees or agents, unless otherwise stated.

5. "IAS" refers to Defendant International Automated Systems, Inc., and to any of its employees or agents, unless otherwise stated.

6. "LTB1" refers to Defendant LTB1, LLC, and to any of its employees or agents, unless otherwise stated.

7. The term "IRS" refers to the Internal Revenue Service.

8. The term "Lens" means any equipment that any Defendant refers to as a "solar thermal lens," "solar lens," "Fresnel lens," and/or "lens" in public statements like the statements made in: (1) the March 2, 2015 version of the "Frequently Asked Questions" site on www.rapower3.com, a copy of which is labeled with Bates numbers US001716 through US001721 and previously identified as Pl. Ex. 1; and (2) the March 3, 2015 version of the "Solar Panels" site on www.iaus.com, a copy of which is labeled with Bates numbers US002856 through US002857 and previously identified as Pl. Ex. 2.

9. The term "System" refers to any technical, scientific, or engineering system that uses or purports to use a Lens in any way, including the purported "solar power technology" described in Pl. Ex. 2; the March 3, 2015 version of the "SOLAR" site on www.iaus.com, a copy of which is labeled with Bates numbers US002858 through US002859 and previously identified as Pl. Ex. 3; and the "combined technologies" referred to in Pl. Ex. 1.

10. The term "Component" refers to any piece of equipment in a System that is not a Lens.

11. The term "Customer" refers to any person or entity who has paid money for a Lens.

12. The term "Sponsor" means the "sponsor" that RaPower-3 refers to in Pl. Ex. 1.

13. The term "Distributor" means any person or entity, other than a Sponsor, who sells any product or service related to any System, Lens, and/or Component.

14. Unless otherwise specified, the relevant time period for the following topics is January 1, 2003 to the present.

Topics for Examination

1. Background information regarding IAS, including its date of formation and whether it is in good standing, IAS's general business purpose, and experience in the field of energy technology.

2. The identity (by name, last known address, and telephone number) of IAS's current and former: corporate officer(s), owner(s), employees, contractors, and other agents

3. IAS's federal tax filings (if any) for income and/or employment taxes, including when IAS filed returns, the amount(s) due, and the identity (by name, last known address, and telephone number) of the person who prepared any such filings.

4. IAS's business relationship, if any, with RaPower-3, Johnson, Shepard, Freeborn, LTB1, LTB, LLC, LTB O&M, LLC, SOLCO I, LLC, Cobblestone Centre, L.C., and XSun Energy, LLC, including whether there are any common officers, shareholders, directors, and/or employees among the entities identified.

5. Current and prior technical specifications for the Lens, System(s), and/or Component(s).

6. How Lenses are manufactured.

7. All costs that IAS incurred to produce each Lens, including the costs of research and development; materials; and manufacturing.

8. How the price of each Lens is determined, including the amount of profit, amount of down payment, and the terms of repayment.

9. Tests that IAS conducted (or has had a third-party conduct) with respect to any Lens, System, and/or Component, the results of such tests, and the identity of the person and/or entity who conducted the testing.

10. Research that IAS has conducted (or has had a third-party conduct) with respect to any Lens, System, and/or Component, the results of such research, and the identity of the person and/or entity who conducted the research.

11. The physical location(s) at which IAS provides products and/or services to any person or entity, and the infrastructure and equipment that IAS uses and/or operates to provide such services.

12. The electricity, heat, solar process heat, hot water, cooling, water of any kind, and/or any other product, that any Lens, System, and/or Component was or is intended to generate. If any product has been generated or is being generated, the quantity generated and the revenue received for each such product.

13. Facts regarding any project at, and/or referred to by the name(s):

a. Yermo, California;

b. San Bernardino, California;

c. Boulder City, Nevada;

d. Mesquite, Nevada;

e. Kokopelli1;

f. Kokopelli2;

g. Safeway, Inc.'s Tracy Distribution Center;

h. Green River City, Utah; and/or

i. Needles, California.

14. The Lenses, Systems, and/or Components that have been installed and/or operated at Delta, Millard County, Utah (*see* Pl. Ex. 415, IAS's Resp. To U.S. 2d Interrogs., No. 19).

15. The "Safety and Operating Guidelines" provided by RaPower-3 to LTB1, (*see, e.g.*, Pl. Ex. 121 ¶ 4.1), and any participation IAS may have had in creating those Guidelines.

16. The "Governmental Approvals that are required to be in the Operators [*sic*] name and that are necessary for the Operator to perform its obligations" under the Operation & Maintenance agreement with Customers. (*See, e.g.*, Pl. Ex. 121 ¶ 2.5.)

17. Agreements (whether draft or executed) between IAS and any person or entity regarding the generation and/or sale of any electricity, heat, solar process heat, hot water, cooling, water of any kind, or any other product.

18. Agreements (whether draft or executed) between any person(s) and/or entity (or entities) regarding the generation and/or sale of any electricity, heat, solar process heat, hot water, cooling, water of any kind, or any other product, from a Lens, System, and/or Component.

19. Power purchase agreements, transmission agreements, and/or interconnection agreements (whether draft or executed) to which IAS is a party (or prospective party) or for which IAS provides any services.

20. All contacts between IAS and Rocky Mountain Power, Intermountain Power Project, PacifiCorp (or any subdivision of PacifiCorp), and/or any other entity to interconnect any property owned, operated, and/or serviced by IAS with property owned, operated, and/or serviced by such entities.

21. How IAS contracted with Customers and/or other users of IAS's products or services, including whether any Customer negotiated the terms of any contract with IAS.

22. IAS's understanding of its rights and obligations under any equipment purchase agreement (*see, e.g.*, Pl. Ex. 181), equipment lease agreement (*see, e.g.*, Pl. Ex. 92), purchase and installation contract, bonus contract (*see, e.g.*, Pl. Ex. 312), "replacement contract," and/or any other contract that IAS has with any person and/or entity related to any Lens, System, and/or Component.

23. IAS's services to any person and/or entity related to a Lens, System, and/or Component, to the extent IAS has provided and/or is currently providing such services.

24. How IAS ensures it meets its obligations under any contract, including monitoring the revenue that may trigger IAS's obligation to pay a bonus to any Customer.

25. Statements to any person and/or entity that that person's and/or entity's unit, equipment, Lens, Component, and/or System had been installed, "put into service," and/or "placed in service."

26. Payments that IAS has made to any person and/or entity related to a Lens, System, and/or Component, including bonus payments that IAS has made to any Customer; payments IAS has made for using any Lens for advertising purposes; and/or payments for using any Lens for "research and development" purposes.

27. Inquiries by any Customer regarding the status of such Customer's bonus payment and/or the performance of any Lens, System, and/or Component.

28. Statements about IAS's business activities, products, and/or services related to any Lens, System, and/or Component, on current and/or former versions of http://www.iaus.com,

including the identity of the person or persons who provided information that supports such statements.

29. Statements about IAS's business activities, products, and/or services related to any Lens, System, and/or Component, in IAS's public filings with the Securities Exchange Commission, including the identity of the person or persons who provided information that supports such statements.

30. Statements about IAS's business activities, products, and/or services on current and/or former versions of the website www.rapower3.com; in "New Solar Breakthrough May Compete with Gas" (*see* Pl. Ex. 16); in "IAUS Technical Overview" (*see* Pl. Ex. 17); in "EXECUTIVE SUMMARY / Creating Stunning Advancements in Achieving National Energy Independence for Transportation, Homes and Businesses"; in "History of RaPower3" (*see* Pl. Ex. 8); on "site tours," and/or other marketing materials and events. This topic includes the identity of the person or persons who provided information that supports such statements.

31. Statements made by RaPower-3, Johnson, Shepard, and/or Freeborn to any person and/or entity regarding the function, operational status, and/or technical capacity of any Lens, System, and/or Component. This topic includes the identity of the person or persons who provided information that supports such statements.

32. Research and/or advice performed by and/or obtained by IAS regarding federal tax consequences related to any Lens, System and/or Component, including the federal tax consequences of the financial structure of any transaction Customers enter related to any Lens, System, and/or Component. This topic includes, but is not limited to: advice from Hansen,

Barnett & Maxwell; Cloward & Sorenson; Todd Anderson, Anderson Law Center, P.C., and/or Kenneth Birrell of Kirton McConkie.

33. IAS's statements to any person and/or entity regarding federal tax consequences related to any Lens, System, and/or Component, including the federal tax consequences of the financial structure of any transaction Customers enter related to any Lens, System, and/or Component.

34. Statements made by RaPower-3, Johnson, Shepard, and/or Freeborn to any person and/or entity regarding federal tax consequences related to any Lens, System, and/or Component, including the federal tax consequences of the financial structure of any transaction Customers enter related to any Lens, System, and/or Component.

35. IAS's gross receipts from any service it has performed and/or any product it has produced if such gross receipts are related to a Lens, System, and/or Component.

36. Statements IAS has made regarding this lawsuit and/or IRS audits of Customers, including the identity of the person or persons who provided information that supports such statements.

37. IAS's responses to the United States' requests for production of documents to IAS, with respect to the manner in which IAS searched for responsive documents, which (if any) of the documents produced in the "Ra3" Bates range are IAS's documents, and the contents of any documents produced by IAS.

38. IAS's role in paying for legal representation for Customers who are being audited or have been audited by the IRS and/or any state department of revenue.

39. IAS's role in paying Defendants' and/or third-party witnesses' attorneys' fees and/or expenses in this lawsuit.

Dated: April 25, 2017

JOHN W. HUBER
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CERTIFICATE OF SERVICE

I hereby certify that on April 25, 2017, the foregoing document and its exhibits were sent via electronic mail to the following counsel of record:

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Buy Solar Lenses

SITE PAGES
Home
Technology
Start Your Business
Opportunity Overvie
Tax Info
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Learning Center
Contact

Frequently Asked Questions

If you have a question that is not answered here please contact us through the contact page.

Categories:

Sponsoring Questions

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1. Why do I need a Sponsor to buy lenses?

First, your sponsor will receive a commission when you purchase systems.

Second, your sponsor can answer questions now and in the future. If not, then his or her sponsor.

2. How can I look at the contracts and agreements before I buy?

Go to our Buy Now page. There you can see all of the documents.

General Questions

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1. In a nutshell, what is the RaPower3 deal?

RaPower3 has solar energy lenses one can purchase. Benefits include rental income, bonuses and tax credit/depreciation benefits that give an impressive return. There are also sales commissions available.

2. Who owns the technology?

International Automated Systems (IAUS). They give RaPower3 the right to sell their lenses.

3. Are there any patents?

About 26 patents and 50 patent pendings covering a number of IAUS technologies as of September 2014. IAUS has both national and international patents.

4. Does RaPower3 have a business licence in my state?

Yes. RaPower3 has current business licences in all 50 states.

5. Does the RaPower3 Solar Project have permits?

Yes. You may view the permit here.

Plaintiff Exhibit 1

US-001716
US001716

A Deseret News article published in Dec 2013 stated that RaPower3 does not have required permits; this is not true. Please refer to our response to this article here for further information. You may also view the county's letter stating our compliance here.

6. Can you define all the different watt terms?

A thousand watts = one kilowatt.
A thousand kilowatts = one megawatt.
A thousand megawatts = one gigawatt.

In the United States, one megawatt of energy would roughly meet the needs of a town of one thousand people. The terms of the cost per kilowatt hour can be different.

For example, an agreement to get ten cents per kilowatt hour (kWh) means for every hour that we produce one kilowatt we would get ten cents. Therefore, if we were able to produce energy at the rate of 200 hours a month, then we would receive $20 per month per kilowatt or $20,000 per megawatt or $2M per month for a 100 megawatt project.

7. What are the British Thermal Units mentioned in the RaPower3 contract?

The British thermal unit (symbol Btu or sometimes BTU) is a traditional unit of energy equal to about 1055 joules. It is approximately the amount of energy needed to heat 1 pound (0.454 kg) of water from 39°F to 40°F (3.8°C to 4.4°C). The unit is most often used in the power and steam generation industries. And, so it is with RaPower3. The solar lenses will heat the water to a very hot temperature creating steam which makes the turbine turn. BTUs can be mathematically converted to kilowatts. This conversion equation is important in maintaining RaPower's agreement with purchasers.

8. What are the RaPower3 contracts?

When you sign up by filling out the Distributor Application Form to purchase your solar lenses, you also electronically sign three other contracts and/or agreements. These three contract/agreements are with three different entities.

a) Your Equipment Purchase Agreement is with RaPower3.
b) Your Operation and Maintenance Agreement is with LTB,LLC.
c) Your Bonus Referral Contract is with IAS (International Automated Systems).

This was done in order for you to receive the maximum benefits possible and to insure your ability to claim all of your tax credits and depreciation as outlined.

RaPower3 Team Members can look at and print out their agreements by going to rapower3.com and logging into the Back Office. You will need your USER NAME that you created when you signed up. We suggest you print out a physical copy for your file and another copy for your tax preparer.

Tax Questions

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1. What are the tax forms used for the solar energy tax credits?

You can access the solar energy tax forms 3468 and 3800 by going to irs.gov. In the upper right hand corner there is a search engine; just put in the form number. After the above forms are filled out correctly, then the tax credit number goes on line 53 of your 1040 form.

2. What tax forms are used for the depreciation?

IRS Form 4562 and Schedule C. The depreciation from 4562 becomes a Net Operating Loss (NOL) on Schedule C and then that figure goes on line 12 on your 1040 form.

3. How are the tax credits and depreciation calculated?

The purchase price per lens is $3,500 so you simply take 30% of that, which=$1,050 tax credit per system.

For depreciation, take half the tax credit ($525) and subtract that from the purchase price, which= $2,975 depreciation per system.

4. What are the depreciation requirements?

To be depreciable, the property must meet all of the following requirements: (Our RaPower3 solar thermal lenses easily meet these four requirements) 1. It must be property you own; 2. It must be used in your business or income-producing activity; 3. It must have a determinable useful life; 4. It must be expected to last more than one year after being placed in service.

5. When can I start claiming my depreciation?

A taxpayer can start claiming depreciation of an asset as soon as his or her property is placed in service. Property is placed in service when it is ready and available for a specific use, whether in a business activity, an income-producing activity, a tax-exempt activity, or a personal activity. This does not mean you have to be using the property; just that it is ready and available for its specific use. The Placed-In-Service letter and Bonus Referral Contract that you will receive after you purchase your systems verifies this.

If the equipment is ready and available for ANY income producing activity, including leasing it out for advertising purposes, the owner may start claiming depreciation on the asset. This is what we give you with the Bonus Referral Contract. Your solar thermal lenses qualify for the 50% bonus depreciation in 2012, 2013 and 2014 as the above standards have been met. You use the standard 5-year double declining balance depreciation method for 2014.

6. I know I have to materially participate in my solar energy business to be considered non-passive so I can claim the depreciation. Do I have to spend 500 hours a year to be considered active because I really can't do that?

No, you do not have to spend 500 hours to qualify for material participation. Here are the guidelines taken from irs.gov website: If the taxpayer and/or the spouse meet any of the following, he materially participates and income is non-passive and should not be on Form 8582, triggering passive losses:

1. Did taxpayer work more than 500 hours a year in business?
2. **Did taxpayer do most of the work?**
3. Did taxpayer work 100 hours and no one worked more?
4. Did taxpayer work 100-500 hours in several passive activities, the sum of which exceed 500 hours?
5. Did taxpayer materially participate in the activity any 5 of the prior 10 years?
6. If the business is a personal service activity, did he materially participate in any 3 prior years?

Most RaPower3 Team Members qualify under guideline #2. Almost all of our RaPower3 Team Members work by themselves in their solar energy business. They have no employees and therefore, they do all or most of the work involving their solar energy business. So these team members usually don't spend 500 hours on their business, but qualify anyway under guideline #2 because they do most of the work.

7. Will the lenses I purchased be Placed In Service?

Yes. You will get a Placed-In-Service letter e-mailed to you in late February 2015 stating that fact. We suggest you make a copy of the letter and give it to your CPA so it's on file for his/her records.

8. How and when did all these amazing tax benefits come about?

The Tax Relief, Unemployment Insurance Reauthorization, and Job Creation Act of 2010 included provisions that allow businesses to elect 100 percent depreciation through 2011 and a 50 percent bonus depreciation through 2013. This bonus deprectiation is not available for tax year 2014 or later unless extended by congress.

On October 3, 2008, the House of Representatives passed H.R. 1424, the Emergency Economic Stabilization Act of 2008 by a vote of 263-171. Soon after, President Bush signed the bill into law. The U.S. Senate passed its own version of the bill on Oct. 1, 2008. In the bill are a number of provisions supporting energy efficiency and renewable energy, including all of the solar incentives advocated by SEIA (Solar Energy Industries Association).

This package includes an 8-year extension of the 30% commercial solar investment tax credit, completely eliminates the monetary cap for residential solar electric installations, and allows utilities and alternative minimum tax (AMT) filers to take the credit. Therefore, RaPower3 will offer the tax benefit program through the purchasing of its solar thermal lenses until the end of the year 2016.

9. What can I do with the Kirton-McConkie tax attorney memorandum? I noticed it referes to SOLCO1, so how can RaPower3 Team Members use this letter?

SOLCO1 is an entity that deals in bigger commercial projects but is owned by RaPower3. Thus, all our RaPower3 Team Members are allowed to use and rely on this tax attorney memorandum. You should make two copies: one for your file and one for your tax preparer. The letter gives a number of references stating why RaPower3 tax benefits as outlined are following IRS tax codes and law.

10. There is also the Anderson tax attorney opinion letter. Since the Kirton-McConkie memorandum is newer, should I just use that one or use both?

Use both. The Anderson tax attorney opinion letter is your best resource in claiming your depreciation. You let IAUS use your lenses for advertising purposes and did so by the Bonus Referral Contract with your compensation tied to the gross sales of IAUS (International Automated Systems). This means you were using your lenses for a money making purpose. Therefore, your lenses were "placed into service" under the guidelines for Depreciation, which are different than the "placed into service" guidlenlines for your tax credit.

11. What if I purchased before the tax attorney letters were written?

It doesn't matter. Both letters are considered retroactive.

12. What code do I use on Schedule C and what is the type of business?

Use the code number 532400 and the type of business is Equipment Rental Services.

Technology Questions

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1. What are the breakthrough technologies?

There are nine breakthrough technologies that should propel RaPower3 to the forefront of our nation's energy needs.

- Solar Thermal Lenses: These highly patented solar lenses are made of plastic and can be inexpensively mass produced. This Concentrated Solar Power (CSP) system is the only technology that uses the highly advantageous refractive approach rather that a reflective approach.
- Jet-Propulsion Turbines: These highly patented turbines can be inexpensively mass-produced. Our turbines are also scalable. This means projects can be built using many small turbines rather that one large one. Finally, our turbines are more efficient and can work with a lower grade of steam with a further advantage of being water tolerant.
- Dual-Axis Tracking System: Tracks the sun both horizontally and vertically creating greater efficiency. One laptop computer can regulate tracking the sun precisely with a thousand or more towers at the same time.
- Framing of the Solar Lenses: Able to withstand winds up to 90MPH. This is far more than our competition.
- Heat Concentrators: This boosts temperatures into the 2,500 degree range which is necessary in mass-producing inexpensive zinc batteries.
- Heat Exchangers: This highly patented technology reduces the size of current heat exchangers on the market by one thousand times thus reducing the cost exponentially.
- Biomass Burner: This patented technology burns any kind of biomass, waste or garbage with zero emissions. Our system is far more efficient and less costly than out competitors.
- Dynamic Voltage Controller (DVC): This highly patented and guarded technology efficiently and smoothly regulates different and fluxuating voltages. This control board can be mass-produced and will have multiple remarkable life-changing uses with a variety of industries. See **VIDEO**.
- Capacitors: This will revolutionize the electric car and energy storage industry. More on this later.

2. What is the significance of these combined technologies?

We have the answer to our nation's energy needs and this answer is available in 2015. Our answer includes all three essential dynamics for changing the energy equation. First, we have the lowest installation costs of any energy source. Second, we have the lowest cost of operation of any energy source. Third, we can mass- produce every component in practically limitless quantities. In a nutshell, our combined technologies have the potential of significantly changing the energy requirements of transportation, homes and businesses.

3. Why can RaPower3 members only buy solar lenses?

Buying only the solar lenses gives our members versatility in claiming their tax benefits. Also, the tax benefits are based on providing solar process heat. Only the solar lenses can do that.

4. Will there be other products for RaPower3 members to buy in the future?

Possibly. There are some really cool technologies and products that will be released by International Automated Systems in the future. Some of these may be a great fit with our RaPower3 marketing concepts. Stay tuned.

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Contract Questions

1. People electronically sign their contracts and agreements. Is this legally OK?

Yes. It is now done all the time in the United States.

2. Why so many contracts and agreements?

All are necessary to put the whole RaPower3 package together.

For example, The Equipment Purchase Agreement has important connections with the Operations and Maintenance Agreement. The Bonus Contract is important for our RaPower3 members in qualifying for the depreciation benefit.

3. How can I get a copy of my Contracts and Agreements?

Easy. Just Log-in to your back office member area. Look to the left hand greenish column. There are two places to get this info that you may also print. First, look for contracts and click. There you will see a list of some of your documents. Just click to see or print. Second, look down further and click View Personal Purchases. This page shows a list of your Personal Purchases. On the left, you will see a small box with a + in it. Click it. This will bring up a lot of info. Your Equipment Purchase Contract, your Operations and Maintenance Agreement. You can even print out your invoice; something your CPA might wish to have.

Network Marketing Questions

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1. I don't like Network Marketing (Multilevel Marketing). What do I have to do?

Nothing. Absolutely nothing. It's just one component of RaPower3. Your participation is completely voluntary.

2. What's the cost?

There is no cost. There is no administration start-up fee like other network marketing companies and also no monthly funds taken out of your account like other companies. You simply get commissions on everyone you sponsor and commissions on everyone they sponsor up to 6 levels deep.

3. What makes RaPower3 different?

Ninety-eight to ninety-nine percent of people who get into network marketing lose money because of the administration fee and having monthly funds withdrawn automatically from their checking account. Most people are unskilled in selling the products that are often times overpriced and, in addition, to being rejected over and over. Discouragement and loss of money leads to quitting with a bad taste.

With RaPower3 you only buy what you need and what you do buy makes you money and continues to make you money.

4. How do commissions work?

You work at your own pace. But the commissions are ten percent on the sales, ten percent on the rental income plus the bonus. It can mount up to a life-changing amount. You can sponsor as many people as you want. We call that going wide. And with each of those people you directly sponsor, you will also get a 1% commission for everyone they sponsor six levels deep. This means you can make commissions when your clients sell systems.

Example: Many people have purchased 100 systems or more. One hundred systems require a down payment of $105,000. That means a $10,500 commission. This also means the client will earn $15,000 a year in rental income. That means another $1,500 a year in commissions from the rental. The bonus would be at a maximum of $100,000.

5. Who would buy 100 systems?

One in ten households should purchase 100 systems. When you speak in terms of being able to go back one to two years, you really don't have to make that big of an income to justify a one hundred system purchase. You can purchase several lenses a month and by the end of the year, you can get it done. Your IRS refunds will be about &160,000. Do the math. What's even better this program is the federal government's program. RaPower3 just uses what was passed by congress and signed into law by two presidents to help make our country go green.

Negative Media (urgent)

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There is the appearance of a lot of negative information against RaPower3 and/or IAUS on the Internet. The truth is, nearly all negative media on the internet about RaPower3 and IAUS stems from an anonymous man whose main alias is TEDennis. This man's agenda is to do harm to RaPower3 and RaPower3 members. Please stay away from this dangerous man. If you know any information on this man, or if he has hurt you in any way, please send the information to info@rapower3.com so that it may be added to forthcoming action.

1. Who is TEDennis?

He is a man who hides behind the annonymity of the internet with the singular purpose to spread misleading and hurtful misinformation about RaPower3 and IAUS in order to disrupt progress by any means possible. His main website is called iausenergy.com. But he has many, many more sites with cleaver titles such as "Scamwatch" and "Fraud Alert", but they are nothing more than free blog sites filled with misleading information about IAUS and RaPower3.

His main site, iausenergy.com is regisered under godaddy. The following came from the registrar:

To see the report on iausenergy.com CLICK HERE

On this report you will see the phone and fax numbers are:
+1.4806242599 and +1.4806242598

And the address is listed as:
14747 N Northsight Blvd Suite 111, PMB 309
Scottsdale, Arizona 85260

The man is dangerous. Do an internet search on these phone numbers and address to see what this man is involved in. It is really scary stuff.

2. I read and article called "Pie in the Sky...", are the claims in the article true?

The answer is, absolutely not.

A detailed response from RaPower3 concerning this article and its wild claims may be read HERE.

Make Payments To:
RaPower3 LLC
4035 South 4000 West
Deseret, UT 84624

PR Contact:
Matthew Shepard
matt@rapower3.com
801-651-2183

Business Contact:
Greg Shepard
greg@rapower3.com
801-699-2284

Technology:
Technology Overview
Technology Videos
Disruptive Solutions
The Basics
Patents

Opportunity:
Opportunity Overview
Payback
Calculate Lenses
Buy Lenses and Join

Tax Info:
General Tax Information
Tax Forms
CPA Information
How Depreciation Works

AGREEMENTS

Lens Purchase Agreement | Operations & Maintenance | Commission Agreement | Policies & Procedures | Distributor Application

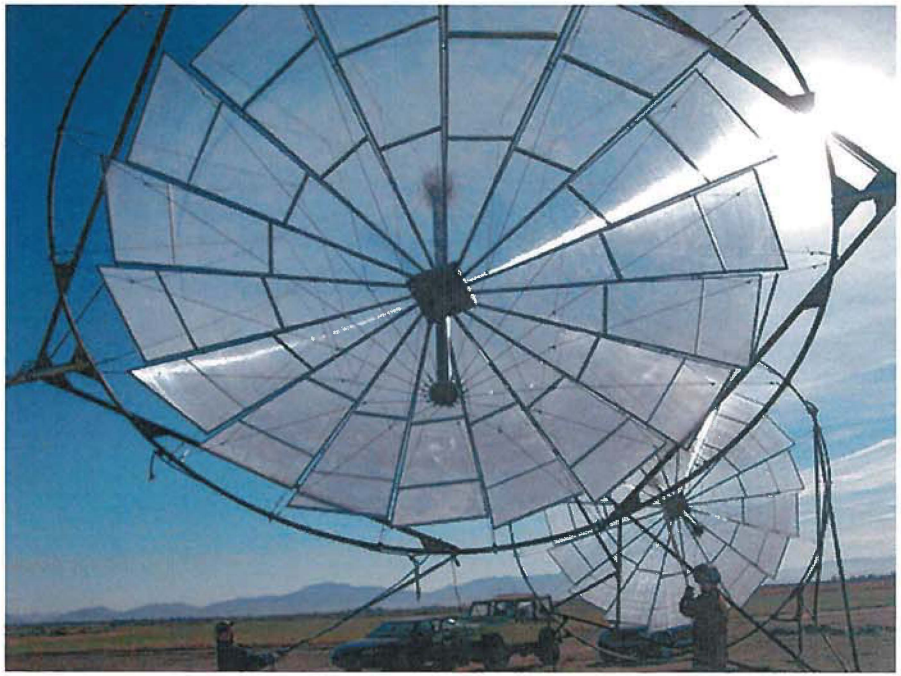
DOCUMENTS

IAUS Tech White Papers | Tax Opinion Letter | Tax Memorandum | RaPower3 History | Millard County Permit

Solar Panels

Solar Panels- IAUS's panel fabrication is a unique, patented, molding process never-before done with a radial Fresnel lens. This process allows for inexpensive, high-volume, mass production that can be expanded for ultra-high volumes in a comparatively short amount of time.

These thin solar panels focus the sun's energy to a small, high-temperature point. The energy generated can be used for both electricity production and thermal heat for manufacturing, water purification, chemical refinement, and other heat-based processes.



Plaintiff Exhibit 2

US002856

Solar
Solar Panels
Bladeless Turbine
Dynamic Voltage Controller (DVC)
DVC Prototype Videos
Instant Charge Batteries
Wind Turbines
PV Solar
CPV Solar
Ocean Wave Energy Generation
Electric Car Energy Capture
Electric Motors/Generators
Smart Grid
Lithium Batteries
News
About

SOLAR

IAUS expects its unique solar power technology to be the first to compete with gas and coal. Two primary issues have prevented solar power from replacing fossil fuels: the high cost of solar power equipment, and limited-volume manufacturing capabilities. In fact, even if today's solar power technologies were competitively priced, the manufacturing capabilities are so low it would take decades to barely make a dent in replacing fossil fuels.

IAUS's new solar technology presents a breakthrough on both fronts. The company has been achieving manufacturing costs competitive with fossil fuels, and its annual production scalability, both cost wise and time wise, is off the charts compared to today's technologies. These two

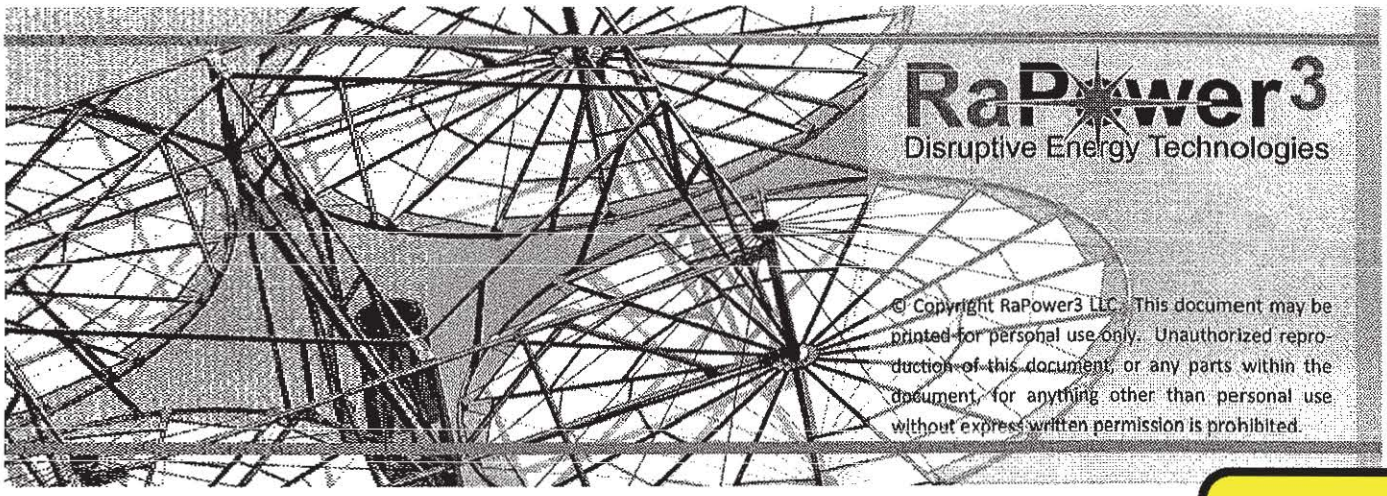
Because of IAUS's other proprietary components such as its bladeless turbine and dynamic voltage controller, the company's solar product can operate as both solar thermal and concentrated photo voltaic (CPV). Combining the two not only lowers the cost, and adds peak-power stability, but it creates a system that can potentially achieve efficiencies above 60%-70%.

Being a thermal based system also allows IAUS's solar plant to function as a hybrid with other fuels such as biomass, and natural gas. In addition, it is capable of producing electricity and desalinated water simultaneously. So coastal areas that are short of fresh water can produce both electricity and desalinated water from the sun.

Plaintiff Exhibit 3

US002858

elements make it perhaps, the energy sector's holy grail in a market currently grossing more than $3 trillion annually, but fueled by less than 1% solar.



Plaintiff Exhibit 8

HISTORY of RAPOWER3

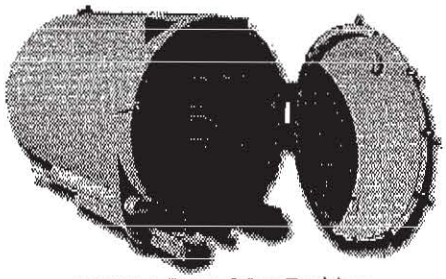
By Greg Shepard

This treatise is not meant to be a complete history. It is based on my memory, as feeble as it may be. The opinions and reflections are mine and mine alone. It will cover a time span from 2003 through 2014 and then give a glimpse into the future.

1. EARLY YEARS

Proof of Concept: The Early Years through 2007

Parameters: RaPower3 uses the technology developed by IAS (International Automated Systems). Thus, any historical writings of RaPower3 must include IAS. Founded in 1987, International Automated Systems, Inc. (IAUS:OB) develops and markets high-technology products. The company, which has been publicly traded since 1988, has patented and patent- pending technology for diverse markets such as renewable energy production, wireless communications, self-service consumer purchasing and secured financial transactions. The company, founded by a former AT&T communications engineer, is based in Utah. Its stock symbol is IAUS and its website is iaus.com.



IAUS Jet-Propulsion Turbine

RaPower3 was started in 2010. Therefore, in this historical section dealing with the early years through 2007, I will focus on two breakthrough technologies developed during this proof of concept time period that involve RaPower3.

THE IAS BLADELESS TURBINE

International Automated Systems, Inc. developed a new breakthrough bladeless turbine technology. It is a patented propulsion turbine, which some believe may revolutionize electrical power generation and low-cost hydrogen fuel production. (From iaus.com)

Most of the following is from the IAS website

Propulsion Turbine

IAUS's unique turbine has many advantages over traditional turbine designs. Rather than relying on turbine blades to spin the turbine cylinder, IAUS's Propulsion Turbine is designed to turn the cylinder without blades. IAUS's turbine efficiencies are very similar to expensive, high-end, multi-stage turbines; however, IAUS's turbine is low-cost and operates minus most of the expensive surrounding components and maintenance issues.

Traditional turbine performance relies upon the environment within its blade chambers. Superheated, high-velocity steam particles are continuously striking the titanium turbine blades to turn the shaft. If steam condenses on the blades, a sharp drop in efficiency and damage to the turbine can result. Traditional multi-stage turbines require dry, high-quality steam.

IAUS's new turbine is structurally unaffected by low quality steam. It blows the energy away from its components instead of on them to turn the shaft. It is smaller than traditional turbines, less expensive, and requires very little maintenance. Unlike traditional turbines, IAUS's turbine can operate without corrosion or system failure on both high quality and low quality steam. It has bi-phase flow capability.

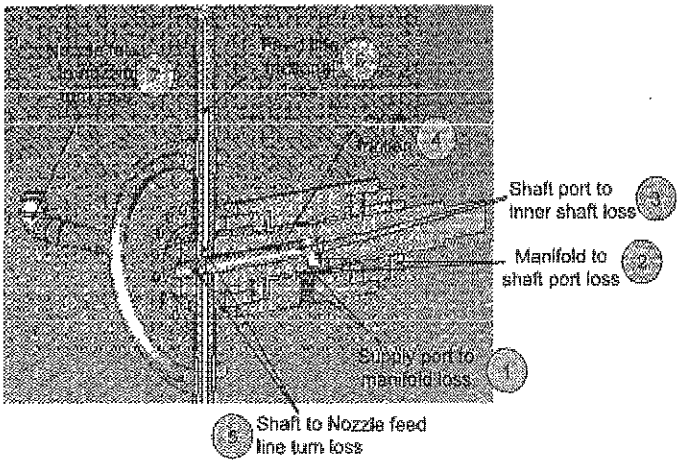
IAUS Turbine Eliminates Need for Boiler

IAUS's proprietary turbine steam cycle does not need an expensive, sophisticated, high-maintenance boiler. Instead IAUS's turbine operates on high-pressure, super-heated water (supercritical fluid) from a series of smaller, high-pressure tubing, which is much safer, less expensive and easier to manage. The expansion or phase change (flashing) from water to steam happens right in the working chamber of IAUS's turbine. It makes the Balance of Plant (BOP) steam production and monitoring equipment less complicated. These are significant advantages over traditional boiler systems required by conventional turbines.

Modular

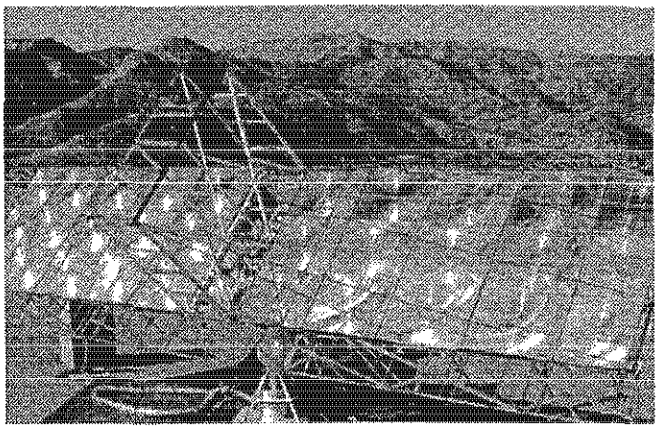
IAUS's turbine can be custom designed for smaller to medium size applications. This allows for staging power in and out and inexpensively segmenting a power plant into smaller sectors which improves issues of downtime while offering low-cost redundancy.(2003 News Release) Jack Dean, who has spent more than 35 years in the energy industry, is well known in connection with renewable energy production and an author and co-author of several publications covering subjects ranging from steam turbine principles and water induction, to power plant principles for plant operators and engineers.

"There are two unique features that give this turbine an unmatched versatility: its physical construction and its use of multiple-phase fluid," said Dean. "Use of this new Propulsion Turbine technology will offer many cost and energy saving opportunities for the people of Hawaii, and thus, move Hawaii closer to a goal of energy self-sufficiency based upon renewable energy and hydrogen."



SOLAR LENS DEVELOPMENT

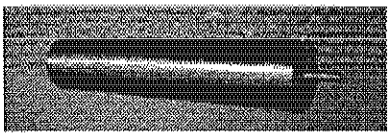
Neldon Johnson, inventor of the IAS technologies, developed his patented bladeless turbine over a decade ago. He thought his turbine would match up well with concentrated solar power energy, but found that conventional polished glass mirror technology that reflected the sun's rays to a tiny focal point was expensive, inefficient and used too much water. He turned to a Fresnel lens where the sun's rays would refract while bending the sun's rays to a much larger focal point. He hooked up Fresnel lenses to his turbine and produced electricity. Thus, he had proof of concept. The problem was that the Fresnel lenses were extremely expensive.



The photo above shows the Fresnel Lenses used in 2004 in Mesquite, Nevada. The Fresnel Lenses captured the heat from the sun which, in turn, created steam as water was heated past its boiling point. The steam then propelled the IAS patented Bladeless Turbine. A special heat exchanger was designed by IAS along with a generator which was "bought off the shelf."

The Result: Electricity was produced! The proof was that a series of truck headlights were brightly illuminated. Twenty-four in all. Many people witnessed this historic event, including myself. (Greg Shepard)

The generous tax benefits that we have today did not exist when Mr. Johnson discovered his proof of concept. Therefore, he set out to produce solar power that would be as affordable as coal. How could this be done? The inspiration to solve this challenge came with an idea of replacing the polished glass mirrors with a plastic/acrylic material using the Fresnel lens.


8-foot Copper Roller Mold

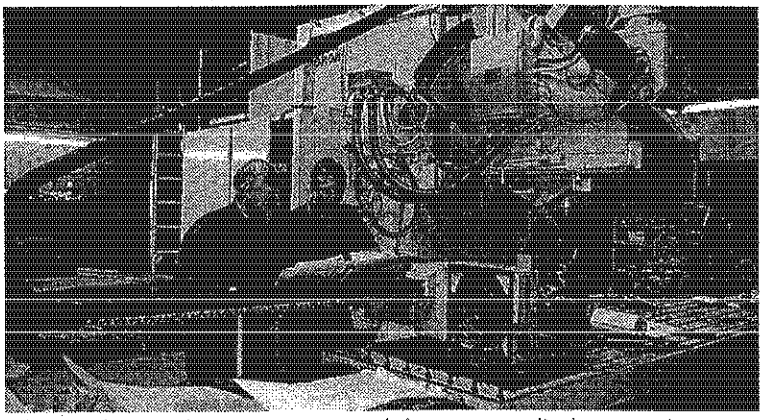
He went to Canada to enlist the help of the scientists who developed the Hubble Space Telescope. After a year of delays and little progress, Neldon and his team took over and finished a roller/mold. They approached Lucite who agreed to let them try the roller on one of their lines. After several months of trial an error, the first plastic/acrylic lenses were successfully produced.

It all starts with the eight-foot copper cylinder and the 89,000 pound mold-making machine. Concrete, four feet in depth, had to be poured to support the heavy mold making

THIN-FILM SOLAR LENS

IAUS's unique thin-film solar panels have a solar insolence transmittance efficiency of nearly 92% - virtually the highest transmittance physically possible of any material. These breakthrough solar panels have shown a conversion of solar energy from the sun into temperatures of over 1,300 degrees F.

machine and to keep it absolutely stationary. The copper cylinder, 22-inches in diameter, is secured by tightly fitted mandrels to make sure it too, is absolutely stationary.



This machine etches grooves around the copper cylinder to make a highly complex roller-mold used to make our thin-film solar lenses.

Highly complex patented software programs the mold-making machine to etch grooves around the cylinder. Many hundreds of grooves are etched into the mold and each groove has six different measurements. The intricacy of making our solar lenses is done here. The intricacy of our competition is done out in the solar field.

It takes three months to etch all of the grooves around the cylinder which is then shipped to Lucite. Each mold/roller/cylinder produces about 700,000 lenses which equates to about 400 Megawatts. We have the capability of making many molds per year and Lucite has no limitations on the number of molds that can go on their production lines. Specifically, the Lucite panels are made up of a very durable, engineering grade-monomer material that has been known to last more than 60 years. These panels are also 100% recyclable.

With the success of the first Lucite run, it became apparent that we could mass produce solar lenses at a tiny fraction of the cost of our competition. Later, we would also prove that it was also far more efficient than the polished glass mirrors, would use very little water, would not disturb the land and considerably decrease the cost of operation.

2007: IAUS Believes New Breakthrough Solar Panel Can Change the World

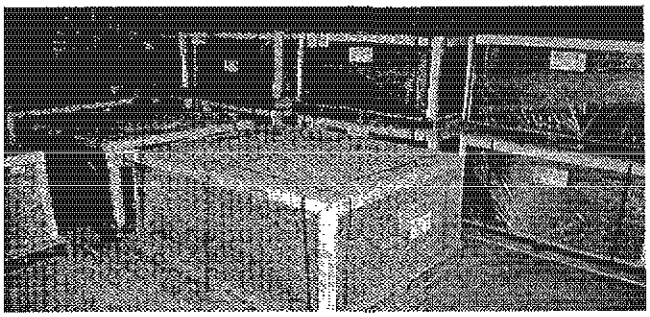
Following a successful high-volume run of its new breakthrough solar panels, IAUS has been conducting tests to identify the parameters of its new product. The new panels have delivered an exciting performance that is in line with preliminary expectations.

IAUS's unique thin-film solar lenses have a solar insolence transmittance efficiency of nearly 92% - virtually the highest transmittance physically possible of any material. These breakthrough solar panels have shown a conversion of solar energy from the sun into temperatures of over 1,300 degrees F.

Initial IAUS data has demonstrated that IAUS's new solar panels focus as high as 30% more solar energy onto its receiver than traditional solar power trough systems typically achieve. Recent advancements will likely increase this number again to more than 50%. IAUS's solar panels

have an estimated life-span of greater than fifty years when properly maintained, and are inexpensive to replace.

IAUS's unique thin-film solar panel can be produced at a fraction of the cost of today's traditional photovoltaic solar panels. IAUS believes its new product is the first solar power technology with legitimate potential to compete with gas and other fossil fuels. Low-cost energy produced by IAUS's new patented and patent-pending solar technology can be used to generate electricity or produce clean fuels such as hydrogen and green methanol (gasoline replacements) at a competitive price. Many experts had predicted that no solar power technology would likely accomplish this milestone before the year 2025.



Shown is a shipment of solar lenses from Lucite.

During its first high-volume run, nearly 1,000 Kilowatts of IAUS's solar panels were manufactured in a short 24-hour period. On a 24/7 operating schedule, an estimated 350 Megawatts of IAUS panels can be produced annually at a cost of less than $500,000. In comparison, a traditional photovoltaic (PV) solar module manufacturing plant with a yearly capacity equal to IAUS would cost an estimated $840 Million to construct. The world's energy market is a staggering $3 trillion per year. This is two times larger than the world's agricultural market. Less than 1% of this energy comes from solar power. Yet, every hour the sun radiates more free energy than the entire human population uses in a whole year.

IAUS Signs Supply Agreement with Lucite International for Production of IAUS's New Breakthrough Solar Power Panels SALEM, UTAH- (2007)

International Automated Systems, Inc. [IAUS.OB] has announced today that it has signed a supply agreement with Lucite International, a global leader in the design, development and manufacture of acrylic-based products. Lucite International generates over $1 billion in annual revenue. It is the world's leading supplier of Methyl Methacrylate (MMA), and the only organization with production, R&D, sales and marketing facilities in all three major geo-economic regions – the Americas, Europe and Asia.

"Solar energy runs consistent with Lucite's commitment to develop and advance "Green" products which promote environmental sustainability," said Wyndham Draper, Vice President – Sales and Marketing for Lucite International, Inc. "We are looking forward to working with IAUS in the production of this exciting new product."

Lucite is a solid company with a global presence and will facilitate high-volume production of IAUS's new solar panels. The personnel and management at Lucite have been exceptional and forward-thinking at every level," said Neldon Johnson, President and CEO of International Automated Systems, Inc. "We are very pleased with IAUS's new relationship with Lucite International.

About Lucite International

Lucite International, the world's largest producer of Methacrylates, is successor to the acrylic business of DuPont and ICI. It is the only vertically integrated acrylics producer with manufacturing facilities in every region of the globe, and employs 2,000 people in sales, marketing, R&D, manufacturing, engineering, technology and business support at 16 manufacturing sites and 35 sales offices worldwide. Lucite serves and supports customers in more than 100 different countries.

Solar Power Breakthrough: IAUS Hits Milestone Previously Thought to be Impossible SALEM, UTAH-

International Automated Systems, Inc. [IAUS.OB] [IAUS: OTCBB] announced today that it has successfully finished its first high-volume run of its new breakthrough solar panels. IAUS plans to quickly expand its annual solar panel production capacity this year to one Gigawatt which is enough to supply an estimated $2 Billion is sales per year.

"The discovery of economical solar energy is more valuable than oil," said Neldon Johnson, President and CEO of International Automated Systems, Inc. "The sun's energy is free, clean and virtually unlimited. IAUS's new solar technology is a discovery of historic proportions that we hope will revolutionize energy production throughout the world."

Witnesses

"I have witnessed the bladeless turbine running on geothermal water at Sulferdale a number of years ago. At that time I had an engineer with Utah Power and Light with me. At various times I have seen the turbine running with natural gas being used. This has been at Salem and in the Delta area. I have had engineers with me on some of these occasions. I have no doubt of the turbine working as I have personally witnessed it many times and with many others being present." Monty Hamilton

"I and the following friends have seen Neldon's turbine engine working at different times: Joseph Anderson (ex Sr. VP Bechtel), Jack Edwards (engineer. ex Saudi ARAMCO), Ron Hadley, Leon Davies (ex engineer Lockheed) and Gordon Larsen (ex United 747 pilot), etc." Sterling Rigby

A Significant 2004 Financial Occurrence

IAUS, through Neldon Johnson, invented the self-checkout system used today by grocery stores. This technology was stolen by

Optimal Robotics from Canada. Mr. Johnson sued but later decided to settle out of court for $1.7 million. He rationalized that more money could be made with solar energy and the settlement money could finance its development.

A press release by Optimal Robotics on January 24, 2004 states: "Optimal Robotics Corp. (NASDAQ: OPMR), today announced that it has entered into a settlement agreement with International Automated Systems, Inc. (IAS), which brings to a close the patent lawsuit between the parties. In accordance with the agreement, IAS will receive a sum that is not considered to be material to Optimal."

This experience would later prove to be valuable. Mr. Johnson became much more wary and steps were taken to always thoroughly protect his technologies. This wariness has now produced over 60 patents and patents-pending in the complex arena of renewable energy.

2. R & D

Research and Development 2008-2010

TURBINE CHALLENGES

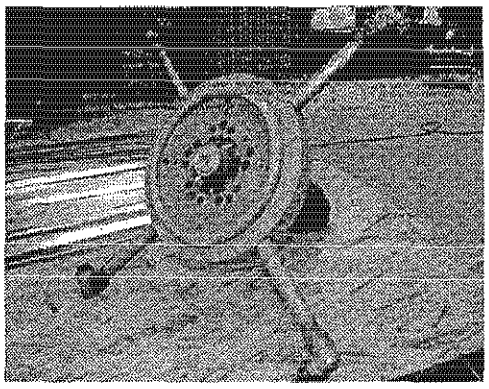
Salem, Utah was the scene for the R & D work on the bladeless turbine. Natural gas was used to heat the water to create steam which, in turn, propelled the bladeless turbine. Visiting engineers were always impressed at how little time it took to start the turbine. This was vastly different from conventional turbines.

A Major Problem

The Johnson Bladeless Turbine reached an incredible 17,000 revolutions Per Minute (RPM). This kind of velocity created intense vibrations within the turbine. It was theorized this extreme wobbling effect could be extremely dangerous. If a steel part were to come loose, nothing could stop it at that rate of speed. The R & D work centered on creating a smooth running turbine.

The Breakthrough Solution

Simple. Inexpensive. Totally effective. Neldon Johnson quickly started the process of getting a patent for his ingenious discovery. See the photo:



Can you see what it was? Look at the circular ring attached to the turbine. Inside the ring are small ceramic beads similar to ball bearings. They roll around inside the ring and will never wear out. This simple solution completely stabilized the turbine and totally eliminated the vibrations.

The Result

This discovery completed the turbine's research and development stage. So now we had the solar lenses and the turbine ready to go.

SOLAR CHALLENGES

Lucite and IAUS did make one tweak on the 2nd run. That was successful and it did increase the efficiency some. Therefore, this technology was completed. All we have to do now is place an order in quantities of at least 100,000 solar lenses. Inquiries were successfully made on where and how to acquire more mold-making machines. Each machine can increase our annual output by about 1,600 megawatts. However, the manufacturing of the solar lenses was just the beginning.

Tracking the Sun

Photovoltaic (PV) systems didn't track the sun because the parasitic load was too great. Some Concentrated Solar Power (CSP) systems used single-axis tracking. Mr. Johnson surmised that if a dual-axis tracking system could be designed with low parasitic loads that a 30% advantage could be attained over PV systems. Meaning that 2,000 annual PV production hours could be boosted to 2,600 annual production hours with a dual-axis tracking system.

Massive Use of Clean Water

Some CSP systems used massive amounts of water through the act of cleaning plus the cooling towers/heat exchanger systems. We also observed if a water-saving closed-loop system was used, costs would escalate. In addition, that clean water had to be used as opposed to brackish water for example.

Wind Damage to Solar Lenses

We observed replacement of expensive mirror lenses were a constant problem. Breakage would occur even a 35 MPH. Also, if a rock chipped a lens with even a small mark, the entire lens needed to be replaced. Could this big cost of operation expense be significantly reduced?

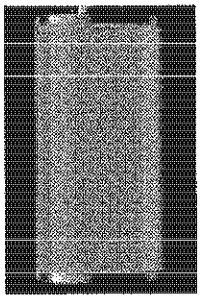
Expensive Batteries

We observed the great need to have power on cloudy days and at night. Photovoltaic projects would sometimes charge batteries by installing extra PV panels in order to achieve this objective.

The problem was in the huge expense. We also noticed lithium batteries being used in automobiles. The rarity of lithium and its volatility were noted. Could a complete paradigm shift in approach overcome the above issues? What about a zinc battery or combining biomass or natural gas with solar technologies?

The Lengthy Battery Recharge Time

Whether one is dealing with electric cars or energy storage, lengthy battery recharge time has severely limited the practical feasibility of wide-spread use.
Could this recharge time be significantly reduced along with its high costs?



Heat Exchangers and Cooling Towers

The installation costs of lengthy pipes connected to heat exchangers and their cooling towers were a significant expense. This expense was not just with Concentrated Solar Power projects but with coal and nuclear projects as well.
In addition, a major part of the cost of operation was connected to the cleaning and maintenance of pipes, cooling towers and heat exchangers. Could these costs be dramatically reduced?

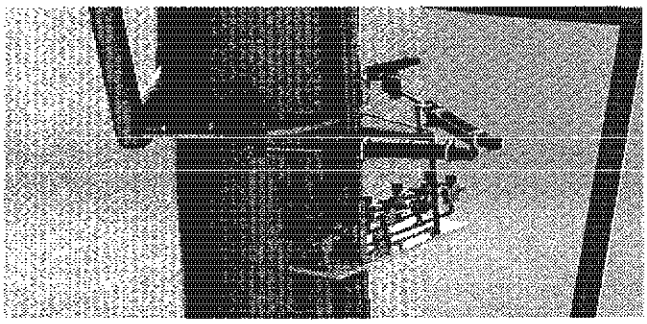
Costly Inverters:

A major expense of photovoltaic systems and wind energy is the inverters, which are electronic devices or circuitry that changes direct current (DC) to alternating current (AC). To bring the cost down to compete with coal power, costs associated with inverters had to be overcome.

SOLUTIONS

Identification of existing challenges and problems is the first step towards innovation. Neldon Johnson's creative mind worked non-stop on all these issues. Inspiration came frequently and in abundance. Patent after patent was applied for as the ideas multiplied.

The Dual-Axis Tracking System



The principle behind the dual-axis tracking system is that the solar lenses can follow the sun in two ways. Basically, up & down and side-to-side. The payoff is 30% more efficiency in production hours. There were about five different designs that were tested in this research and development phase. Each design improvement increased the probability of success.

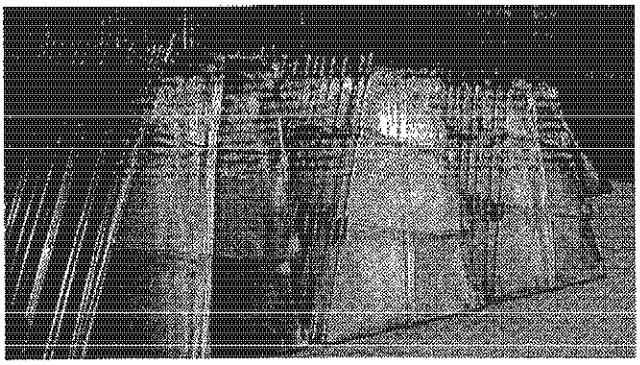
Reducing Water Consumption

Sometimes discoveries happen by accident. Such was the case with our solar lenses and the amount of heat produced without any cleaning. Since we were still in the R&D phase, there was no need to clean the lenses. To our delight, very little loss in heat was experienced, even after months of being installed on a tower. Our competition, like the big CSP plant in Ivanpah, California must clean their 350,000 mirrored lenses every day. We don't. This is a staggering difference in water consumption. We also found that we could easily implement a closed loop system. This means that we can keep reusing our water for steam. Our cost turned out to be negligible, while our competition's cost is significant.

Finally, we found out that we could heat any kind of water and run it through our turbine. Our competition must use clean water. We can smoothly and efficiently use brackish water, contaminated water with arsenic or even salt water to create steam for our turbine. A truly breakthrough discovery was that after these kinds of water were flashed into steam at the jet nozzle, any contaminants, particulates or salt fell to the bottom. We were left with pure distilled water. This meant we could either reuse the water in a closed system or release this pure water into the environment for other uses.

Reducing Wind Damage

Another delightful unplanned discovery was that as rocks and debris chipped away at our solar lenses, they still kept producing extreme temperatures. There was no need for replacement. Further study showed the rock chip only affected the small area of the chip and not the entire lens like our competition.



Solar Lenses with Wind-Resistant Bracing

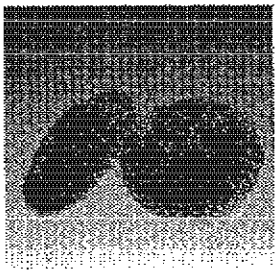
The R&D phase for increasing our wind tolerance was frustrating. A number of designs were tried. Improvements came at a slow and steady pace. At the end of 2010, our wind tolerance was better than our competition, but still

needed further R&D and refinement.

Our Concentrators and Batteries

Mr. Johnson came up with the idea of funneling the sun's rays down to a heat collector using parabolic reflection. This increased focal point temperatures to over 2,500 degrees F. It was aptly called a Concentrator. This inexpensive method of producing these extreme temperatures can make it possible to produce a zinc-air battery and/or zinc fuel cells. Zinc is 100 times more plentiful than lithium. It is well known that possible future applications of a zinc battery include its deployment as an electric vehicle battery and as a utility-scale energy storage system. This idea was so tantalizing to contemplate that Mr. Johnson decided to keep this innovation going for further refinement.

Reducing the Cost of Heat Exchangers and Cooling Towers



The following is absolutely true. Mr. Johnson was at a supermarket looking at copper mesh for cleaning. All of a sudden it hit him. Could copper mesh be used as a three-dimensional avenue for conducting heat through a heat exchanger? He was so excited that he raced home and made a makeshift heat exchanger with copper mesh out of things around the house. He was breathless as it appeared this would actually work.

R&D on this remarkable development immediately took place. Several patents were applied for with this technology. The results were ever so startling. The ramifications of the increased three-dimensional surface area were gigantic. Johnson's new heat exchanger eliminated the need for cooling towers. If that wasn't enough, it also reduced the size, weight and cost of conventional heat exchangers by a thousand times. This had breakthrough written all over it. Stunning even.

Eliminating Inverters with CSP

Concentrated Solar Power, such as the solar technology we use, does not use inverters. However, other renewable energy technologies such as photovoltaic solar panels and wind require inverters. There was this feeling that current inverter technology that had been around for years could be replaced by something better. Several years later this feeling would evolve into another truly breakthrough technology.

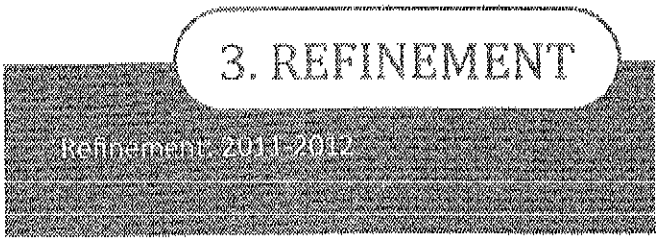
MARKETING AND SALES

There was a small pilot program launched in 2006 that sold solar lenses to a few individuals. It was a precursor to the RaPower3 program that began in 2010. Testing the market in those early years proved to be a successful marketing approach. Neldon Johnson created the program with some extremely bright attorneys. Neldon wanted to combine his low-cost technology and expected low-cost of operation with his modular capabilities so that everyday people could take advantage of all the generous tax benefits. This meant just not receiving solar tax credits, but also getting the depreciation benefit. He combined the tax benefits with a generous bonus and rental income.

The number three in RaPower3 would stand for the three different ways income could be generated. An optional network marketing component was also added as RaPower3 was launched in 2010. Commissions were generous and RaPower3 grew by leaps and bounds.

CONCLUSION

The research and development of these products and technologies from A to Z has been no small task. In fact, it has been nothing short of monumental. There have been inventions within inventions. The development of these devices, components and processes had never been done before. The results were revolutionary! Now it was time for the refinement of the R&D work which would also include manufacturing, marketability and putting all these remarkable components into one workable package.



MAKING IT A REALITY

The successful research and development period gave us confidence that we could take over the renewable energy business in a big way. Some of the breakthrough technologies needed refinement to make this bold assertion a reality. All research and development with its refinement centered around three driving forces.

First, manufacturing and installation costs had to be significantly lower than any energy provider including coal plants. Second, the cost of operation had to be significantly lower than any other energy provider. Third, we had to be able to mass produce every component; enough to produce over a thousand megawatts of energy per year.

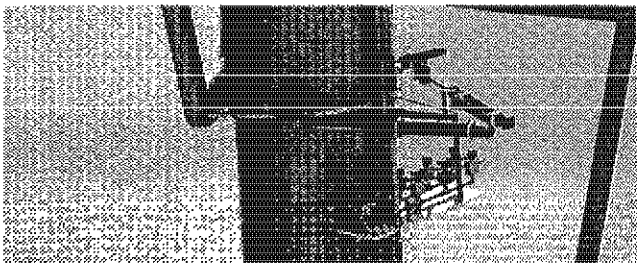
COMPLETED TECHNOLOGIES

Both the solar lenses and turbine were completed. Also, the batteries were just a matter of producing intense heat and we could do that.

TECHNOLOGIES NEEDING REFINEMENT

The Dual-Axis Tracking System

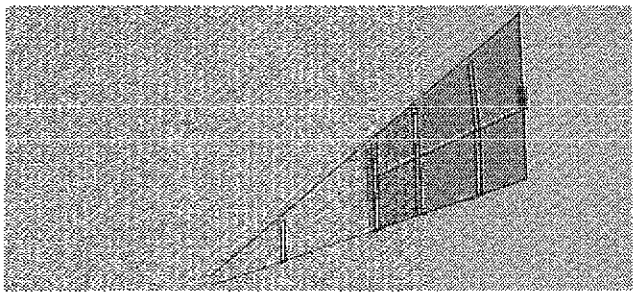
Several methods were tested. Some tests led to a better idea. Some methods failed while some were successful. The challenge was to get the parasitic load significantly under the energy cost that tracked the sun. The four solar discs with the steel pipes and trusses weigh hundreds of pounds. This factor coupled with wind loads exacerbated the challenge. Slowly headway was achieved. Our dual-axis hydraulic system operation became smoother running. As the year 2012 ran down, we were convinced that with even more refinement we could eventually create a tracking system with a remarkably low parasitic load.



Hydraulic dual-axis solar tracking system mounted to tower to add 30% more operating sun-hours.

The Solar Frames for Wind Resistance

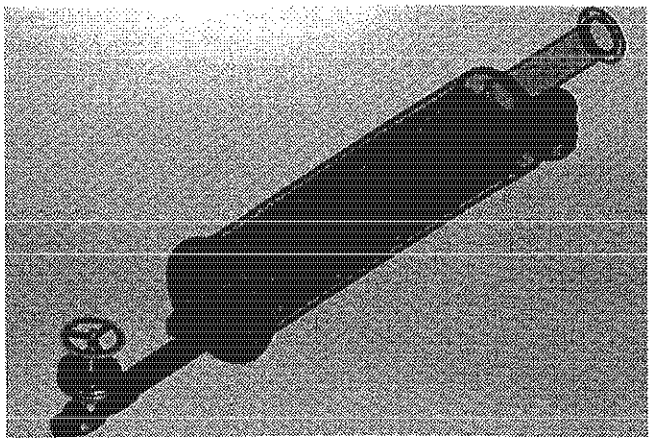
Balancing the need for mass production of the framing process and increasing the wind resistance of the solar lenses became the biggest refinement challenge. We tried screwing the frames and braces to the frames and sometimes the lenses would crack. We were told by a glue manufacturer that their glue would work perfectly under our conditional parameters. It didn't. We tried a variety of methods. By the end of 2012, our research was full of workable data, but we weren't fully satisfied. More refinement seemed to be necessary.



Harmonic bracing added to the solar lenses to reduce vibrations and wind-resistance.

The Heat Exchanger and the Molten Salt Container

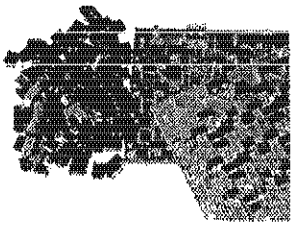
Continued to be refined along with manufacturing and installation development.



Rendering of the Heat Exchanger

The Circuit

This potentially disruptive technology showed so much promise that it was given a high R&D priority. At the completion of the prototype and white papers in 2014 it would be named the Dynamic Voltage Controller.



The Manufacturing Process

Manufacturing companies attempted to make various needed components. After delays and lack of real success, it was decided to get completely into the manufacturing business. This gave us two distinct advantages. First, we would have complete control over every component. Second, needed refinement could more easily be accomplished.

A large building in the Delta area was purchased in early 2012. Extra land was also purchased in order to meet future expansion manufacturing needs.

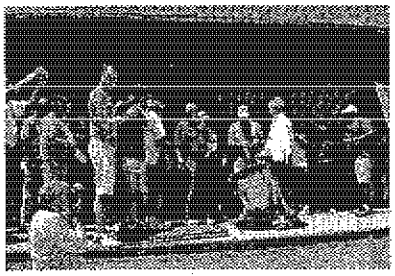
The 2012 Installation/Construction Process

It was also decided to form our own construction company for control and R&D purposes at the project site. Compo-

nents were delivered from the manufacturing plant: some completed components were stacked in the field ready for construction, while other components needed to be tested over and over many times.

Marketing & Sales

The program provided by RaPower3 proved to quite effective in the years of 2011 & 2012. Hundreds of people across the nation purchased solar lenses. Many came to see the manufacturing and construction sites. Word spread through the RaPower3 network marketing component.



One of the many tours of the solar site and manufacturing plant in 2012.

People were attracted by the generous bonus program contracted through International Automated Systems and the long-term rental program offered by LTB, LLC, an Operations and Maintenance Company. In addition, the tax benefits offered to solar companies producing heat were also attractive.

The RaPower3 sales gave Neldon Johnson and his staff much needed revenue to achieve our three-fold objective: (1) To have the lowest manufacturing and installation cost of any energy company; (2) To have the lowest cost of operation of any energy company; (3) To have mass production capability.

4. PREPARATION

Preparation & Production 2013

GETTING IT DONE

The year of 2013 mostly centered on the manufacturing plant with testing of the various components at the project site. A full-time engineer was hired to hasten the work. His office is conveniently located at the manufacturing plant.

The three-fold objective of having the lowest manufacturing and installation costs combined with the lowest cost of operation while creating mass production was always uppermost in everyone's mind.

Our engineer wore several hats. He was in charge of lining up vendors to supply all parts and components. Prices were negotiated while attaining volume discounts. At least three suppliers were found for each part and component. All parts and components were diligently put into our computer system complete with computer drawings and 3-D cad renderings. An extensive flow chart was also created.

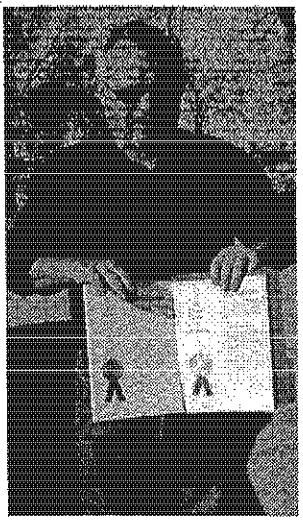
Greg Shepard (L) talking with head engineer Jeremy.

Jeremy, our engineer, calls his job with us his "dream job." Neldon Johnson would come to Jeremy with an idea and then Jeremy was able to put the idea into motion. First, on the computer and then Jeremy would actually build the component. Jeremy thrived on this kind of arrangement. He also supervised the work both at the manufacturing plant and project site.

HIGHLIGHTS

There were a number of highlights that made 2013 a special year. Here are some of the more important achievements:

- More patents and patents pending were filed.
- The elevated turbine/heat exchanger system on the tower was moved to two ground-level containers: One for solar and the other for biomass.
- An insulation supplier from California was found that lowered our insulation costs by over 80 percent.
- The wind resistant solar frames were improved to withstand 100 mile per hour winds.



New patents issued.

- The dual-axis tracking system improved substantially through extensive testing at the manufacturing plant.
- Our two CNC lathes were programmed successfully and certified ready by an outside engineering expert.
- The 89,000 pound mold-making machine was moved into its proper place at the manufacturing plant
- Fully-insulated pipes were installed at the project site connecting all eleven towers.
- Great progress was made on the circuit board, which would later be called a Dynamic Voltage Controller on the patents and marketing in 2014.
- Many more RaPower3 team members added.
- The addition of the "Grid Home" and surrounding property connecting to the project site.
- Transformers purchased connecting the project site and the grid home through about 400 yards of electric cable.
- Many millions of dollars in inventory acquired and completed.
- Additional employees hired

5. IMPLEMENTATION

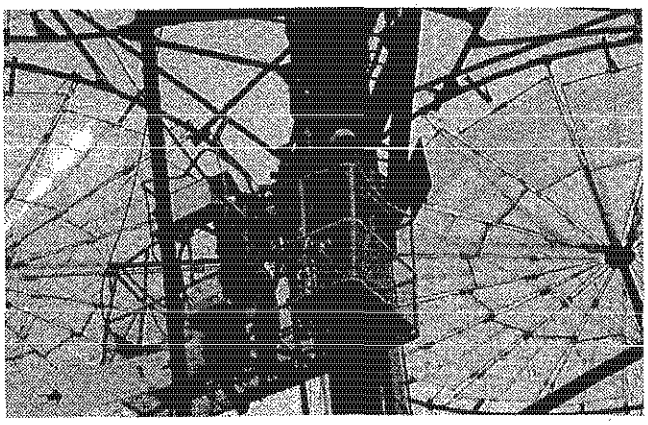
Implementation - From January 1, 2014 through June 21, 2014

COMING TOGETHER

Everything began to come together during the first half of 2014. We called it the period of implementation. All cylinders of our three-fold objective began accelerating in 2014.

The manufacturing plant kept adding and improving in ways to increase production while decreasing costs. Millard County granted a conditional use permit for the manufacturing plant. Automation procedures and even more equipment were put into place. Every manufacturing station was thoroughly analyzed to meet production levels of at least two megawatts per shift per day. Plans for robotic machines are also in the works to further increase future production levels as work will commence 24-hours per day.

Installation of components continued. The dual-axis tracking system was installed on two towers. The initial tests passed with flying colors. Crane operators were certified. Huge portable construction tents were erected with the purpose of protecting the workers from searing heat in the summer, frigid cold in the winter and frequent high velocity winds. Procedures were calculated to also meet demands of at least two megawatts per day per shift.



Installing the dual-axis tracking system.

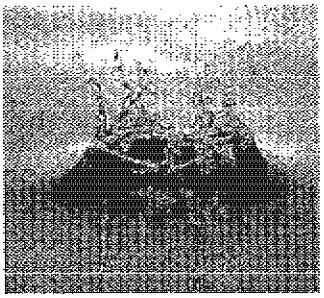
Elaborate testing was completed by Jeremy, our engineer, and Neldon Johnson. The turbine, heat exchanger and molten salt container worked perfectly. This helped confirm our cost of operation calculations of a half a cent per kilowatt hour. Coal plants normally have a cost of operation nine times more than our half-a-cent mark. This more than met our goal to be disruptive in the energy business.

Extensive plans were formulated to mass produce all of our components coupled with the construction of projects worldwide that were, frankly, on an unprecedented scale. The basic game plan to shatter the competition was to combine the dual-axis solar tracking system with our biomass system. Both systems would use the same turbine.

The solar energy system would give us 30% more annual production hours than non-tracking systems and 15% more annual production hours than single-tracking systems. In addition, the biomass system would give 8,600 annual production hours. The combination of these two systems gives us operation capabilities of running 24-hours a day with over five times the annual production hours over other solar companies.

Furthermore, our installation costs are far less as is our cost of operation and we can complete installation of any size project far quicker than our competition. Also, we are modular, meaning we can produce revenue as we are in the construction process.

Finally, our turbine can use any kind of water including salt water. This means we can produce prodigious amounts of pure distilled water from salt water, brackish water or most kinds of contaminated water as we are producing massive amounts of clean affordable renewable energy.

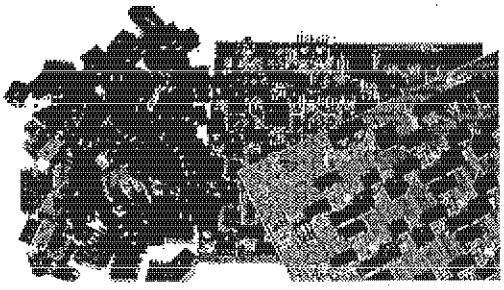


In conclusion, International Automated Systems (IAS), the owners of a number of our technologies, began issuing press releases and completely revamped their iaus.com website. The implications of the technologies presented for the first time were jaw dropping. The future of RaPower3 and IAS will be fantastic as they seem destined to emerge as the world energy leader with their disruptive technologies.

IAS TECHNOLOGIES
PRESS RELEASE IN JUNE OF 2014

Dynamic Voltage Controller- What if electric cars, cell phones, laptops, and power tools could recharge within seconds, or renewable energy suddenly became less expensive than coal? IAUS believes that with its new voltage controller, these possibilities will quickly become a reality.

The patented, Dynamic Voltage Controller (DVC) is the first technology capable of handling and converting a full range of variable input voltage on the fly to a constant DC or AC voltage and frequency output. It can also convert a constant input voltage to a variable output. This new device operates without transformers or coils, making it much lighter and significantly more compact than today's transformers and inverters. For many uses, it can be reduced to the size of a silicon chip.

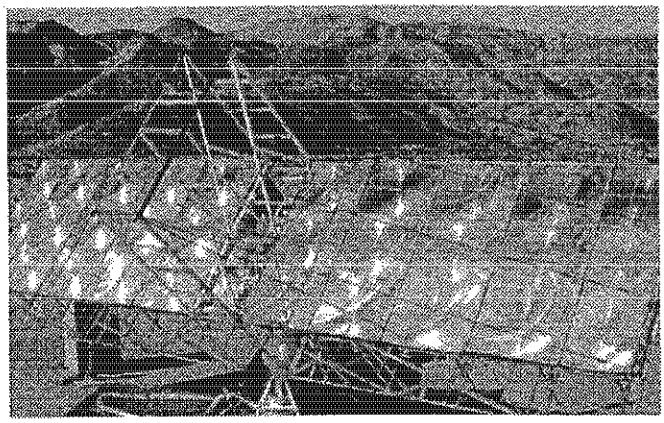


Dynamic Voltage Controller

PHOTOS

Photography History

2004

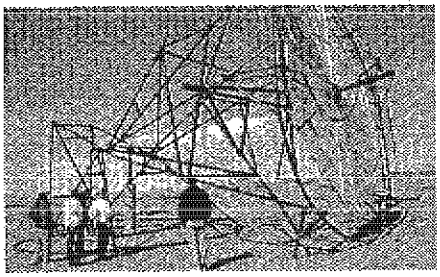


Proof of Concept: To prove the jet-propulsion turbine could be driven by steam created from Fresnel lenses to produce electricity a prototype was built and installed in Mesquite, Neveda. This prototype continuously powered 24 truck lights. The following two years were spent on developing a new type of Fresnel lens that could be easily and inexpensively mass produced.

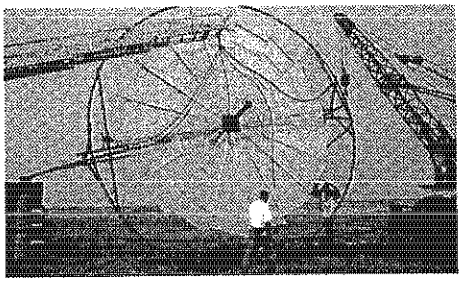
2005

Turbine Field Testing: Hundreds saw the jet-propulsion turbine working with natural-gas at the old Salem, Utah building. The turbine was also tested on geothermal and solar. Independent Engineering White Papers from industry experts were completed. These engineers rated the turbine at 43.5% efficient and good for an unprecedented 1,000,000 hours of continuous use.

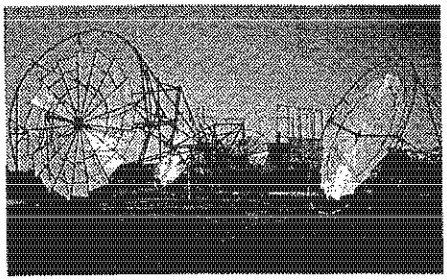
2006



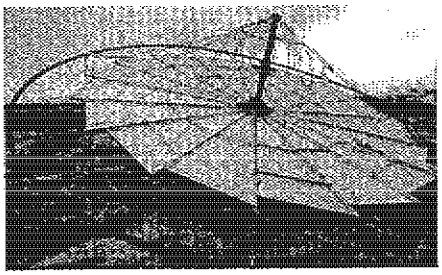
First Solar Tower Concept: R&D on IAUS Acrylic Fresnel Lenses. This was our first solar tower concept design.



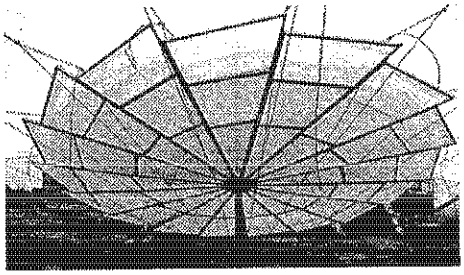
First Solar Tower Concept: Independent Engineering White Papers done by NASA engineers show the lenses at 90% efficient in the field.



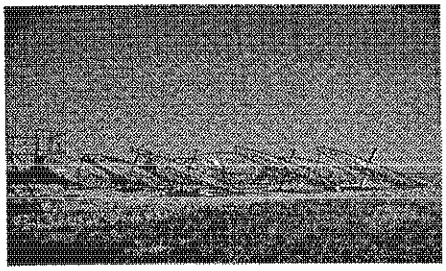
First Solar Tower Concept: Construction on the original single-disc tower design.



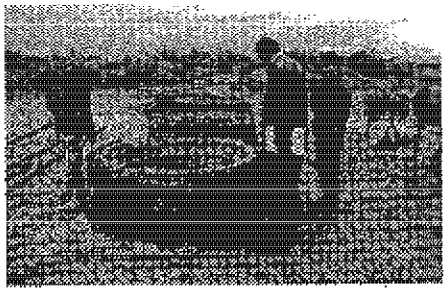
Solar Disc Design: Top view of the original solar disc design.



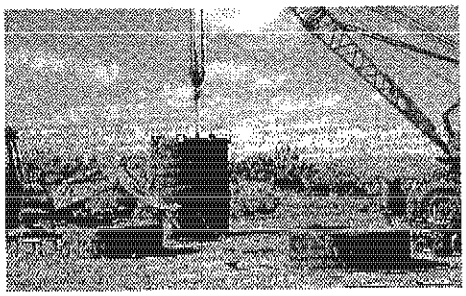
Solar Disc Design: Bottom view of the original solar disc design.



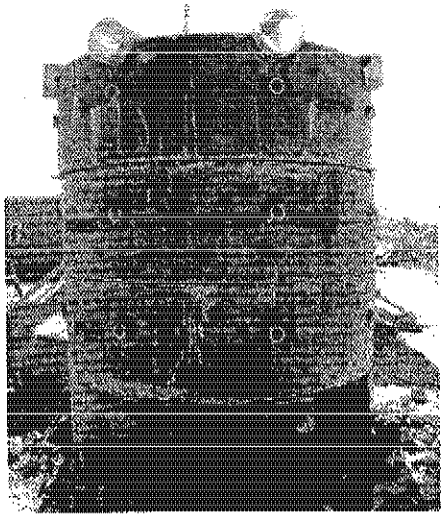
Solar Lens Field Testing: Original R&D solar field.



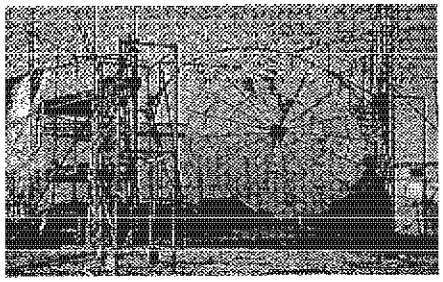
Biomass Testing: This R&D Biomass Burner was built to work in tandem with our solar towers for 24-hour operation with power generation and water distillation.



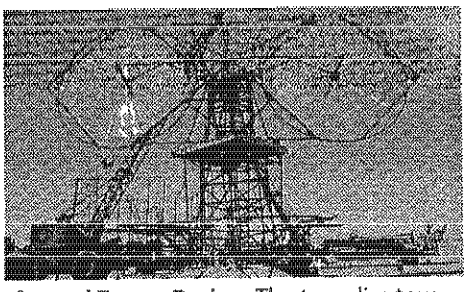
Biomass Testing: The Burner includes a cyclone in the upper chamber that burns off all toxins. The only emission is CO2. It doesn't need a boiler and works with our pipe-less heat exchanger.



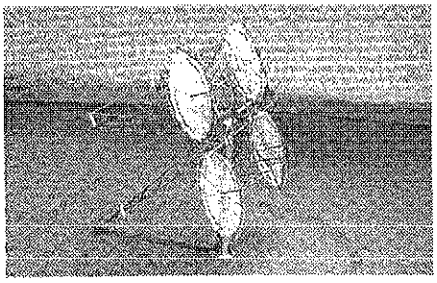
2007



Second Tower Design: A two-disc solar tower concept was constructed with idea of lowering construction costs over the single-disc concept.

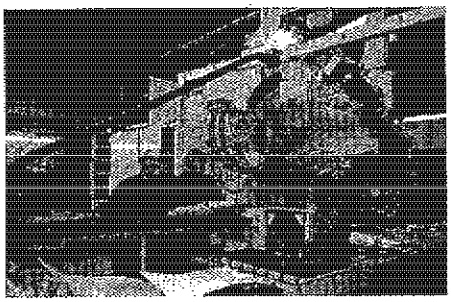


Second Tower Design: The two-disc tower concept required a gantry crane. Today, the disc-assembly and hydraulic tracking systems are installed at ground level and raised as a complete unit saving time and money.



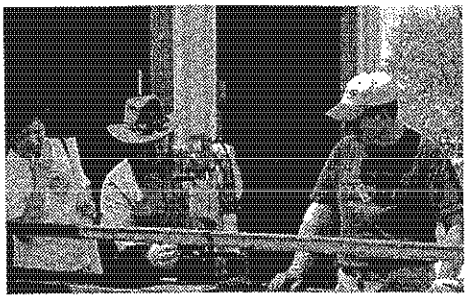
Four-Disc Concept: After successfully proving the tower concept many configuration designs were considered. The four-disc designed was adopted because it gave the greatest cost and assembly advantage.

2008—2010



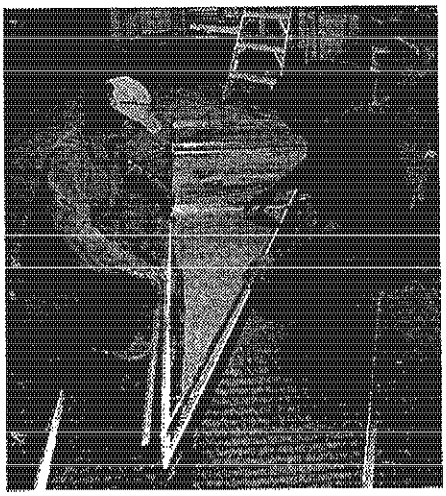
Solar Lens Manufacturing: Our mold-making machine was delivered in 2008. This machine takes 3 months to etch the thousands of intricate grooves into our lens molds.

Field Testing: On a visit to our site in 2008, Murray City Mayor, Dan Snarr, tests the heat coming off this unfocused lens. Even unfocused the lenses produce a substantial amount heat.



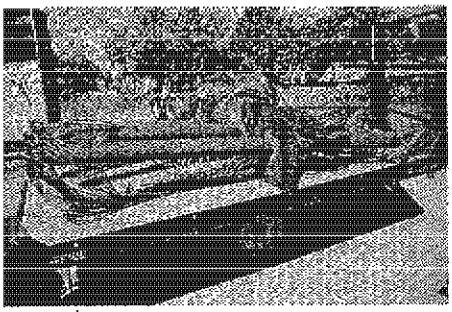
R&D Fabrication: Inventor Neldon Johnson at the first small fabrication shop in Delta, Utah.

R&D Fabrication: Greg Shepard holding the first solar heat collector nicknamed the "Magic Ball". Each solar disc focuses heat to a 2" focal point on this rotating ball. Heat-transfer fluid collects the heat and carries it to a central heat-storage system.

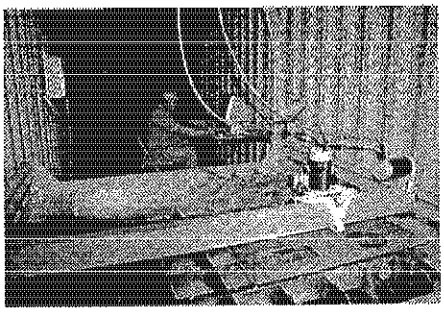


R&D Fabrication: Here are workers assembling the first solar-lens frame. Currently, we are on our 5th solar-frame design. The current design can withstand winds up to 100 mph.

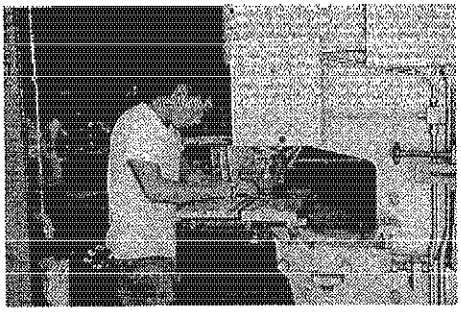
R&D Fabrication: Here is a picture of our first solar heat concentrator. The parabolic design in this heat concentrator allows us to reach temperatures nearing 3,000 degrees F.



R&D Fabrication: Original cores for the solar lens disc assembly ready to be delivered to the R&D site.

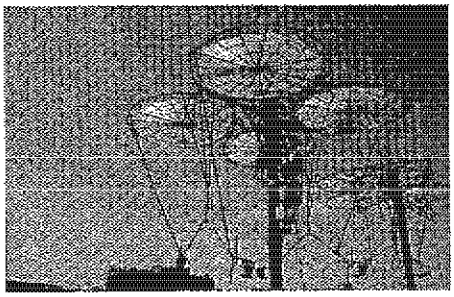


Field Testing: Neldon at the computer at the project site in Delta, Utah.

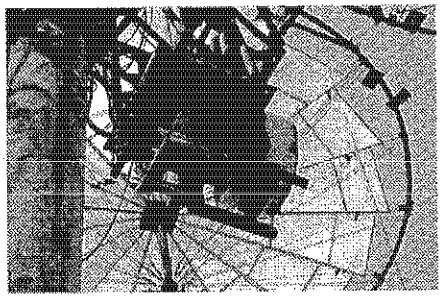


R&D Fabrication: Worker at the first small fabrication shop in Delta, Utah.

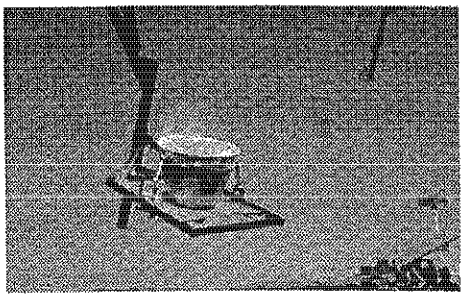
2011—2012



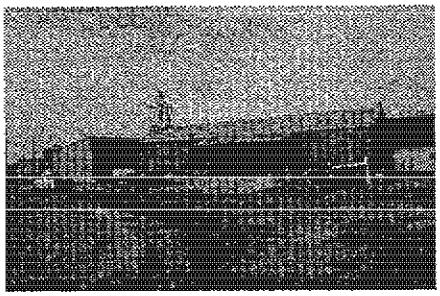
Field Testing: The original design had multiple solar towers in series connected driving a single turbine on the ground. In an effort to drive down construction costs a turbine was mounted directly to a single tower for use by only that tower.



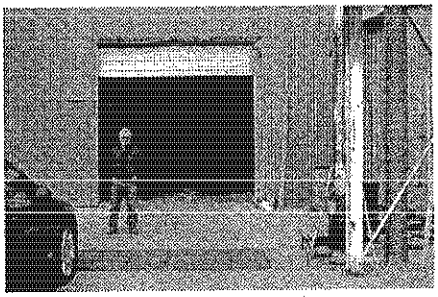
Field Testing: The tower-mounted concept worked but did not end up saving any time or money on construction so we went back to the original in-series model.



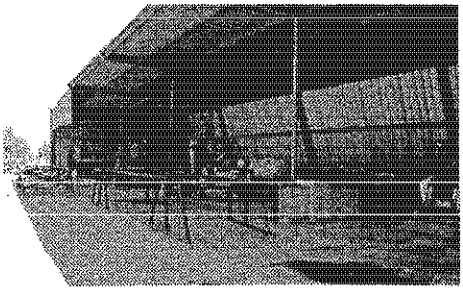
Field Testing: By adding the parabolic heat concentrator, we were able to achieve focal point temperatures nearing 3,000 degrees F.



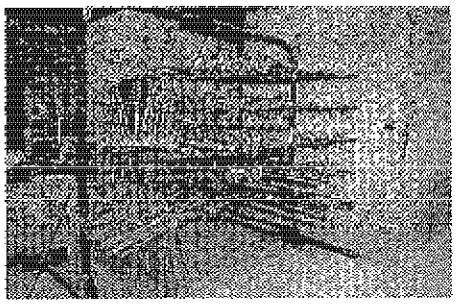
Early Manufacturing: In early 2012 an old warehouse was purchase in Delta, Utah near the solar site.



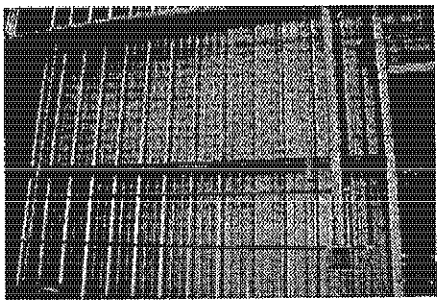
Early Manufacturing: The warehouse's electrical system was upgraded to accommodate all of the machinery that would be added to convert it into a manufacturing plant. Shown is Neldon Johnson at one of the truck doors.



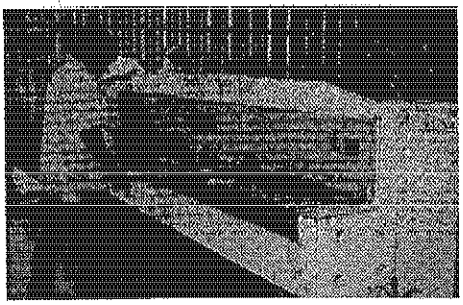
Early Manufacturing: The outside 3-walled building would later be converted into a pipe-cutting and pipe-bending operation.



Early Manufacturing: Light fabrication completed on one of several R&D phases on solar lens framing.

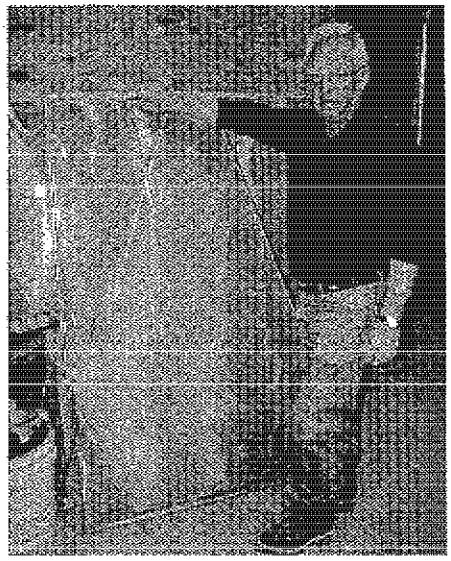


Early Manufacturing: The walls had to be outfitted with welding stations along with electrical and compressed air outlets.

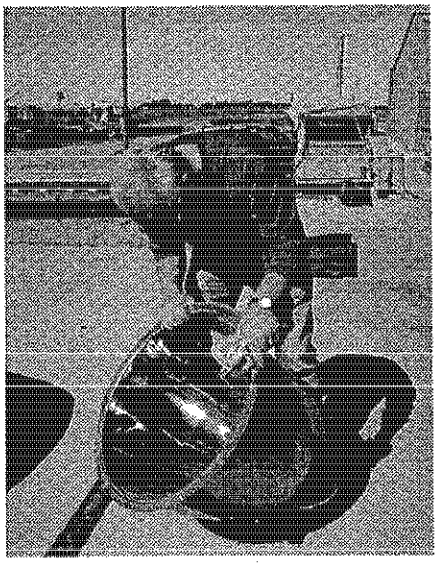


Early Manufacturing: A worker cutting metal in the new manufacturing plant.

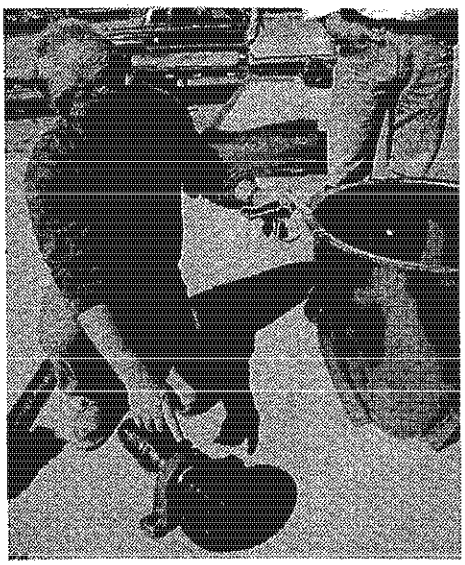
2011-2012



Early Manufacturing: Neldon with one of the earlier versions of a framed solar lens.

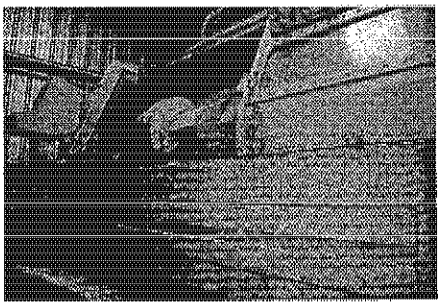


Early Manufacturing: Neldon demonstrating how the heat concentrator focuses the suns heat.

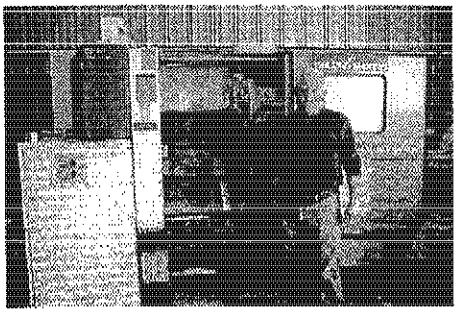


Early Manufacturing: Neldon Johnson with the parabolic heat concentrator and heat collector.

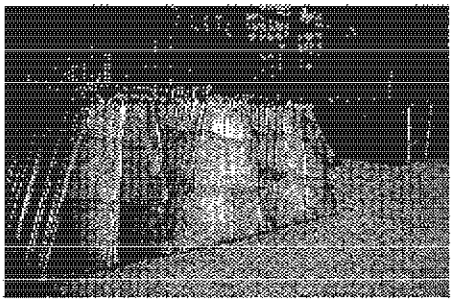
Early Manufacturing: Neldon with a workman on designing a framing procedure.



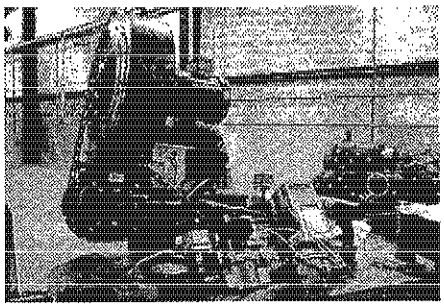
Early Manufacturing: Many pieces of automated heavy machinery was purchased and delivered to the manufacturing plant. Shown is a CNC Lathe for manufacturing heat exchangers.



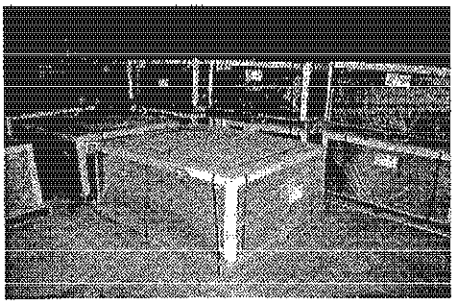
Early Manufacturing: Neldon Johnson with the newly acquired CNC Lathe for manufacturing the jet-propulsion turbine.



Early Manufacturing: This is the November 2012 model of framed lenses during the R&D phase.

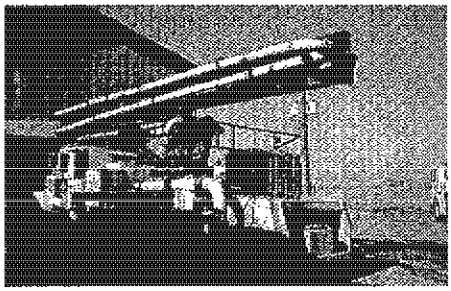
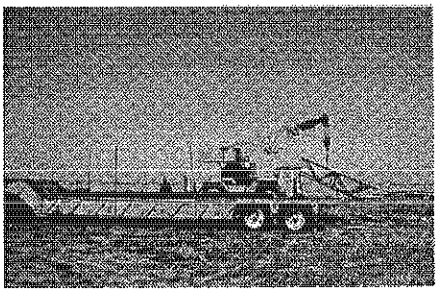
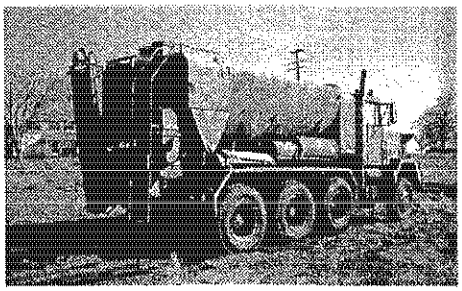
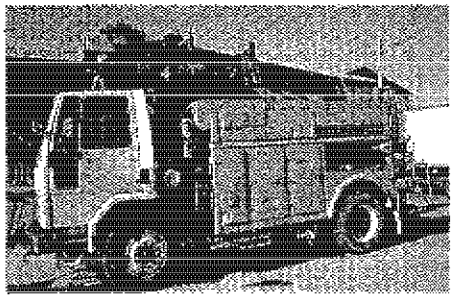
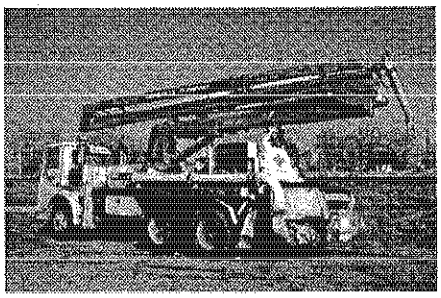
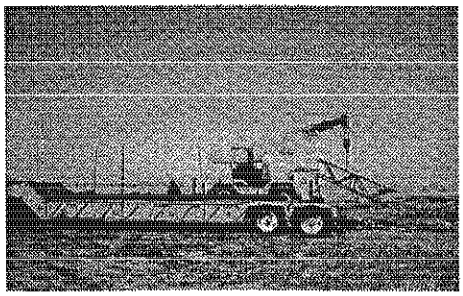


Early Manufacturing: The turbines are designed to run off of solar heat and any other heat source. Shown is a biomass burner.

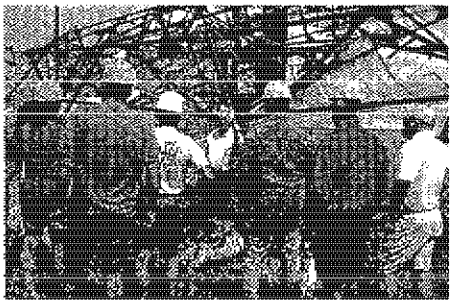


Early Manufacturing: Pallets of solar lenses shipped by Lucite International to the Delta manufacturing plant.

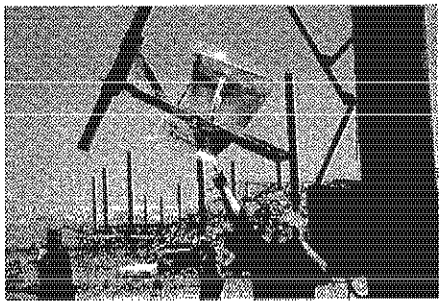
2011-2012

Construction Equipment was purchased.

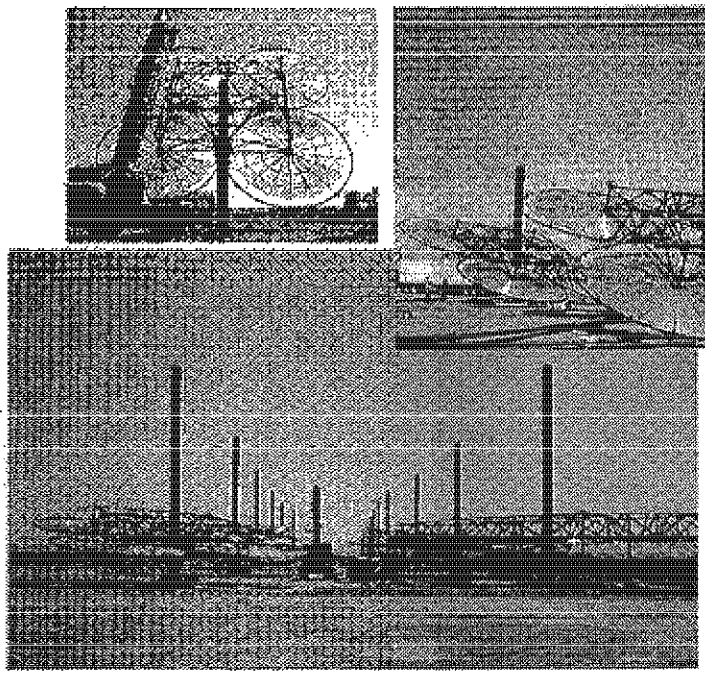
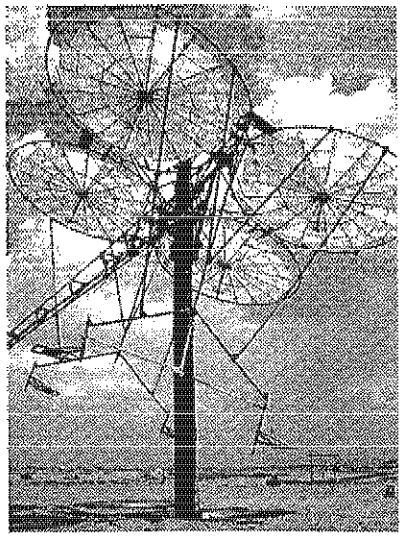


Tours: Neldon Johnson showing a 2011 tour group the R&D development stage of the solar towers.



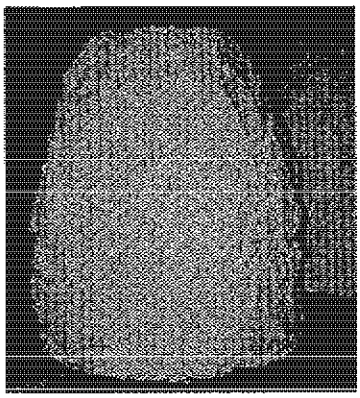
Field Testing: Neldon Johnson demonstrating the intense heat at the heat concentrator.

Field Construction: Manufactured components being delivered and stacked.

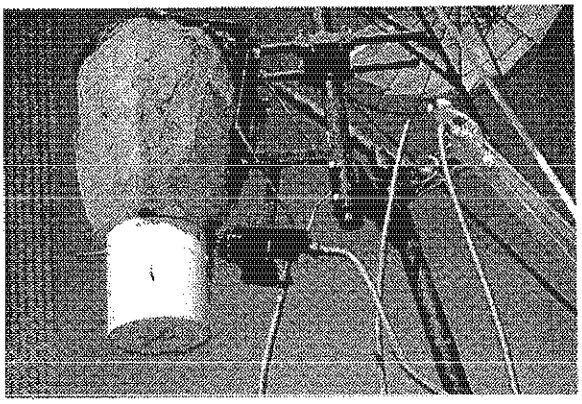



Constructing an IAUS Solar Field

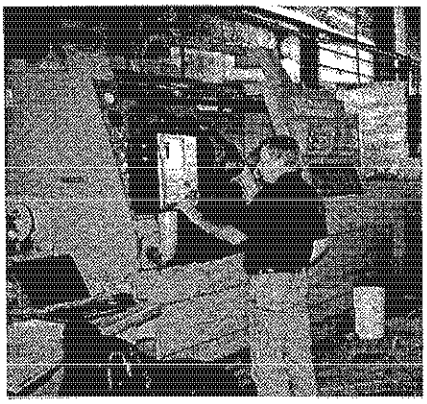
2013



Manufacturing: Insulated heat concentrator.



Installation: Mounted insulated heat concentrator with protected heat collector.

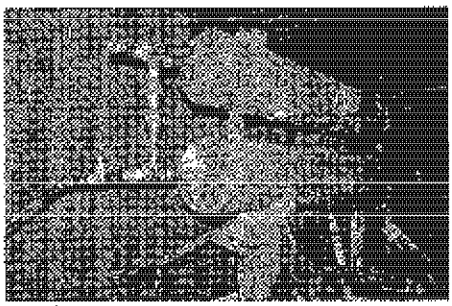


Manufacturing: Outside engineer certifying one of our CNC lathes .

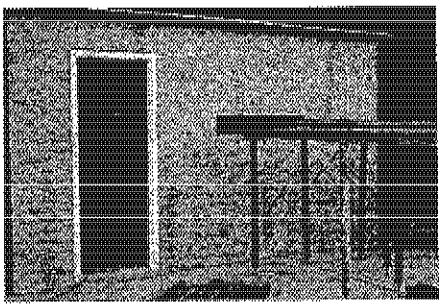
Prototyping: Early prototype of the hydraulic dual-axis tracking system.

Installation: Delivering insulated pipes from the manufacturing plant.

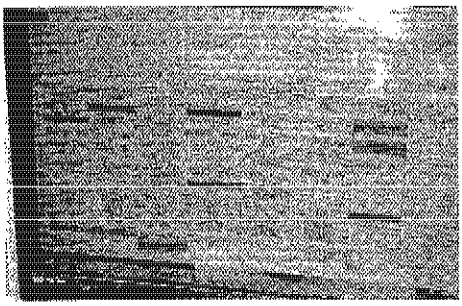
Installation: The biomass container is on the left and the solar energy container on the right.



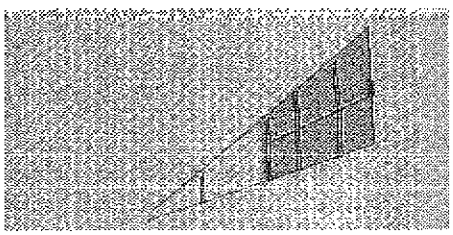
Prototyping: Prototype of our breakthrough heat exchanger.



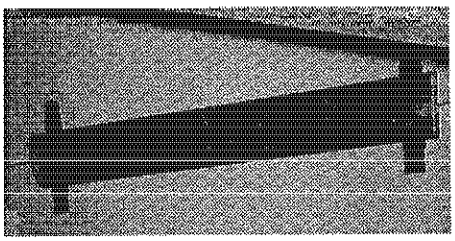
Manufacturing: Installed pipe-bender with insulated housing.



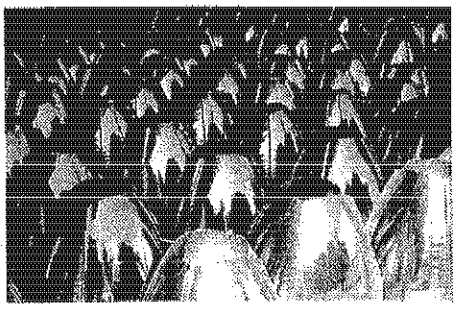
Manufacturing: Detailed engineering data of the heat-exchanger.



Manufacturing: 3D CAD design for our harmonics bracing for solar lenses.

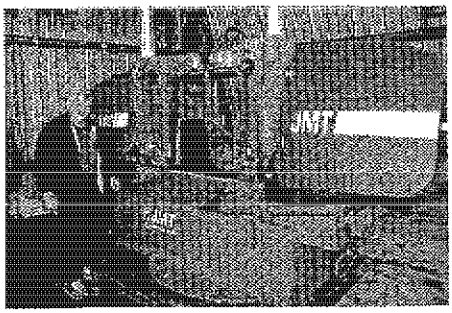


Manufacturing: 3D CAD design for pipeless heat exchanger.

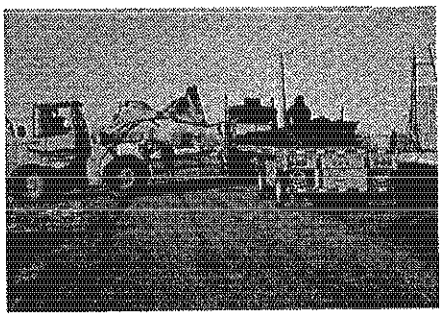


Manufacturing: Mass producing the heat concentrators.

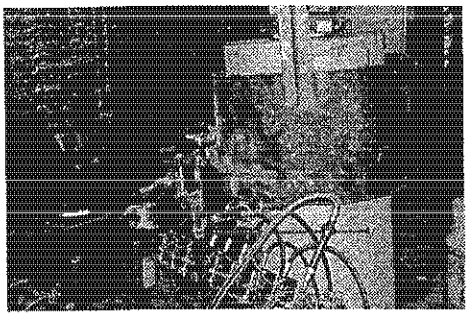
2014



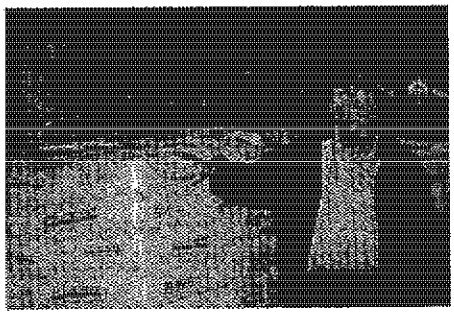
Manufacturing: New robust pipe cutter delivered and installed can cut through 5 pipes at a time.



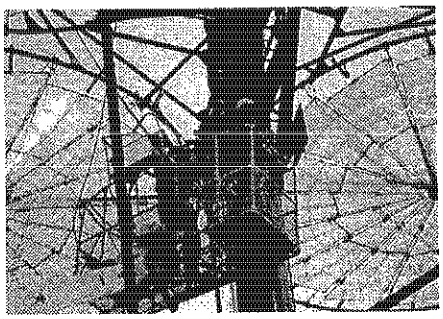
Manufacturing: Truckloads of pipe were bought at auction and shipped to the manufacturing plant.



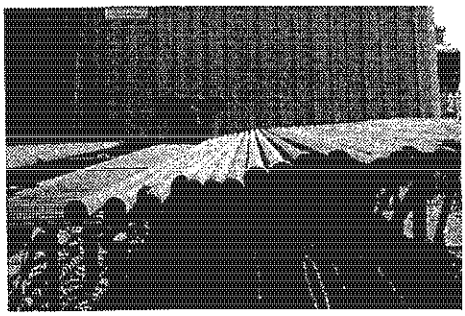
Manufacturing: The dual axis R&D station at the manufacturing plant.



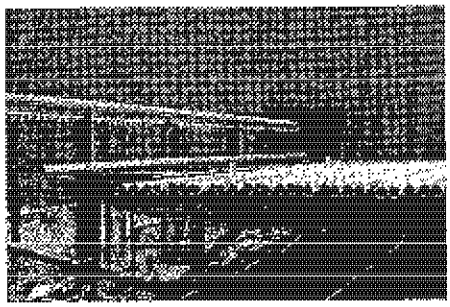
Manufacturing: Many tours were conducted by Greg Shepard in 2014. Here Greg Shepard is explaining the insulation material imported from Turkey.



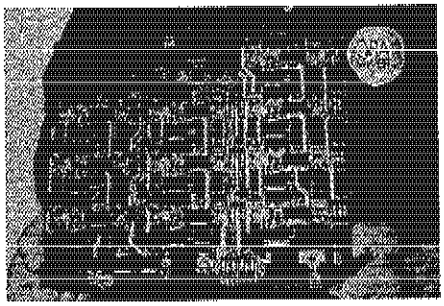
Manufacturing: Jeremy installing the new and final ram for the dual-axis solar tracking system.



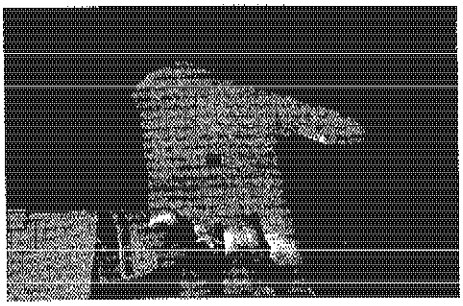
Manufacturing: The automated system for feeding pipe to the cutting machine.



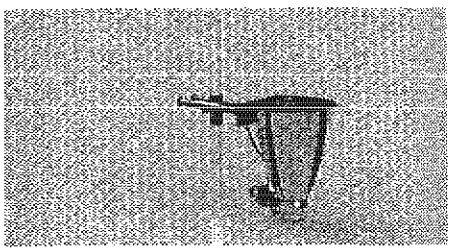
Manufacturing: The automated system for feeding cut pipe to the pipe bender. They red rams underneath lift the pipes up to the feed system.



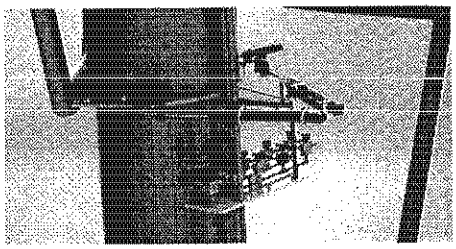
Supporting Technology: Our dynamic voltage controller was designed to eliminate the need for expensive coils and inverters. A chipset and circuits can receive a fluctuating voltage and output one, or multiple, designated set voltages.



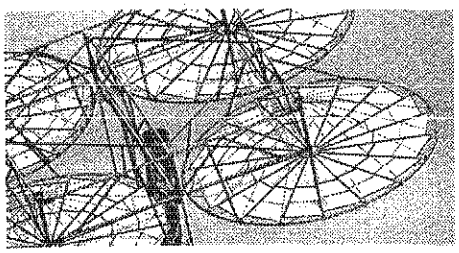
Prototyping: Prototyping began on concentrated photovoltaic (CSP) designs using our solar lenses in conjunction with our dynamic voltage controller and gallium photovoltaic chips.



Manufacturing: Completed 3D CAD design for our heat collection assembly.

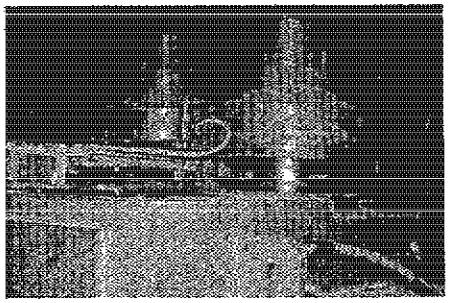


Manufacturing: Completed 3D CAD design for our hydraulic dual-axis solar tracking system.

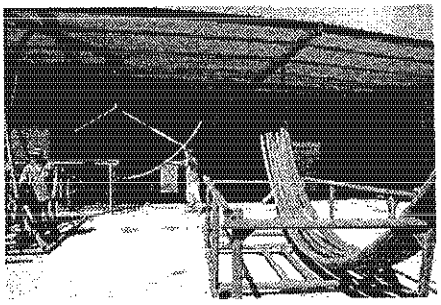


Manufacturing: Completed 3D CAD designs for our solar towers.

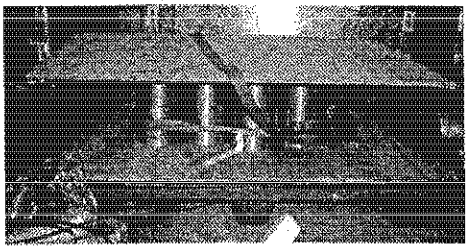
2014



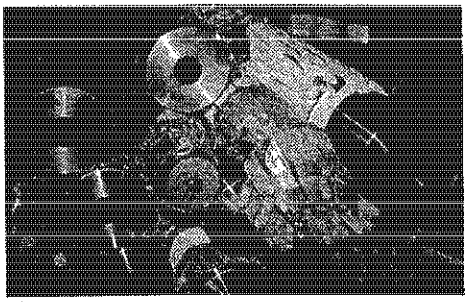
Manufacturing: Our pipe bender has been programed and an automatic feeding system has been added to increase productivity.



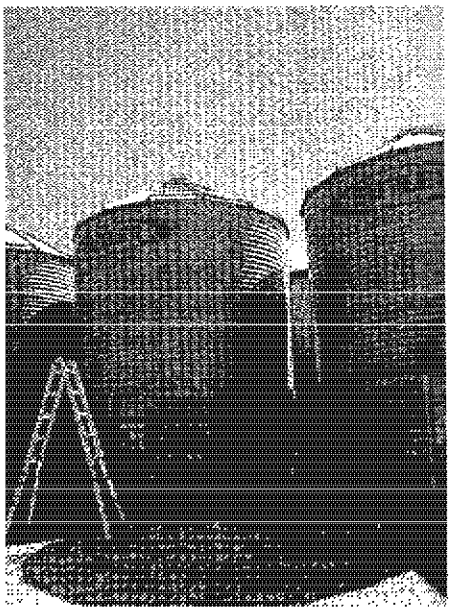
Manufacturing: Bent pipe hoisted by a crane to be put into a container for delivery.



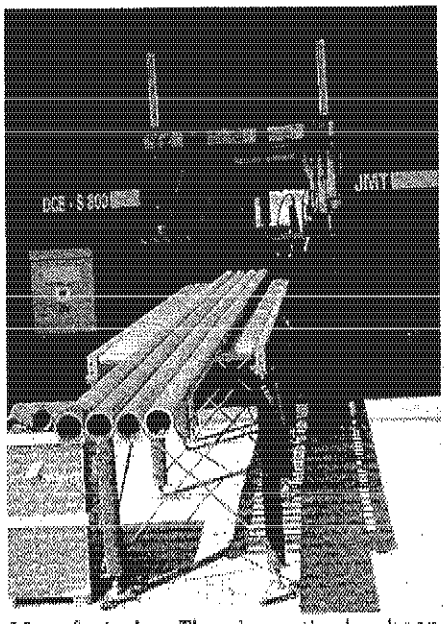
Manufacturing: Jet-Propulsion Turbines are now in inventory. Shown are the outer casings of the turbine.



Manufacturing: Shown are inner casings of our Jet-Propulsion Turbines. There are now 25 turbines in inventory.

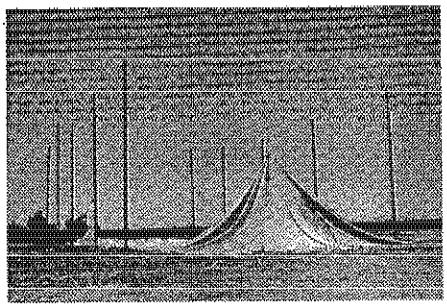


Manufacturing: Three silos at the manufacturing plant are now connected to become clean rooms that will produce the world's first commercially-viable concentrated photovoltaic (CPV) technology.

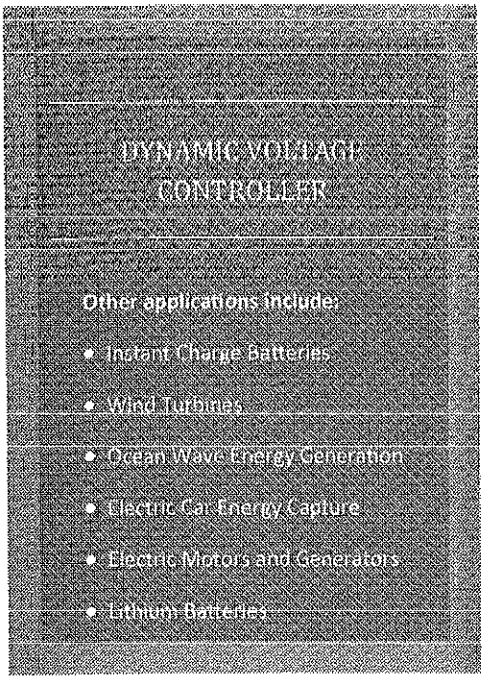


Manufacturing: The pipe cutter has been programed and an automatic feeding system has been added to increase productivity.

Installation: Our R&D towers being converted to commercial spec units.



Installation: These two canvas buildings will add 20,000 square feet of construction space at the Delta, Utah project site. Twenty-five construction workers will be employed to install twenty towers a day or close to two megawatts a day. To install that many towers/megawatts per day with only 25 workers is unprecedented in the history of energy construction. Target date to begin is before summer's end in 2014.



New Solar Breakthrough May Compete with Gas
www.iaus.com

International Automated Systems, Inc. [IAUS] has developed a unique solar power technology that it believes will be the first to compete with gas, coal, and oil. Two primary issues have prevented solar power from replacing fossil fuels: The first obstacle is the high cost of equipment. Currently, solar power equipment is far too expensive to compete with fossil fuels. The second is production capacity. Even if the price of today's solar power technologies was in line to compete with fossil fuels, the production capabilities are so limited it would take decades to even scratch the surface of replacing fossil fuels.

IAUS's new solar power technology presents a breakthrough on both fronts. The company's unique solar power technology is priced to replace fossil fuels, and its annual production capabilities marginalize any other solar technology- making it perhaps, the energy sector's holy grail in a market currently grossing more than $3 trillion annually but fueled by less than 1% solar.

IAUS Solar Technology- What Makes it Different?

Plaintiff Exhibit
16

US-001836
US001836

(Figure 1: IAUS Solar Tower with Four Circles of Panels)

IAUS Solar Panels- IAUS has developed a very unique thin panel with lens-like properties that focuses the sun's energy to a high-temperature focal point on a receiver. The heat is converted to steam which is then used to generate electricity. IAUS'S unique panels are inexpensive, efficient, and low maintenance. Typical solar reflector panels (e.g. solar dishes, troughs, heliostats) are very expensive and require a great deal of periodic, manual fine-tuning to sustain a solar focal point on its target. Once installed, IAUS'S panels need no manual fine-tuning to maintain its focal point. This significantly reduces the cost of plant operation.

In addition to IAUS'S actual field tests, optical ray-tracing simulations have been conducted to verify the efficiencies of IAUS'S panel design. IAUS'S unique solar panels show efficiencies of over 90%. In the field, IAUS'S panels produce temperatures from 1,600-1,800 degrees Fahrenheit while tracking the sun.

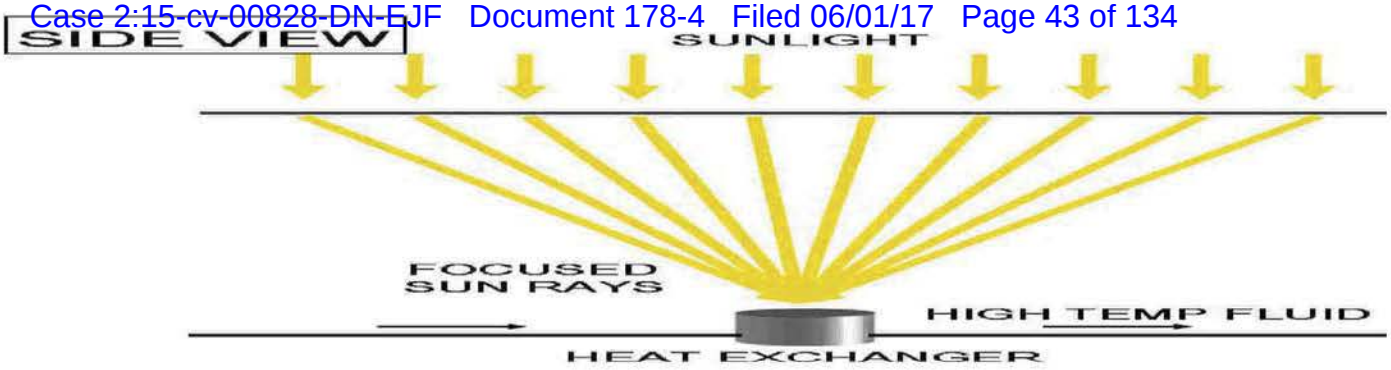
By adding the new compound parabolic concentrator IAUS's temperature can exceed 2500°F.

Seventeen panels fit together in a circular pattern which spans approximately 39 feet in diameter. Four of these circles are mounted to a single tower equipped with dual-axis, automated tracking. The panels follow the sun east to west, north to south, producing higher number of hours than single axis concentrator solar power (CSP) systems and flat-plate mounted Photovoltaic (PV) systems.

IAUS'S unique panels are made up of a very durable, engineering grade monomer material that has been known to endure extreme weather conditions for more than 60 years with low degradation. IAUS'S panels are 100% recyclable.

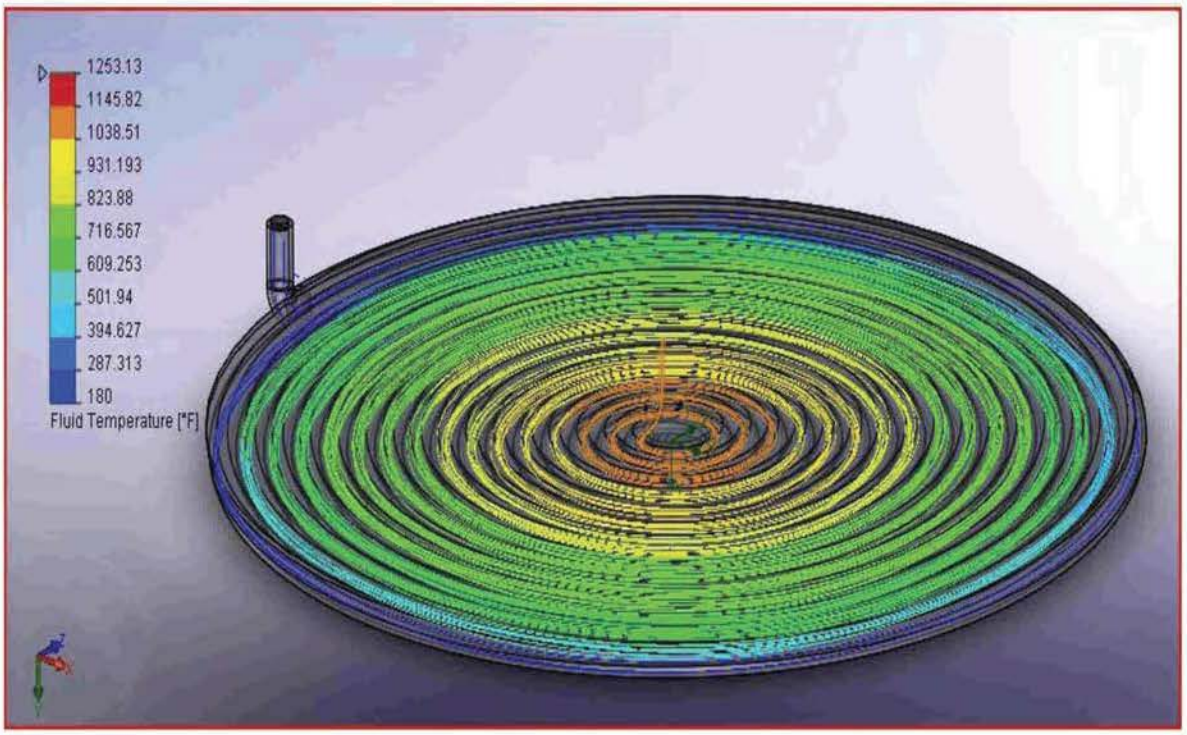
The panels are also designed to rotate about themselves to reduce wind load on the system. As the wind approaches some predetermined velocity the panels will break loose and turn about there axis. This prevents the plastic panels from breaking while reducing wind load on the mechanical structure. This has the added advantage of reducing the metal in the mechanical structure thus reducing the cost of the structure. This also reduces maintenance cost in replacing broken lenses.

IAUS Receiver- Each circle of panels or lenses has only one receiver. There are four circles of lenses and four receivers per dual-axis tracking tower. The receiver is a heat-exchanger that directly transfers the heat from the high-temperature focal point into water. Water flows into each receiver until it reaches a temperature between 1,000-1,100 degrees Fahrenheit.

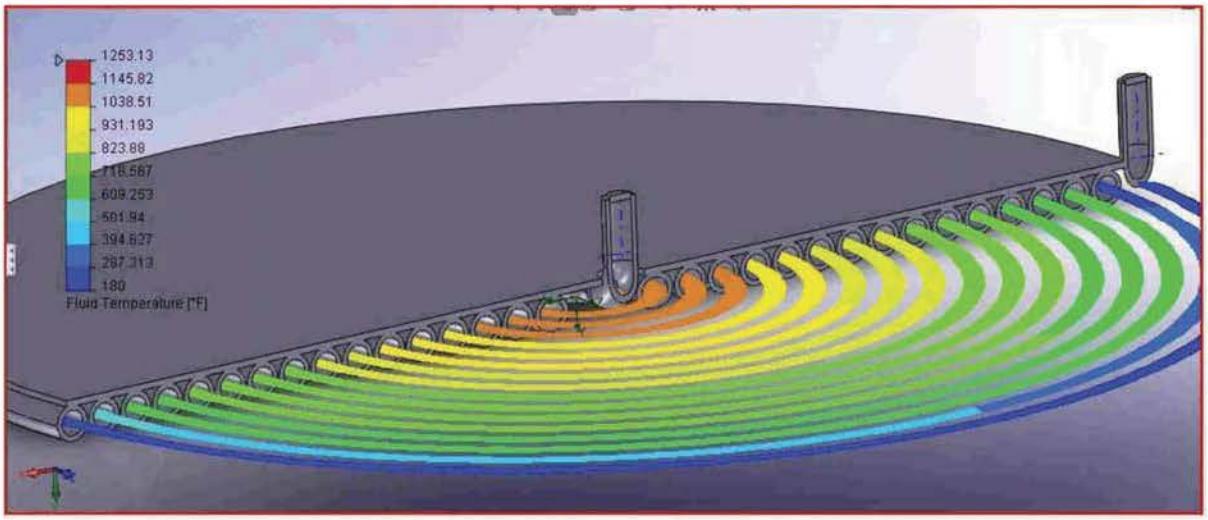


(Figure 2: Side view rendition of one of IAUS'S circle of solar panels or lenses focusing on a solar receiver heat exchanger)

In addition to performing field tests on its receivers, independent thermal dynamic and hydraulic flow simulations were conducted to verify flow rates and thermal efficiency. These numbers supported that IAUS'S receiver has a heat-absorption rate efficiency of over 90%.



(Figure 3: Top cut section view of water absorbing the sun's heat through IAUS's solar receiver heat exchanger)



(Figure 4: Middle cut section view of water absorbing the sun's heat through IAUS's solar receiver heat exchanger)

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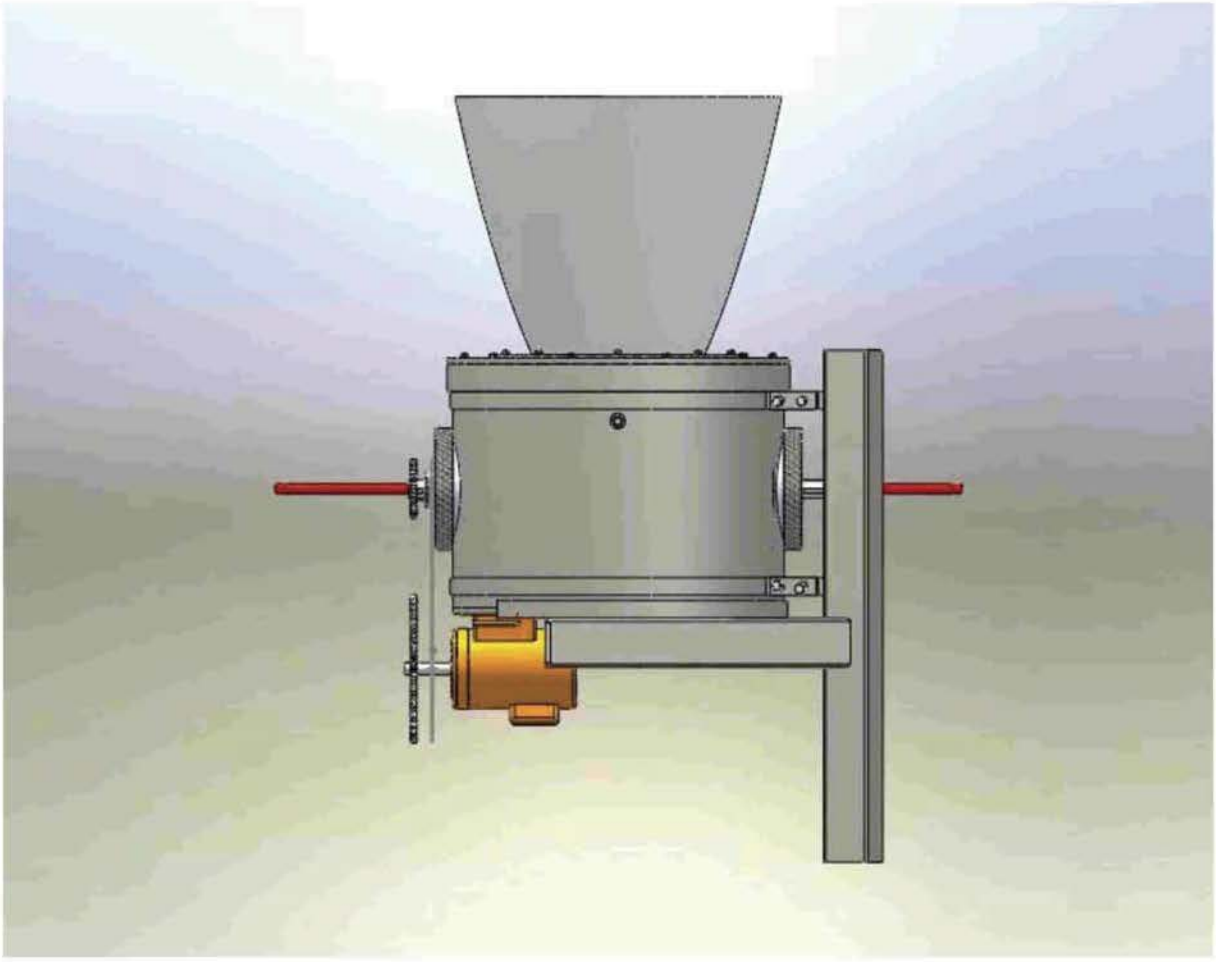


(Figure 4.1 New solar receiver showing the concentrator along with the movable heat exchanger)

New concentrator and heat exchanger- Referring to fig 4.1 this is the new heat exchanger design featuring the concentrator with the new heat exchanger and the rotation mechanism. The top portion is the concentrator which takes the incoming rays from the lens and further concentrates the suns rays which also increases the temperatures that hit the heat exchanger portion. The heat exchanger rotates to control the temperature at any given point on the heat exchanger. The rotation also eliminates hot spots on the heat exchanger reducing the chance of melting or burning the heat exchanger. This also provides a more even temperature exchange between the heat exchanger and the heat absorbing medium inside.

This heat concentrator and heat exchanger combination also reduces the infrared radiation coming off of the heat exchanger.

This heat concentrator and heat exchanger design also allows the solar energy to be used to convert zinc from zinc oxide without using a hydrocarbon compound to isolate the oxygen atom from recombining with the zinc.

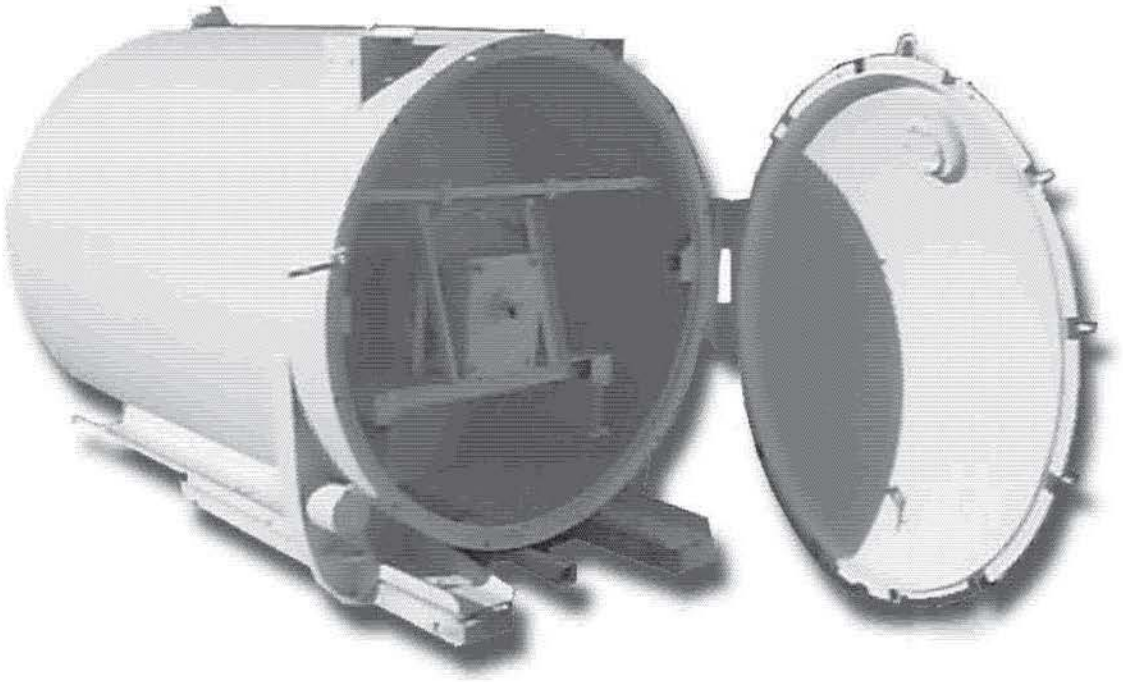
IAUS Turbine Eliminates Need for Boiler- IAUS'S solar thermal collectors can easily work with either a traditional steam turbine, or with IAUS'S new, proprietary turbine. IAUS'S proprietary turbine steam cycle does not need an expensive, high-maintenance boiler. Instead IAUS'S solar collector system can feed the super-heated water directly into IAUS'S turbine.

IAUS'S solar power technology successfully operates without a boiler or pressure vessel because it utilizes a unique, bladeless turbine design developed by IAUS to drive the electric generator. IAUS'S turbine runs on both high quality and low quality steam with a bi-phase flow capability. Unlike traditional turbines, the high-temperature water does not need to pass through an expansion tank to flash to steam prior to IAUS'S turbine. Instead, IAUS'S bladeless propulsion turbine can run directly on super-heated, high-pressure water. The expansion or phase change (flashing) from water to steam happens right at the nozzle of IAUS'S turbine.

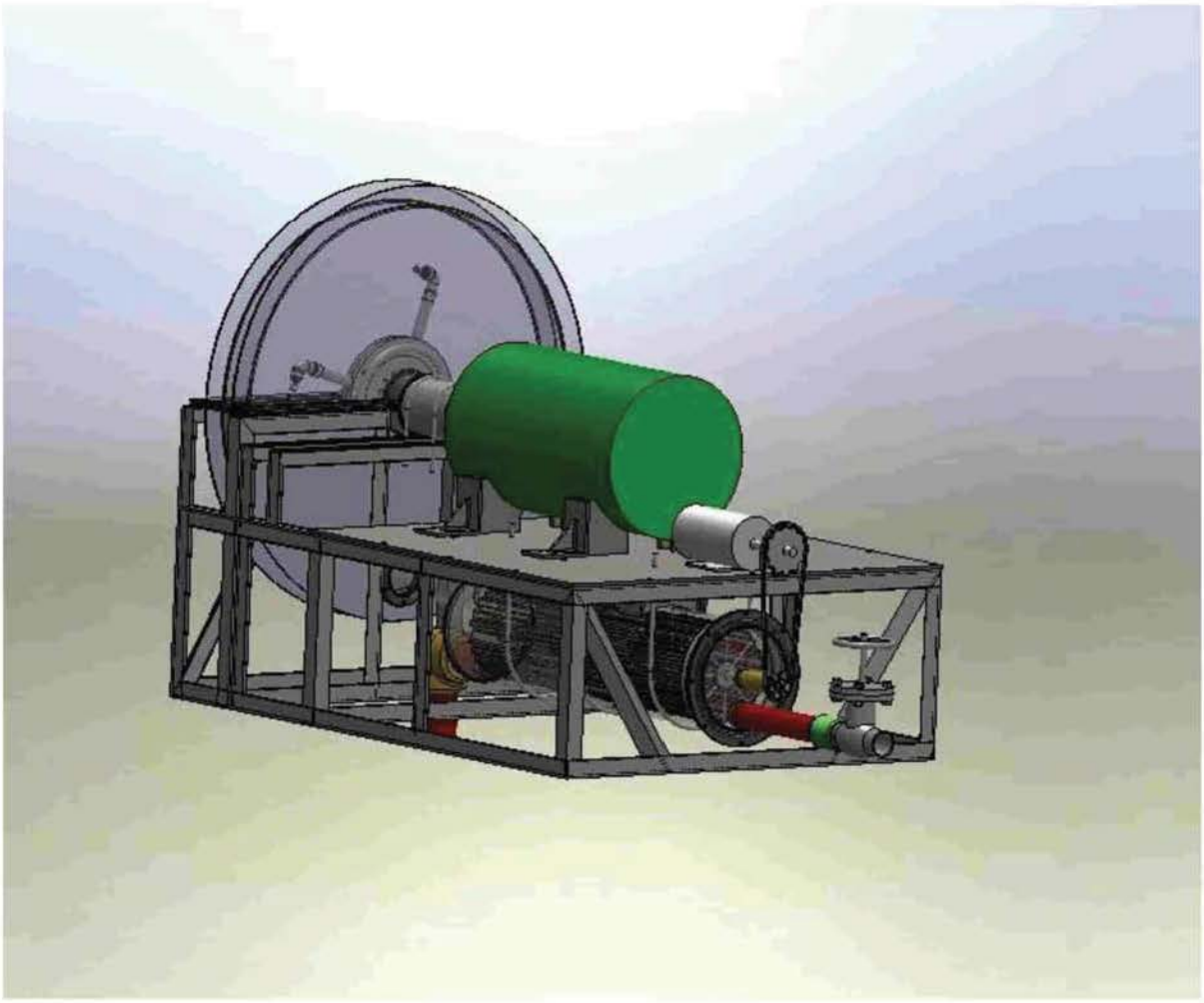
In a conventional power plant, the water is boiled and flashed to steam in a large, high-pressure tank called an expansion tank. The steam is then sent through a series of super-heating stages. The expansion tank and steam channels are large pressurized vessels that make up the boiler and must be regularly certified. If something goes wrong with this traditional power plant boiler system, it can explode like a bomb. Each weld must be routinely X-Rayed and the entire system continuously monitored with sophisticated and expensive equipment to ensure safety and the output of high-quality steam.

IAUS's system does not need an expensive and sophisticated boiler like this. Instead IAUS's turbine uses a series of smaller, high-pressure tubing, which is much safer, less expensive and easier to manage; and, it makes the Balance of Plant (BOP) steam production and monitoring equipment less complicated. These are significant advantages over traditional boiler systems required by conventional turbines.

Propulsion Turbine- As previously mentioned IAUS'S solar collector system can operate with either a traditional high-end steam turbine or IAUS'S own proprietary steam turbine. There are many advantages to IAUS'S unique turbine. Rather than relying on turbine blades to spin the turbine cylinder, IAUS's Propulsion Turbine is designed to turn the cylinder without blades. IAUS'S turbine efficiencies are very similar to expensive, high-end, multi-stage turbines; however, IAUS'S turbine is low-cost and operates minus most of the expensive surrounding components and maintenance issues.



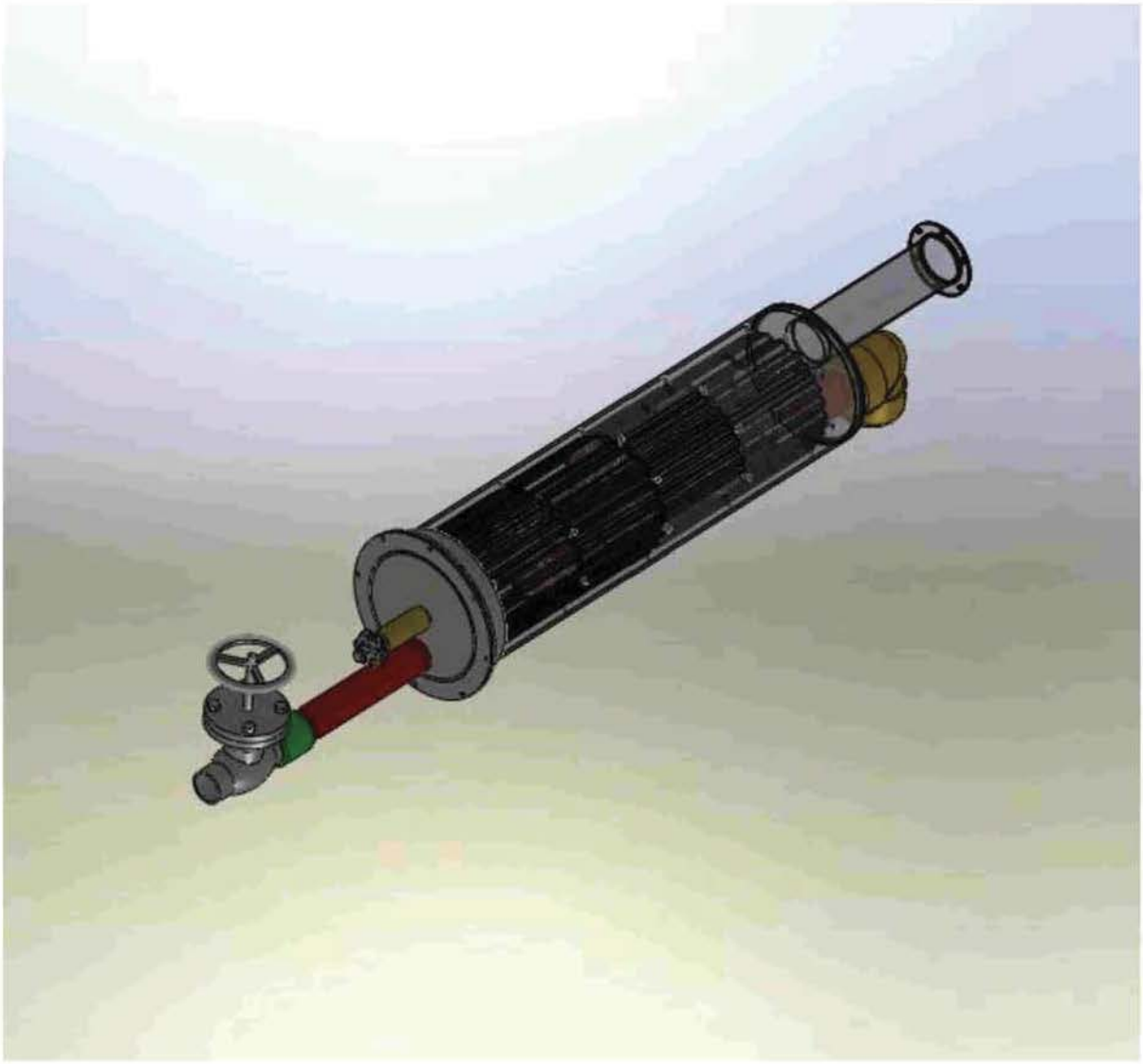
(Figure 5: IAUS bladeless propulsion turbine)



(IAUS's bladeless turbine)

Traditional turbine performance relies upon the environment within its blade chambers. Super-heated, high velocity steam particles are continuously striking the titanium turbine blades to turn the shaft. If steam condenses on the blades, a sharp drop in efficiency and damage to the turbine can result. Traditional multi-stage turbines require dry, high-quality steam.

IAUS's new turbine is structurally unaffected by low quality steam. It blows the energy away from its components instead of on them to turn the shaft. It is smaller than traditional turbines, less expensive, and requires very little maintenance. Unlike traditional turbines, IAUS's turbine can operate without corrosion or system failure on both high quality and low quality steam.



(*Figure 5.1 this is the new heat exchanger that recovers the steam from the turbine)*

Cooling Towers- Because of the unique nature of IAUS's turbine, the actual working chamber of the

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turbine can be used as both a direct heat-exchanger and water recovery system on the condensing side. This increases the efficiency and lowers the sophistication and cost of a dry cooling tower. IAUS's system can recycle virtually all of the water used in the process of power production instead of being wasted into the atmosphere like with wet cooling towers that are typically used in the condensing cycle of a traditional power plant.

Cooling towers are a critical component of traditional turbines that help maintain a sophisticated delicate balance. These towers cool the steam exiting the turbine, creating a vacuum. The towers must maintain a consistent low temperature otherwise the traditional turbine potentially faces both a sharp drop in efficiency and serious damage.

As previously noted, IAUS's unique turbine has no blades to corrode, therefore, the expended steam and water can be condensed within the working chamber of the turbine using a simple air-cooled recovery system. This water is re-pressurized by a high-pressure pump and re-circulated through the solar field to repeat the cycle. Very little water is wasted, unlike wet cooling towers.

Wet cooling towers, at a typical coal-fired power plant, waste enormous amounts of water. A family consumes as much water using electricity as they do in everyday water usage. Because IAUS'S turbine can operate without traditional wet cooling towers and recycles the water in a closed loop, it is perfect for areas of the Southwest where water conservation is very important.

Also, because IAUS'S turbine does not require such a delicate balance on the cooling side, IAUS power plants can operate a highly efficient co-generation cycle. The excess heat that is normally wasted in the production of electricity at a typical power plant can instead be put to some other use in conjunction with IAUS's power plants. The thermal and electrical load can easily be adjusted up or down depending upon the need, to best utilize the heat byproduct from the power plant. Putting the heat byproduct to use can increase the efficiency of the plant from approximately 20% up to nearly 70%. A traditional turbine is a poor design for co-generation. It creates difficult BOP consequences including the accelerated corrosion of the turbine itself.

Salt water or brackish water or polluted water recovery using bladeless turbine- In addition to not using water to cool the steam the new IAUS's turbine can also purify salt water, brackish water and or polluted water at little additional costs.

IAUS Solar Breakthrough Technology can Make Fresh Water from Sea Water for Free While Powering a City

Unlike photovoltaic (PV) solar panels, IAUS's new solar breakthrough technology can utilize waste heat to desalinate sea water for free. Waste heat is a byproduct of IAUS's solar power process as it produces electricity for the grid. Due to the unique design of IAUS's patented turbine, it utilizes a technique called

vapor compression in the heat recovery process. Vapor compression is becoming a widely-used means for distilling water.

Utilizing the waste heat from an IAUS solar field to produce fresh drinking water increases the overall efficiency of the system to nearly 70% peak power production without a significant increase to the price. Fresh water has become a serious global issue and is predicted to be more perilous than forecasts of current energy issues—both are daunting without renewable energy advancements. In some parts of the world, fresh water is already becoming equal or more expensive to obtain than fuel.

Currently, desalinating sea water costs approximately $800-$1600 per acre foot of water. This price is about 10-20 times greater than the cost a typical farmer currently pays per acre foot to irrigate his crops. In coastal areas around the globe an IAUS solar plant could produce electricity from the sun at an economical price, whereupon the utility company could sell the power to citizens--while at the same time--desalinating water as a waste byproduct for free.

IAUS solar desalination gives IAUS's product a unique edge over other technologies in coastal areas wherein fresh water is becoming a problem due to inland populated areas growing. This ability can greatly help inland communities as well. Some project that the State of Utah will exhaust its Colorado River water shares by the year 2020. Southern Nevada has long been attempting to increase its water shares from the same river. If Southern California coastal cities that are somewhat dependent upon the Colorado River were to utilize an IAUS solar desalination plant—more water shares could be available for Utah, Southern Nevada and others.

Electric Generator- IAUS'S turbine can turn either an induction or synchronized generator to produce AC power that is thereupon connected to the grid through a simple, inexpensive cut-off switch. A traditional turbine drives a synchronized generator and requires a very expensive, instantaneous cut-off switch control mechanism. This is another reason the BOP system for a traditional turbine is very sophisticated. If the supply steam is inadvertently reduced, the grid can turn the electric generator into a motor pulling for more steam supply than is available like a vacuum whereupon the turbine blades will cavitate, potentially causing them to shatter out the chamber like an explosion. This is extremely dangerous.

IAUS's bladeless turbine presents no such danger. The instantaneous shut-off mechanism in the BOP system for IAUS's turbine is not critical to the same degree and is therefore a simpler design and much less expensive. IAUS'S less sophisticated BOP controls not only save a great deal of cost in set up, they can also reduce O&M costs by nearly 1-2 cents or more per kWh.

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IAUS'S turbine can be sized to virtually any generator, big or small and can start and stop instantaneously without any cavitations. This allows IAUS to construct its solar plant in smaller 1MW-10MW segments if desired. The turbines can be staged in and used only when needed, and they can be shut down at night. When using smaller plant segments, if one important component goes down, it doesn't shut down the whole plant. In contrast, a traditional turbine gen set would be a financial, operational and maintenance nightmare in multiple smaller sizes.

Each 1MW-10MW segment is self-contained and independent of the other. A 1 MW segment consists of approximately 20-25 towers that include 80-100 circles of lenses and receivers all powering a single turbine gen set and water recovery system. The IAUS plant design requires approximately 5-6 acres of land for every 1 MW of peak power capacity.

Comparisons to Other Solar Technologies

Photovoltaic (PV)

Currently, PV is the most expensive solar technology available. PV has advantages for very small, remote power needs, however, even if PV manufacturers are able to reduce costs with the prospect of thin-film or nano PV technology it still will not match the low cost and other advantages of IAUS'S system.

Hidden Costs of PV

Flat-Plate Installation- In addition to installed costs, PV has hidden costs. For example, advertised PV installed costs do not include dual-axis tracking systems. Therefore, a flat-plate mounted PV system measured during peak sun to be 1 KW ($7,000) of capacity actually produces nearly 30% less power annually than 1 KW ($1,500) of IAUS'S dual-axis solar technology.

Inverters- PV technologies produce DC power and therefore, require an inverter to covert DC to AC power. Inverters, regardless of how small or large cost about $500 per KW. While the inverter is usually included in the advertised, installed price of a PV system, it has a very limited life-span after which it must be replaced. The life-span for an inverter is roughly about 20 years. IAUS'S solar can produce either AC or DC power; therefore, IAUS'S system doesn't require an inverter which eliminates one of the front-end and back-end costs that come with PV systems.

Panel Replacement- In addition to inverters, PV panels also begin to degrade after 20-30 years and eventually need to be replaced as well. This means that after 30 years, when the equipment should finally be paid off and realizing the full benefits of free energy, the buyer will likely end up paying the entire cost of the solar plant all over again to replace it.

IAUS'S dual-axis solar tracking structure is made of steel and will likely hold up for more than 100 years. Also, IAUS'S actual solar panels are made of a material that has been known to last more than 60 years. However, if needed, the cost of panel replacement for an entire IAUS plant is approximately only 15%-20% of the original cost. The cost to replace the PV system after 20-30 years is virtually 100% of the original cost, which is literally repurchasing the entire plant all over again.

Maintenance Logistics- PV is more suited for residential installations than for utility-scale power plants. In fact, the U.S. Department of Energy has determined that solar thermal technology (not PV) is the most reliable solar power for utility scale power plants. While residential installations have benefits (especially in remote areas outside of the grid), they present different challenges. For example, a 100 MW utility scale solar power plant will power about 50,000 homes from a single location. Installation, part replacement, adjustment, maintenance, etc. can be done in one place. On the other hand, 50,000 homes with PV systems are like scattering 50,000 randomly located miniature power plants all over the map that also include remote locations for installation, part replacement, maintenance etc. Travel time becomes a significant cost, not to mention that each installation site is unique.

Energy Storage- PV systems can only store energy using batteries. Batteries are extremely expensive (about $600/kWh of storage) and have a very short life of about 5 years. Since IAUS'S system runs exclusively on heat, it can operate both as a hybrid power plant using other heat sources in addition to the sun such as biomass, natural gas, etc., or, it can store heat in a heat sink for continued operation after the sun has set. Unlike batteries, heat sinks are inexpensive (about $30/kWh of storage) and a properly designed heat sink will last virtually a lifetime.

Unlike IAUS'S technology, PV systems do not utilize the sun's heat. Since much of the sun's energy is heat, this energy is entirely wasted on PV systems. The heat byproduct from IAUS'S system after producing electricity can be utilized for a list of important uses- manufacturing and refining processes, desalination, heat storage, etc. When this heat is put to use, IAUS'S solar energy efficiency is improved again to more than 3-4 times the efficiency of PV systems.

Manufacturing- Currently, IAUS can produce approximately 350 MW of panels per year. It would cost a solar PV manufacturing company approximately $800 million to duplicate IAUS'S current annual production capacity. Within six months, IAUS can increase its annual capacity to 1,000 MW. Within a year, IAUS can increase its annual capacity to 2,000-4,000 MW. This annual solar panel production capacity would cost a PV manufacturing company a little more than $4 billion. To put IAUS'S production capabilities into perspective, one of the current leaders in PV manufacturing has an annual production capacity of 120 MW.

Environmentally Friendly- IAUS'S solar technology is also 100% recyclable. Today's PV systems using silicone are not.

Solar Thermal Mirrors

Mirrors Require Tighter Tolerances- Solar thermal mirror technology (also called Concentrated Solar Power (CSP)) has been around for decades (e.g. solar dishes, troughs, heliostats). IAUS'S technology is

also a CSP system, and therefore, it operates under similar thermal dynamic principles. However, IAUS does not use expensive mirrors. Therefore, IAUS'S panels refract the sun's rays instead of reflect. The error ratio of reflecting the solar rays from a mirror to its target is four times greater than refracting the rays like IAUS'S system does. Therefore, mirror-based CSP support trusses, hinges and tracking systems require significantly tighter tolerances than IAUS's to maintain focus and remain correctly dialed in.

Shadowing Effect of Mirror Receivers- Also, since IAUS'S receiver is behind its panels instead of in front like mirror-based CSPs, it is far less expensive, easier to manufacture and install, and casts no shadow on the panels. IAUS has a smaller insulated receiver with only one flat side exposed to the concentrated focal point, yet it still maintains a greater surface area ratio between focal point size and target than mirror-based CSPs. This minimizes the possibility of the sun's rays missing the receiver. Attempting to increase the ratio between the focal point size and surface area on a mirror-based CSP system in order to minimize losses and increase efficiency would require a larger receiver and a larger receiver would block more incoming sunlight to the mirrors.

Maintenance Issues of Traditional Turbine- The lowest cost, mirror-based CSP systems use a traditional steam cycle to turn a conventional, bladed steam turbine and generator. As mentioned above, IAUS'S steam cycle does not require large expansion tanks to superheat the steam; it does not require water-cooled cooling towers to condense the steam; and it does not require the expensive and sophisticated monitoring devices for BOP due to the rugged durability of IAUS'S turbine under extreme environmental shifts.

The absence of both an expansion tank, traditional turbine and cooling towers not only significantly reduces the overall cost of equipment and installation, but also reduces daily operations and maintenance costs which translate into a lower wholesale price for electricity per kWh produced.

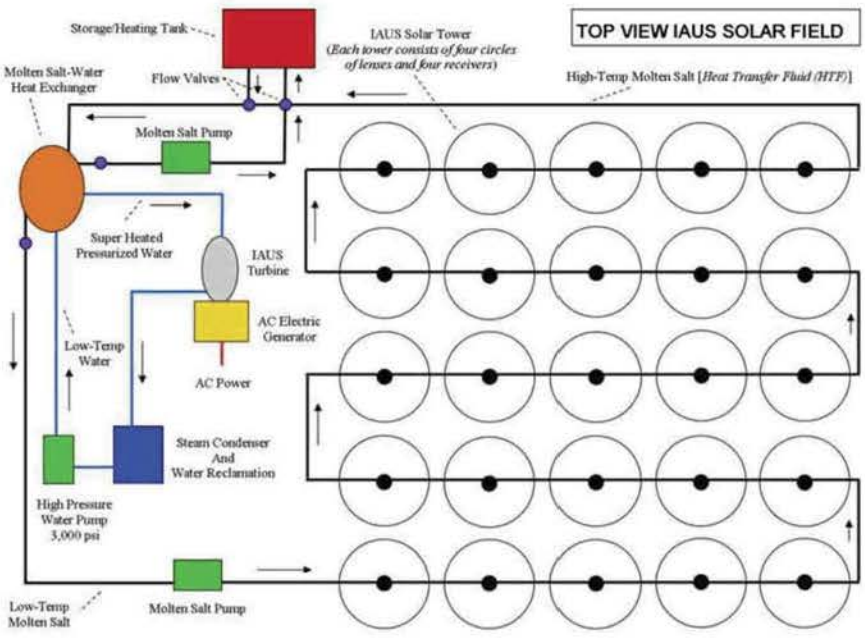
Not Much Room for Price Reduction- After decades of development, current mirror-based CSPs have streamlined down to what appears to a bare minimum cost without many more areas, if any, to cut prices. Each additional refinement or advancement to today's mirror-based CSPs from here on out will likely have an inconsequential impact on lowering the price. IAUS expects to be less than half of the cost of today's CSP technologies, with room to strip down more costs in the future.

CSP Manufacturing Capacity- Manufacturing capacity is a very limiting factor with CSP technology. Most CSP technology companies have a lower annual production capacity than PV manufacturing companies.

Status of IAUS'S Solar Technology

IAUS is poised to enter the market in full production with its commercialized product this year. IAUS has already successfully completed a mass-production test run of approximately 2 MW of IAUS solar panels. The dual-axis tracking structure has been constructed and designed for mass-production as well. IAUS'S proprietary software that controls the dual-axis tracking mechanisms has been completed. IAUS'S proprietary controls follow the sun, monitor wind-speed, and measure the sun's energy per square meter. Several generations of the turbine have been designed and tested.

(Figure 6: IAUS solar field under construction)



IAUS Technical Overview

Introduction

Concentrated solar power (CSP) technologies focus the sun's heat and convert it into usable energy such as electricity. After more than 20 years of continuous operation, CSP is not considered an experimental technology. Extensive long-term data has been collected from various CSP technologies, to both identify and quantify the definitive factors that affect the annual solar-to-electric efficiencies and economics of a utility-scale CSP plant under actual, real-world circumstances. In one extremely detailed study by the U.S. National Renewable Energy Laboratory (NREL), scientists Sargent and Lundy concluded "that CSP technology is a proven technology for energy production."

Having developed several generations of its unique CSP technology, IAUS is familiar with the material and construction costs of its equipment. Based upon the revolutionary low cost of its new product, IAUS estimated that its proprietary CSP technology needs to reach only a 5% net annual solar-to-electricity efficiency to match the dollar for dollar cost of the currently lowest priced competing CSP technology available. This 5% efficiency benchmark is a reasonable target to reach, being more than 60% below industry standard.

The following report is not intended to detail the low cost of IAUS's unique breakthrough CSP technology, but rather to discuss its overall efficiency based upon independent review. This material addresses the specific scientific data supporting that IAUS's CSP technology achieves an annual solar-to-electric efficiency of nearly 24%- a number that far surpasses its minimum 5% necessary to compete.

As noted, the independent field data covering CSP technologies is extensive. The real affects of dust, transient clouds, parasitic load, energy loss through pipe insulation, etc. are well documented. Enough parallels exist between IAUS's CSP technology and other CSP technologies that the net annual solar-to-electric efficiency of IAUS's technology can be accurately determined by both superimposing common characteristics between IAUS's system and current CSP systems, and isolating and verifying the efficiencies in areas that differ.

IAUS's CSP technology and traditional CSP technologies have a number of differences such as structural design, system controls, operations and management (O&M), as well as others, but in areas that affect the overall net efficiency, there are only two noteworthy differences- the IAUS Propulsion Turbine and Solar Panels. In the thermal-dynamic design of IAUS's CSP system, these two are the only components that have such unique design divergences that numbers from other CSP studies would not necessarily apply. Therefore, this report focuses on the efficiency of both the IAUS turbine and panel design in the form of independent expert review. By combining these numbers with data from other CSP studies compatible to IAUS's CSP system, the annual net solar-to-electric efficiency can be accurately determined and verified.

Note-- In the following section, the third party reviews (both of the IAUS Solar Panels and Turbine) included in this report list the background of the experts and their respective scientific reviews only. No names have been included in this draft for proprietary purposes.

IAUS Solar Panel

The following independent review of IAUS's solar panel efficiency and performance was conducted by a master physicist who is an expert in optical engineering. IAUS's third party optics expert has 50 years of experience in the field of optics, 39 of which were with a leading international electronics corporation where he designed Fresnel lenses and lenticular lenses for projection TVs. He also designed asymmetrical, aspheric lenses for color CRT manufacturing and developed an electrophotographic process to make color CRTs. He is responsible for 20 patents assigned to the above mentioned international electronics corporation.

Evaluation and Overview of the Design Philosophy of IAUS's Solar Panel

This paper will give a brief overview of the design philosophy of IAUS's large Fresnel lens designed for solar energy use. The collection and concentration of sunlight and using the power obtained from the heat to generate electricity is an important goal in man's desires to provide clean virtually inexhaustible power from the sun.

The sunlight falling on earth has a power density of 1,366 watts / sq. meter. At sea level this power density is about 1,000 watts / sq. meter due to atmospheric absorption and scattering. To collect and produce significant amounts of electrical power, large collectors are required. Most people are probably familiar with magnifying lenses and as children may have used them for concentrating sunlight, burning paper, ants or their fingers. A ray tracing made for a small lens is shown in Fig. 1. The source of rays is far away so the incoming rays are essentially parallel.

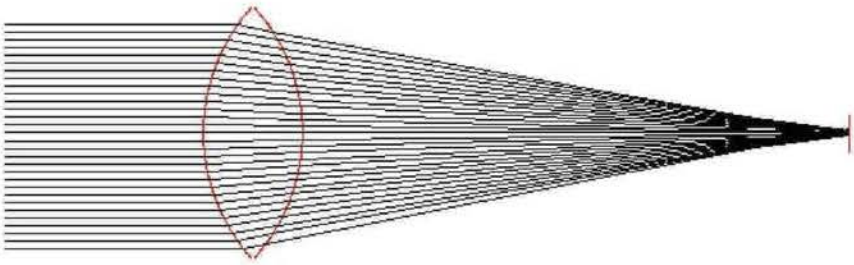


Fig. 1

The focal length is fairly long in the tracing above. The f-number is approximately 2.2 A lens of this design would mean that the target is far removed from the lens. For the large diameter lenses we want to consider, large structures would be needed to support the lens. It is desirable to have a lens with a short focal length.

A lens of a much shorter focal length is shown in Fig. 2. The f-number is approximately 1.0

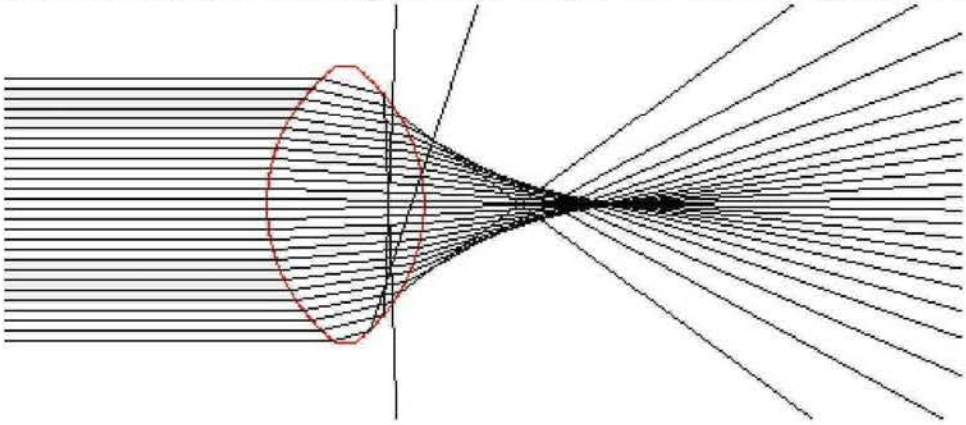


Fig. 2

In the case of this low f-number lens, we get a short focal length however there is much aberration which smears out the rays in the focal region and there are some rays undergoing total internal reflection (TIR). We will come to these problems later.

To extend the principle of the magnifying lens to large collection areas requires a very large lens. The thickness in the center of the lens in Fig. 2 is a large percentage (60%) of the lens diameter. Considering the size of the collectors desired in this project, 436 inch (36.33 feet) diameter, a lens made in the proportions to the one in Fig. 2 would have a thickness of about 262 inches. This would be a very expensive and heavy lens. Another concern would be how much sunlight would be lost traversing such a thick piece of material.

A way around this problem is to put facets in a surface so that the refractive power still exists to bend light but the thickness does not build up. See Fig. 3. Light houses need such a lens working pretty much opposite to our needs. The rays from a nearly point source of light are collected and made to project to a parallel beam of light for a long distance. In 1823 the first lens of this type of construction used for a

light house and was used and credited to Augustin-Jean Fresnel.

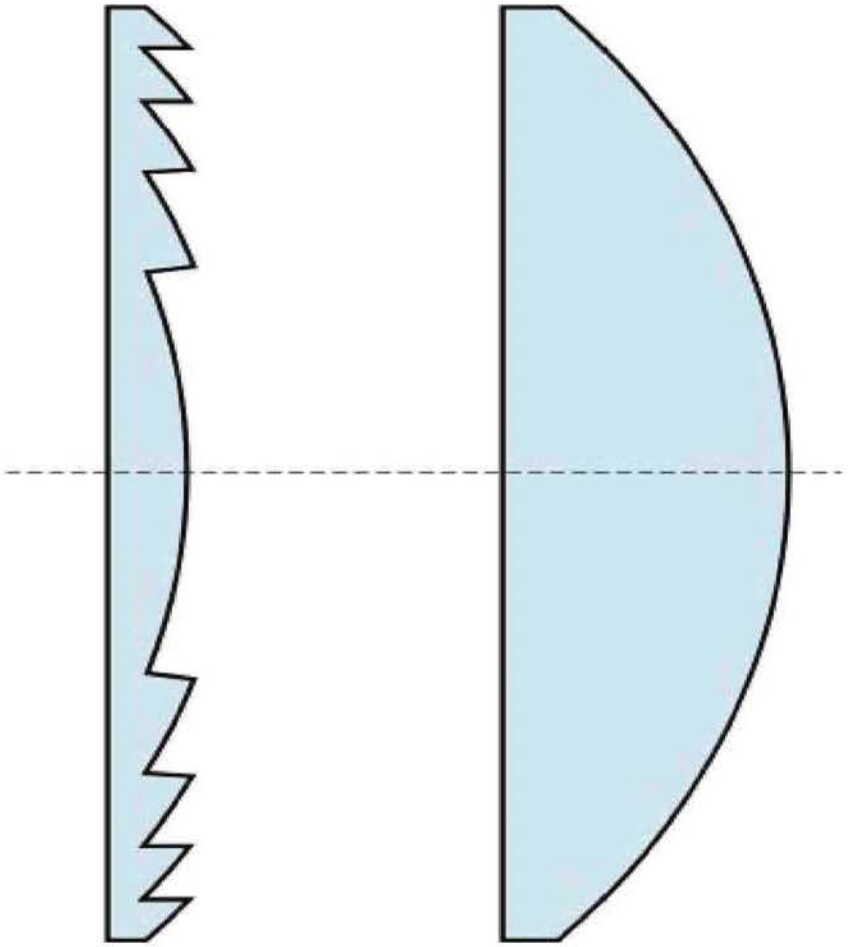


Fig. 3 (Wikipedia)

As can be readily seen, much less material is used to construct the Fresnel lens than the conventional lens. In addition the slope of each facet can be controlled so that spherical aberration is eliminated. This is of concern when designing a short focal length lens was evidenced in Fig. 2.

A number of items needed to be considered in the design of IAUS's Fresnel lens for solar energy collection.

Below is a drawing identifying some of IAUS's Fresnel lens components.

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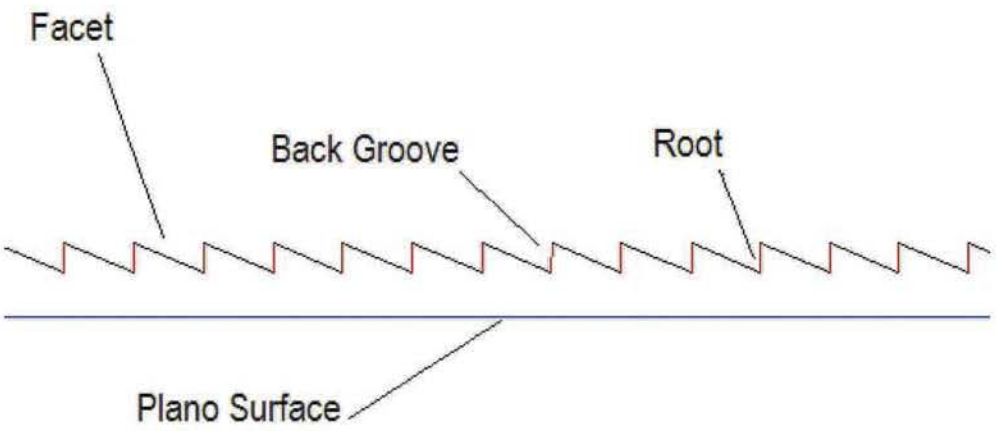


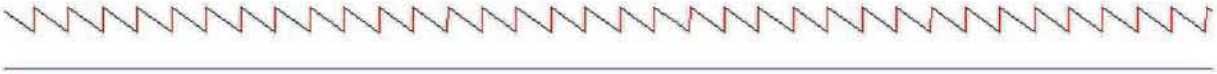
1 **Diameter.** The power generating requirements determine the diameter. For this project, the lens diameter of 436 inches has an area of 96.32 sq. meters and has a 100 kW collection capacity potential.

2 **Groove pitch**. The groove spacing cannot be too large as the facet angle will not be correct across a long facet and produce errors in rays landing in the focal plane. If the groove spacing is too small, diffraction effects will start to cause rays to be lost from the main rays and a loss of efficiency will occur. In the present design, the thickness of the lens was to be kept small. As the facet angles changed from the center of the lens to the edge, this meant that the groove pitch had to change as a function of position in order to provide enough thickness at the bottoms of the grooves to hold the lens together. Near the center of the lens the facet angles are small and the pitch of the grooves can be relatively large, but away from the center of the lens, the facet angles increase in order to refract light more to reach the focal plane. The steeper facet slopes thus cut into the lens at a steeper angle and cannot be extended as far as the facets near the lens center. At the outer edges of the lens the facet angles were steep.

7 Inches from the center.

50 Inches from the center.

100 Inches from the center.



204 Inches from the center.

3 **Groove Back Angle.** For the purposes of releasing the lens from the mold developed by IAUS, the back angles of the grooves had to provide relief. For this lens 0.5 degrees of relief was used in the design.

5 **Groove Root Radius** The tool used to cut the grooves in the mold is not infinitely sharp and so a finite radius was used in the design. This was taken into account in the ray traces. Eventually a very small radius was used (0.0001 inch) so that it had negligible effect on the efficiency of the lens.

6 **Focal length.** The shortest focal length possible is desired for mounting space. However refractive and reflective properties of optical materials and the laws of refraction and reflection limit just how small the focal length can be. The following plots show the Fresnel reflection effects due to rays passing through mediums of different indices of refraction. Fresnel also has reflection equations associated with his name. The equations below represent the amount of reflection for waves with components parallel to the plane of incidence and perpendicular to the plane of incidence.

Fresnel Reflection Co-efficients

$$Rs = (\sin(\theta 2 - \theta 1) / (\sin(\theta 2 + \theta 1))^{\wedge} 2$$

$$Rp = (\tan(\theta 2 - \theta 1) / \tan(\theta 2 + \theta 1))^{\wedge} 2$$

Where:

Rs = reflection component perpendicular to the plane of incidence.

Rp = reflection component parallel to the plane of incidence.

Θ1 = angle of incidence.

Θ2 = angle of refraction.

R. W. Ditchburn: Light, 1963 PP 14.8

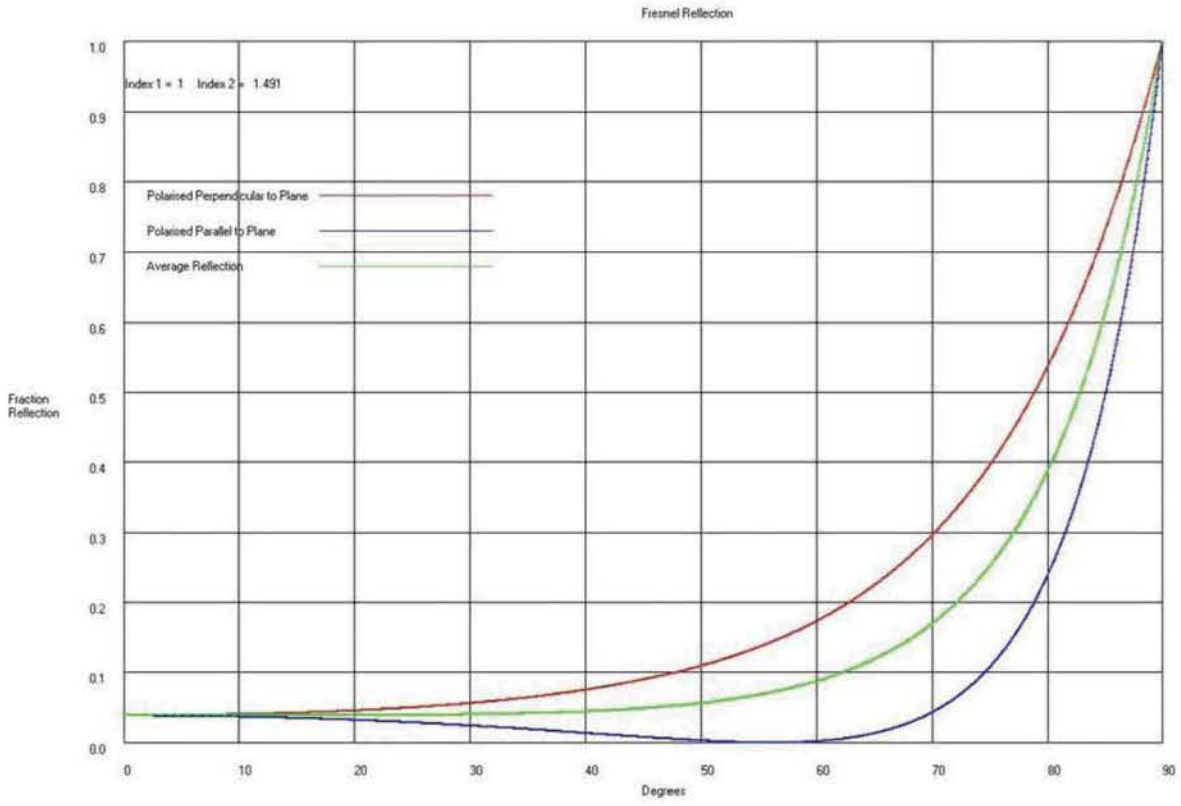


Fig. 4

The above plot shows the reflection of the parallel and perpendicular components of light vectors undergoing reflection when entering a material of index 1.491 from air. We see that there is about 4% reflection for light entering at zero degrees incidence and that the reflection increases as the angle of incidence increases. At 60 degrees the average value reflected is about 8%. Thus for best efficiency the design should minimize the angle of incidence. However this means that the focal length would be large which is not desirable.

In the case where the rays leave a high index material into air the situation is much different. At angles of about 42 degrees incident all of the rays are reflected, this is referred to as total internal reflection (TIR) which means that no rays in those areas would get to the focal point target. We can see that below:

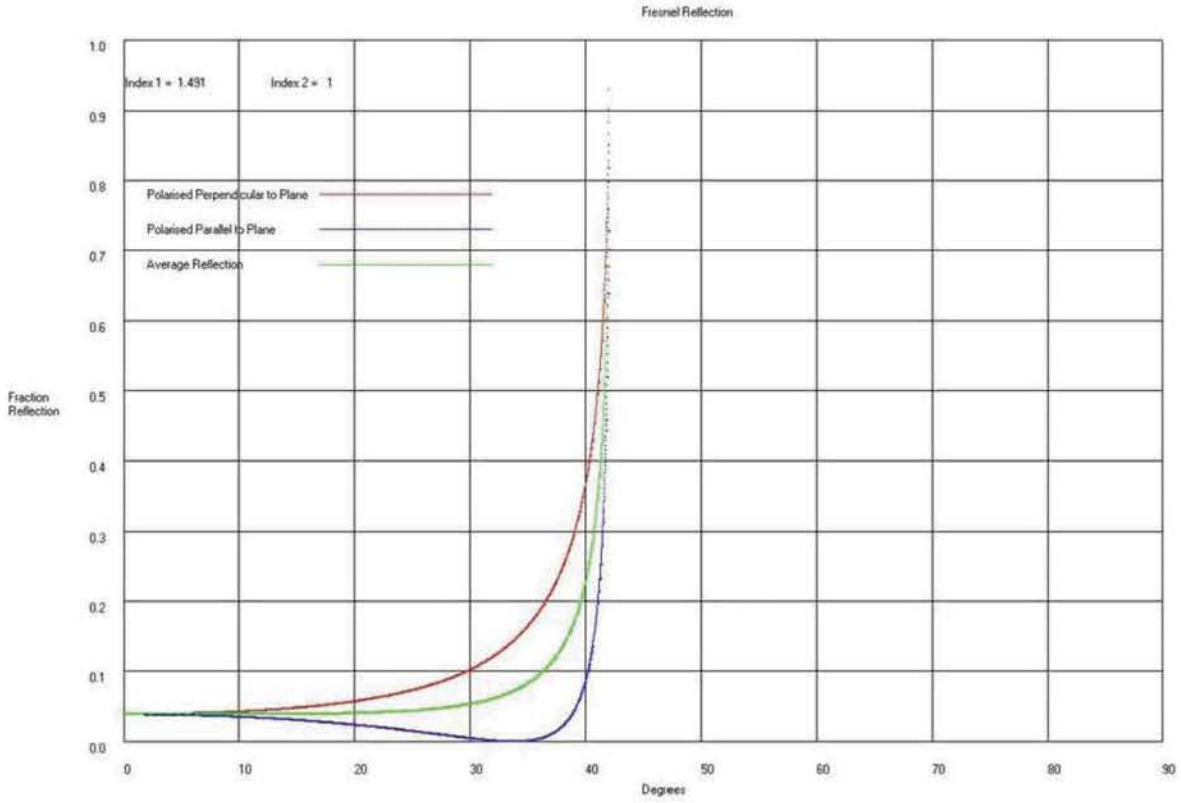


Fig. 5

The ray tracing program uses the Fresnel reflection co-efficients in the ray tracing so that the efficiency of designs can be evaluated. Many designs were considered in order to determine the best comprise focal length and efficiency. Fig. 6 shows the efficiency fall off from center to edge across short focal length lenses.

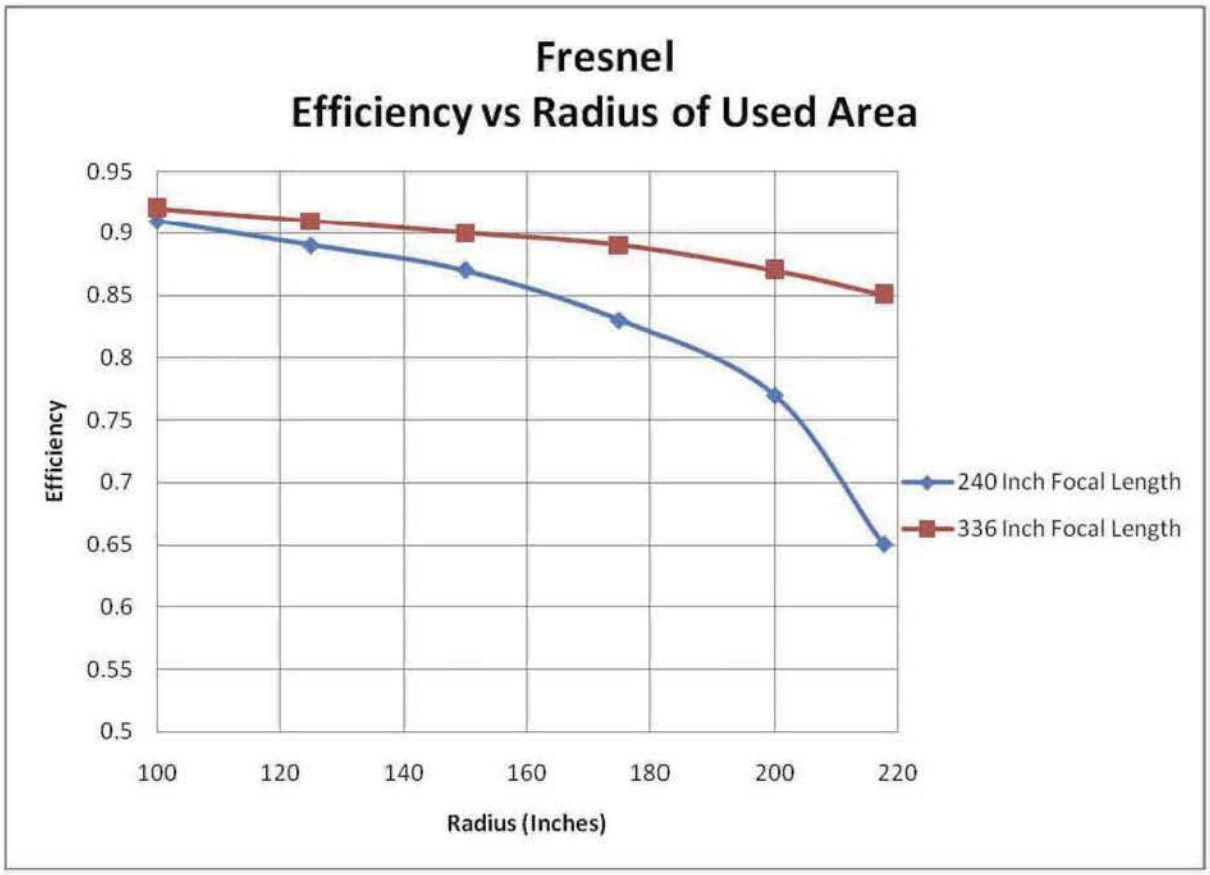


Fig. 6

Ray traces were made (Fig 7) to determine the efficiency of various focal length lens designs. The longest focal lengths had the highest efficiencies but to keep the size of the overall optical system to a reasonable value a focal length of 450 inches was chosen for the final design.

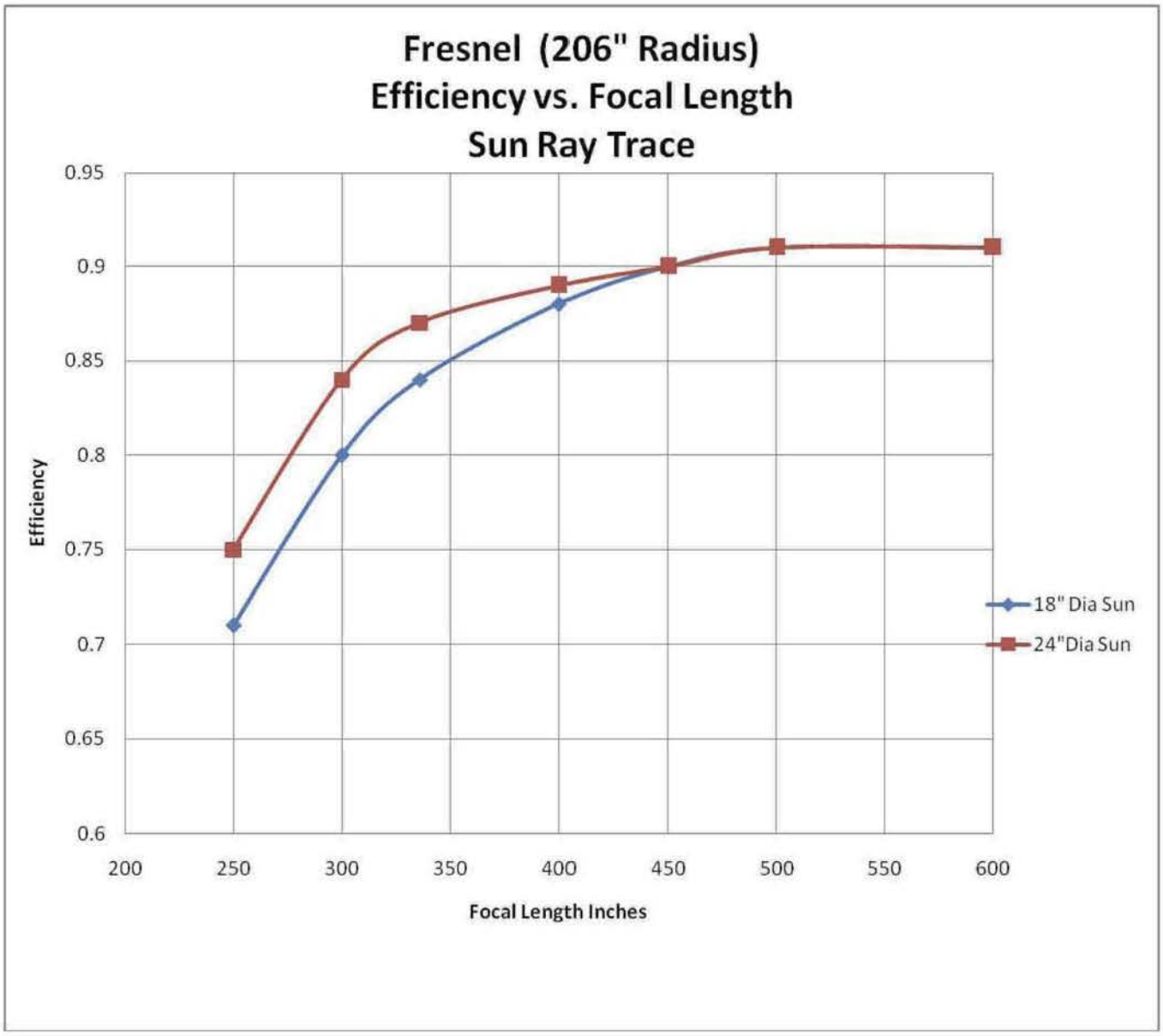


Fig. 7

We find from the plot that only about a 2% gain in efficiency would be obtained by going to a longer focal length than 450 inches.

7 Ray Tracing. In the ray tracing program, rays were initiated to simulate rays coming from the sun. Rays were sent to the lens at various angles to simulate the finite size of the sun (angular extent of about 0.52 degrees). The well known Snell's law was used in the ray tracing program to calculate the angle of refraction when a ray met a boundary.

$$N1*\sin(\theta 1) = N2*\sin(\theta 2)$$

Where N1 and N2 are the indices of refraction of the media in which the ray traverses and θ1 and θ2 are the angles of incidence and refraction at the boundary of media of the ray passing from medium one to medium two.

The solar spectrum contains energy at many wavelengths. In Fig. 8 we see that most of the power is contained in the 300 to 1,000 nm range. At the shorter wavelengths the earth's atmosphere blocks most of the power and many plastic materials do not transmit the rays.

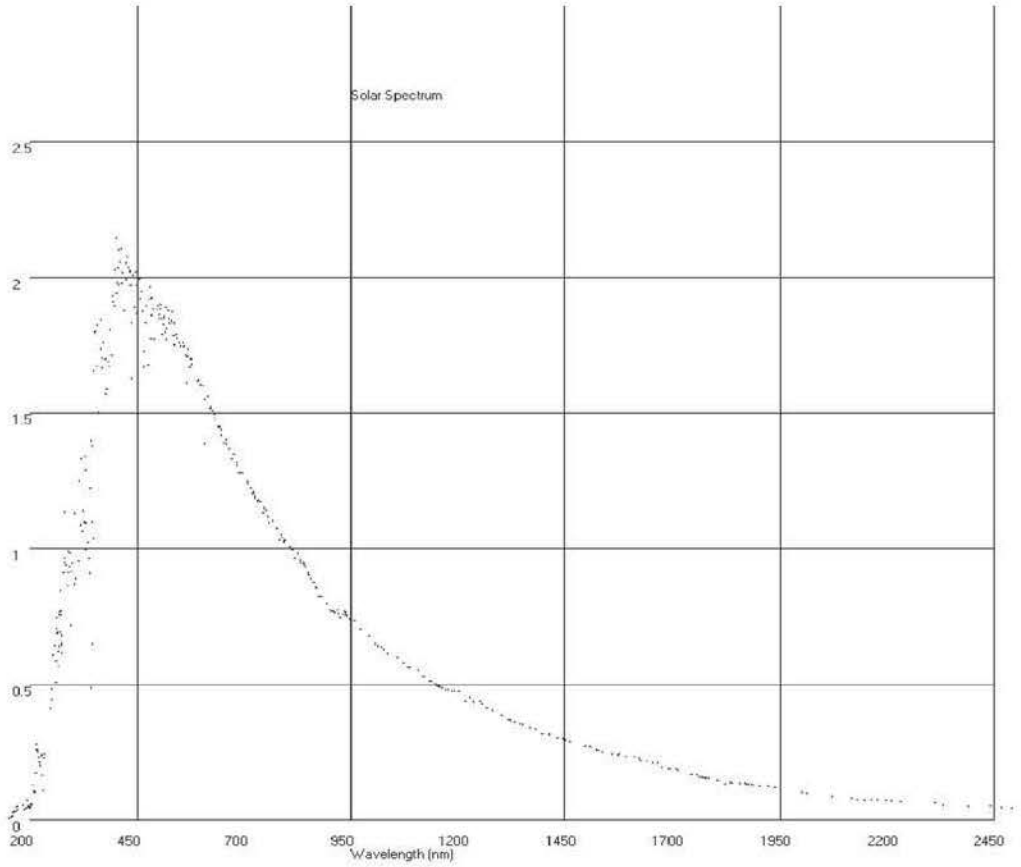


Fig. 8

PMMA which is used as the material to make IAUS's Fresnel lens has an index of refraction which varies as wavelength (humidity and temperature also affect the index of refraction but this was not considered in ray tracing). This means that rays of different wavelengths will bend different angles as they pass through the boundaries of the material. In ray tracing two different values of index of refraction were used, representing different parts of the solar spectrum, namely 1.491 and 1.482 which represent wavelengths of roughly 400 nm and 800 nm in the solar spectrum. This brackets the power range of

sunlight at the earth's surface. As a result of the 5 solar locations and the 2 wavelengths and the spacing of the rays traced, 0.001 inch, over 2,000,000 rays were traced for each analysis run.

Fig. 9 shows a detail of a ray tracing made with much fewer rays than normally run to better show what each ray is doing. In this section the rays are coming in from above and sent towards the right towards the Fresnel lens axis.

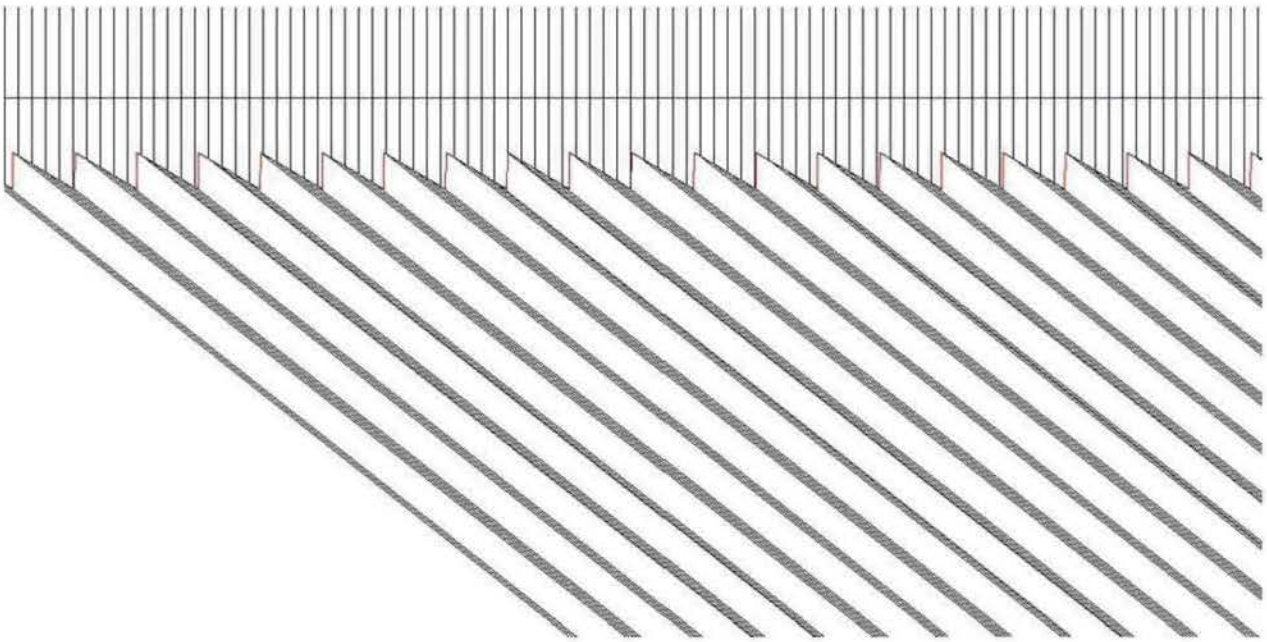


Fig. 9

In Fig. 10 the overall redirection and focusing of the left half of the Fresnel lens is shown.

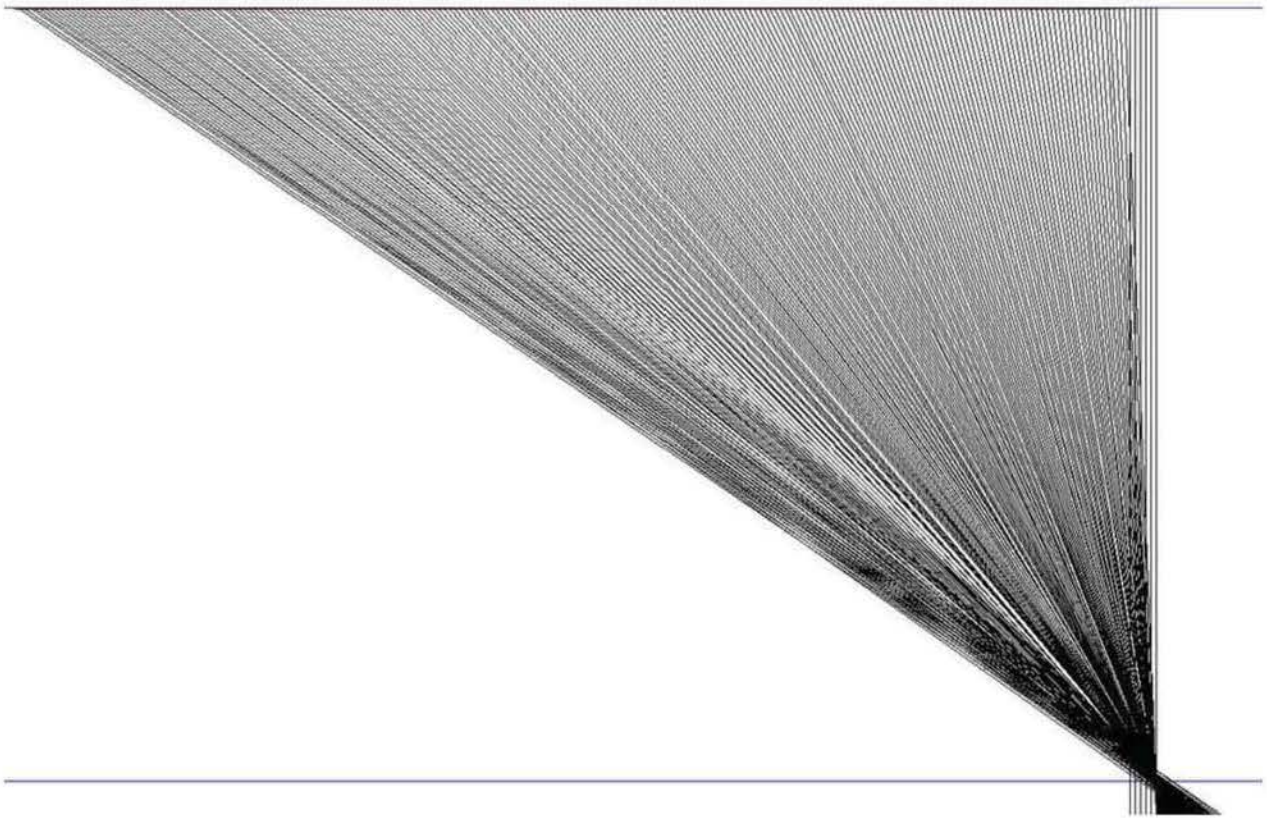


Fig. 10

In Fig. 11 the zone near the focal plane is shown in detail. The center 12 inch diameter of IAUS's lens does not have any facets and so there are some rays that come straight down to the target without focusing.

US001863

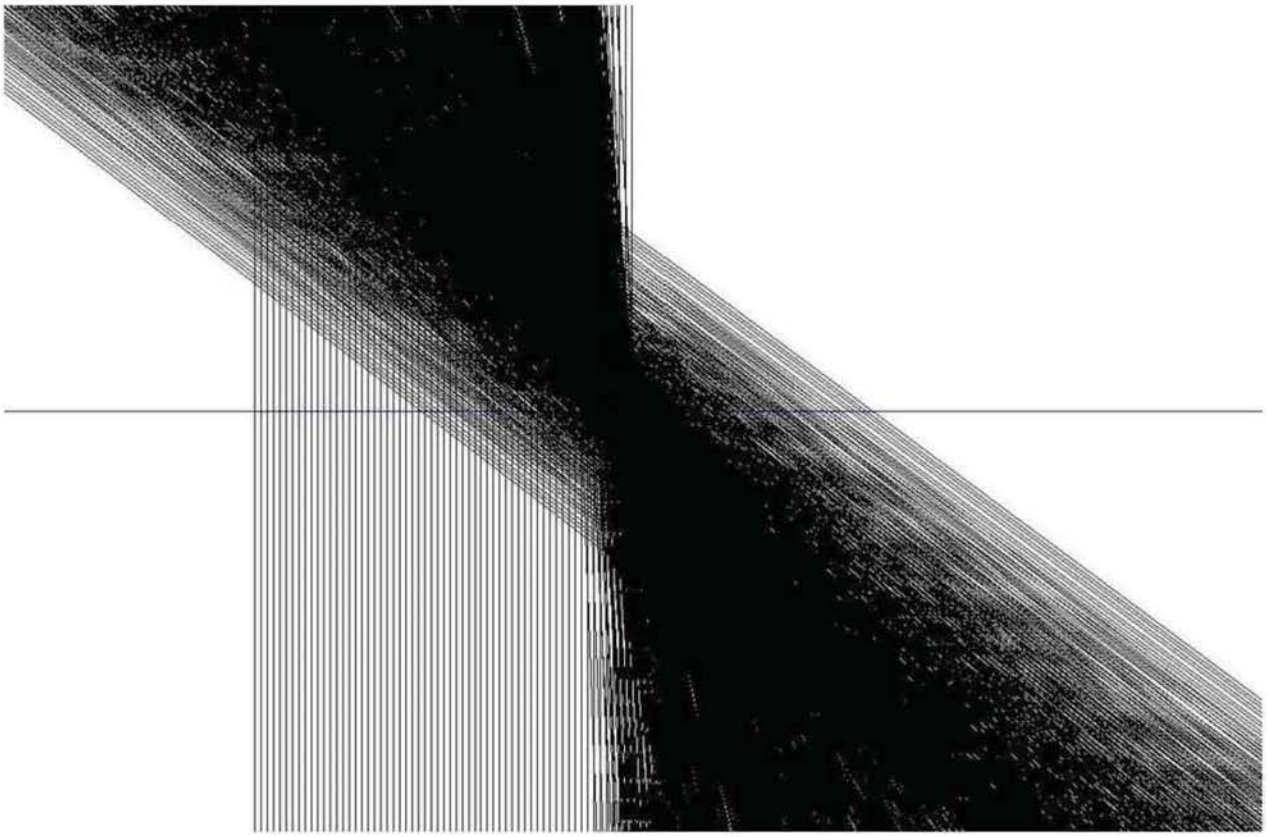


Fig. 10

Only the rays focused from the left half of the lens are traced here. Again the center of IAUS's lens does not have any facets and the rays from the center are shown coming straight down without focusing.

Temperature calculations across the focal plane were made based on a thermodynamic equation given in book by Leutz and Susuki "Nonimaging Fresnel Lenses, Design and Performance of Solar Concentrators". On page 20 the following equation is given:

$$T_{max} = T_{sun} * (C / C_{max}) ^ {.25}$$

The maximum temperature in Kelvins is equal to the temperature of the sun (5777K) times the fourth root of the Fresnel concentrator divided by the maximum possible concentration (43,400). This equation was used for temperature calculations; however the temperatures seem a little high. I contacted one of the authors of the book (Leutz) and he also felt it gave temperatures higher than gotten in practice but did not have an explanation. Perhaps the exact geometry, emissivity and thermal conductivity of the actual target do not match the theoretical model assumed by the thermodynamic equation. In any case the temperature distribution is proportional to the rays traced and their intensity at the target.

The computer program generates a report file so that all the parameters used and the results of the ray tracing are tabulated. Below is a report for the 450 inch focal length design.

"DesignFresnel 1.217 12-21-08"

"Todays Date","01-12-2009"

" "

"Fresnel Design Data ********************"

" "

"Units ","Inches"

"Fresnel Focal Length ",450

"Constant Groove Depth ",.04

"Groove Root Radius ",.0001

"Fresnel Groove Relief Angle Degrees ",.5

"Fresnel Thickness ",.1

"Fresnel Start Radius ",6

"Fresnel End Radius ",218

"Fresnel Design Index of Refraction ",1.491

"Air Index of Refraction ",1.000293

"Number of Grooves ",2299

"Step Size in Angle Calculation (Rad) ",.00002

" "

"Ray Trace Conditions ********************************"

" "

"Rays Traced Nonsequentially"

"Source ","Sun"

"Number of Source Positions ",5

"Ray Index Traced ",1.491

"Ray Index Traced ",1.482

"Target Position ",450

"Ray Starting Position ",0

"Ray Stop Position ",206

"Ray Step Value ",.001

"Number of Rays Traced ",2060000

"Fraction Passing First Surface ","0.96"

"Fraction Passing Second Surface (no grooves)","0.00"

"Fraction Passing on Grooves ","0.91"

"Fraction Passing on Relief Back ","0.00"

"Fraction Passing in Groove Radius ","0.00"

" "

"Target Results**********"

"Number of Target Sizes ",15

"Target Diameter ",2,"Fraction of Rays in Diameter ","0.19"

"Target Diameter ",4,"Fraction of Rays in Diameter ","0.44"

"Target Diameter ",6,"Fraction of Rays in Diameter ","0.60"

"Target Diameter ",8,"Fraction of Rays in Diameter ","0.74"

"Target Diameter ",10,"Fraction of Rays in Diameter ","0.79"

"Target Diameter ",12,"Fraction of Rays in Diameter ","0.83"

"Target Diameter ",14,"Fraction of Rays in Diameter ","0.86"

"Target Diameter ",16,"Fraction of Rays in Diameter ","0.88"

"Target Diameter ",18,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",20,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",22,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",24,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",30,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",36,"Fraction of Rays in Diameter ","0.90"

"Target Diameter ",1000,"Fraction of Rays in Diameter ","0.91"

" "

"Temperature Profile of Target **********"

" "

"Solar Constant Used (watts/meter sq) ",1000

"Absorbtivity of Target ",.986

" "

"Target Diameter ",2," Concentration Ratio ","7,861.7"," Temperature in Disk ","3,069"

"Target Diameter ",4," Concentration Ratio ","4,616.3"," Temperature in Disk ","2,724"

"Target Diameter ",6," Concentration Ratio ","2,806.1"," Temperature in Disk ","2,440"

"Target Diameter ",8," Concentration Ratio ","1,954.5"," Temperature in Disk ","2,255"

"Target Diameter ",10," Concentration Ratio ","1,339.2"," Temperature in Disk ","2,079"

"Target Diameter ",12," Concentration Ratio ","980.1"," Temperature in Disk ","1,945"

"Target Diameter ",14," Concentration Ratio ","745.4"," Temperature in Disk ","1,836"

"Target Diameter ",16," Concentration Ratio ","585.7"," Temperature in Disk ","1,747"

"Target Diameter ",18," Concentration Ratio ","469.4"," Temperature in Disk ","1,669"

"Target Diameter ",20," Concentration Ratio ","383.2"," Temperature in Disk ","1,601"

"Target Diameter ",22," Concentration Ratio ","316.7"," Temperature in Disk ","1,540"

"Target Diameter ",24," Concentration Ratio ","266.1"," Temperature in Disk ","1,488"

"Target Diameter ",30," Concentration Ratio ","170.4"," Temperature in Disk ","1,362"

"Target Diameter ",36," Concentration Ratio ","118.4"," Temperature in Disk ","1,270"

"Target Diameter ",1000," Concentration Ratio ","0.2"," Temperature in Disk ","484"

" "

"Target Position ",0," Temperature Kelvins ","3,786"

"Target Position ",1," Temperature Kelvins ","3,155"

"Target Position ",2," Temperature Kelvins ","2,547"

"Target Position ",3," Temperature Kelvins ","2,305"

"Target Position ",4," Temperature Kelvins ","1,765"

"Target Position ",5," Temperature Kelvins ","1,625"

"Target Position ",6," Temperature Kelvins ","1,458"

"Target Position ",7," Temperature Kelvins ","1,346"

"Target Position ",8," Temperature Kelvins ","1,177"

"Target Position ",9," Temperature Kelvins ","1,037"

"Target Position ",10," Temperature Kelvins ","493"

"Target Position ",11," Temperature Kelvins ","532"

"Target Position ",12," Temperature Kelvins ","549"

"Target Position ",13," Temperature Kelvins ","569"

"Target Position ",14," Temperature Kelvins ","575"

"Target Position ",15," Temperature Kelvins ","579"

"Target Position ",16," Temperature Kelvins ","585"

"Target Position ",17," Temperature Kelvins ","579"

"Target Position ",18," Temperature Kelvins ","573"

"Target Position ",19," Temperature Kelvins ","566"

"Target Position ",20," Temperature Kelvins ","553"

"Target Position ",21," Temperature Kelvins ","553"

"Target Position ",22," Temperature Kelvins ","532"

"Target Position ",23," Temperature Kelvins ","525"

"Target Position ",24," Temperature Kelvins ","504"

"Target Position ",25," Temperature Kelvins ","492"

"Target Position ",26," Temperature Kelvins ","477"

"Target Position ",27," Temperature Kelvins ","450"

"Target Position ",28," Temperature Kelvins ","449"

"Target Position ",29," Temperature Kelvins ","419"

"Target Position ",30," Temperature Kelvins ","416"

"Target Position ",31," Temperature Kelvins ","386"

"Target Position ",32," Temperature Kelvins ","378"

"Target Position ",33," Temperature Kelvins ","373"

"Target Position ",34," Temperature Kelvins ","372"

"Target Position ",35," Temperature Kelvins ","376"

"Target Position ",36," Temperature Kelvins ","381"

"Target Position ",37," Temperature Kelvins ","375"

"Target Position ",38," Temperature Kelvins ","377"

"Target Position ",39," Temperature Kelvins ","369"

"Target Position ",40," Temperature Kelvins ","384"

"Target Position ",41," Temperature Kelvins ","385"

"Target Position ",42," Temperature Kelvins ","375"

"Target Position ",43," Temperature Kelvins ","382"

"Target Position ",44," Temperature Kelvins ","388"

"Target Position ",45," Temperature Kelvins ","371"

"Target Position ",46," Temperature Kelvins ","380"

"Target Position ",47," Temperature Kelvins ","377"

"Target Position ",48," Temperature Kelvins ","364"

"Target Position ",49," Temperature Kelvins ","372"

IAUS Propulsion Turbine

The following independent review of IAUS's Propulsion Turbine efficiency and performance was conducted by two specialized engineering firms. The lead engineer from Engineering Company #1 is an expert in combustion stability, liquid rocket engine performance and injector design, and laser diagnostics. He received his B.S. degree in Chemical Engineering from M.I.T., his M.S. degree in Mechanical Engineering from the University of Miami, and his Ph.D. in Mechanical Engineering from U.C. Berkley. The second engineer from Company #1 is an expert in system optimization, mechanical and fluid systems analysis, liquid rocket engine performance, solid and gel propellant performance, and component design. He received his B.S. degree in Mechanical Engineering from V.M.I. and his M.S. degree in Nuclear Engineering from M.I.T. Engineering Company #1 is specialized in propulsion technology and has worked with government agencies such as NASA, U.S. Missile Defense Agency, U.S. Air Force, and Office of Secretary of Defense.

In addition to other experience, the lead engineer for Engineering Company #2 is an expert in structural loads prediction, stress analysis and mechanical design; structural dynamics including rotating machinery and vibration; the use of finite element methods and computer analysis programs to solve stress and dynamic loading problems, including composite structures; and probabilistic and statistical design, analysis and data reduction. He received his B.S., M.S., and Ph.D. degrees in Mechanical Engineering from U.C. Davis. His Ph.D. dissertation was on practical nonlinear simulation of rotating machinery dynamics with application to turbine blade rubbing.

The new IAUS propulsion turbine offers several advantages over traditional turbines. The steam cycle starts at the nozzle. This eliminates the boiler steam generation cycle. The boiler steam generation cycle required by traditional turbines increase the cost of the system, increases maintenance, and reduces efficiency. Also because the turbine exit temperature can be higher than traditional turbines it uses air to condense the steam back to water which eliminates the need for costly cooling towers and the use of water used to cool the traditional turbine exit steam temperature. Again this reduces cost by eliminating costly cooling towers and water requirements.

IAUS has developed special heat exchangers both for heating the water and for cooling the water. These heat exchangers do not need the complicated traditional piping system now used in traditional steam turbines. The new heat exchanger design eliminates the piping used in the traditional heat exchangers. This eliminates most of the maintenance required.

They new heat exchangers developed by IAUS also will allow for very inexpensive biomass energy systems. The turbine can be used to produce electrical energy from a variety of sources. The new heat exchangers can make all forms of fuel more efficient and make biomass competitive with coal and other fossil fuels.

One of the main reasons why biomass fuels are not competitive with fossil fuels in the high cost involved with transporting these types of fuels. By using the new IAUS turbine the turbines can be

made smaller and therefore, can be placed close to the biomass supply. This means the where now biomass was not profitable it can be made very profitable and competitive with traditional fuels.

IAUS Propulsion Turbine Evaluation

1. INTRODUCTION

This report is an update to, and supersedes, previous Sierra Engineering Inc (Sierra) reports on the parametric sizing and performance of the International Automated Systems (IAUS) bladeless steam turbine. The major change in methodology for this revision is the definition of system efficiency. Previous reports have considered the turbine as a system rather than as a component. As such, the efficiency was defined as the ratio of output shaft to total available enthalpy drop. The total available enthalpy drop was taken as the difference between the turbine inlet enthalpy and the enthalpy of the steam when expanded isentropically to ambient pressure (14.7 psia). This definition also neglects any energy recovery that may be achieved from subsequent water condensation. The current report treats the turbine as a component in a closed cycle steam system. As such, we are reporting only the efficiency of the turbine to make shaft power from the energy extracted from the steam. The current definition of efficiency is thus:

Turbine Efficiency = Output Shaft Power / (Flow rate x Ideal Enthalpy Drop)

where the ideal enthalpy drop is the difference between the turbine inlet enthalpy and the enthalpy of the steam when expanded isentropically to the nozzle exit pressure. For all designs considered, the nozzle has been sized to expand the steam to 95% quality.

Sierra has developed a first order system analysis tool to evaluate bladeless steam turbine performance and geometry. The tool predicts the required steam flow rate and nozzle radial distance necessary to produce the desired generator output (1 MW). An analytical hydraulic model of the steam flow through the power shaft and turbine supply tubes has been included to assess the system pressure drop. Aerodynamic drag on the turbine rotor disk is also assessed. Basic analytical structural burst and rotordynamic critical speed analysis models of the power shaft and nozzle supply tubes have also been included in the system analysis.

Specific design parameters included in this first-order system design trade include:

- Power level,
- Gear box ratio (or absence of a gear box),
- Turbine rotational speed,
- Nozzle radial position and number of nozzles on the turbine,
- Nozzle supply tube diameter,
- Nozzle design,
- Bearing frictional losses, disc and nozzle aero drag,
- Steam supply conditions, and

- Material of fabrication (by specification of allowable stress levels).

A system design trade was conducted for a 1 MW generator. The design trade assumed:

- 3200 psia steam supply pressure
- 1460 R steam supply temperature
- 95% steam quality at the nozzle exit
- 96% generator efficiency
- 1% bearing friction loss
- 1% gear box friction loss (if present, for low gear ratios with one gear mesh)
- No seal frictional loss nor mass leakage through the seals

A cursory design optimization was performed considering the following design parametrics:

- 1800, 3200, and 3600 RPM generator speeds
- 0.5, 1.0, and 2.0 gear box ratios for the 3200 RPM generator
- 4, 6, and 8 exhaust nozzles

2. CONCLUSIONS

The baseline turbine inlet conditions are 3200 psia inlet pressure and turbine inlet temperature of 1000 F (1460 R). The current design recommendations are:

Generator speed:		3600 RPM
Gear box ratio:	1.0	
Number of exhaust nozzles:		8
Radial nozzle feed tube I.D.:		0.50 inch
Radial nozzle feed tube O.D.:		1.25 inch
Exhaust nozzle radial center line:		26.2 inch
Predicted turbine efficiency:		43.81%

We also recommend the following preliminary characteristics for the system:

- Include bearings on both sides of the turbine disc
- Maximize the number of steam nozzles
- Reduce size of radial supply tubes while keeping the internal pressure drop at a reasonable level (<100 psid)

- Avoid using a gear-box despite improved turbine efficiency (+2.5% with 7200 RPM turbine), due to analysis uncertainty and additional cost

Details of the analysis approach, trade space considered and trends are presented in the following sections. A more detailed turbine optimization will require establishment of the following:

1. design limits on the maximum number of nozzles and the potential flow interactions developed between adjacent nozzles;
2. development of a list of acceptable materials for the use of tube and nozzle manifold fabrication;
3. cost limits for component and assembly manufacture, since this may limit material sections;
4. expansion of the fluid property database.

3. ANALYSIS TOOLS

System model:	Excel based module
Steam properties:	ALLPROPS 6/4/96
Nozzle Design:	ONC '98
Nozzle performance:	TDK '01
Steam circuit hydraulics:	Excel based module
Turbine supply tube structural:	Excel based module

- Centrifugal and pressure burst
- Rotor critical speed

4. APPROACH

The Excel-based system model was developed to predict the required steam flow rate and overall turbine efficiency as a function of a set of input parameters. This system analysis model is supported by other analysis modules; a system structural module, and a system hydraulics module.

The structural analysis module predicts the required thickness of the nozzle supply tube to withstand pressure and centrifugal forces. The required bearing stiffness is determined to ensure 25% RPM margin from the first rotordynamic critical speed. Rotordynamic analysis assumes bearings are present on each side of the rotor for maximum bearing stiffness effectiveness, i.e. the rotor is not overhung.

The structural analysis assumed the use of AISI 321 stainless steel in the ½-hard condition. This material should provide the minimum strength characteristics needed for prolonged application with high-temperature steam. The material allowable stress analysis was decremented by 10% to provide some degree of margin. Table 1 presents the allowable stress for AISI 321 stainless steel as a function of condition, as well as the design allowable stress used for the present trade study.

Alternate materials of fabrication can be used, however, the allowable strength should be at least equal to the design stress presented above, assuming the mass density is similar to that of a steel alloy. Higher strength materials effectively increase the design factor of safety and are therefore more desirable. Due to the peculiarity that the centrifugal loads (via mass) increase proportionately with increasing supply tube cross section area, a certain minimum strength material is required for a design, i.e. making the tube thicker is not necessarily a design solution. The material must also have low creep and good strength at 1000°F for long periods, as do AISI 321 and 347 stainless steels.

Table 1. Material Allowable and design strength of AISI 321 Stainless Steel.

Material Condition	Allowable Strengths @ 1000F	Design Strength @ 1000F
	(psi)	(psi)
321SS annealed	15860	
321SS 1/4 hard	42090	
321SS 1/2 hard	56730	51057
321SS 3/4 hard	71980	
321SS full hard	83570	

The hydraulic analysis of the turbine divides the system down into seven segments. These segments include:

1. form loss for the supply port to the supply manifold,
2. form loss for the supply manifold to the shaft port(s),
3. form loss for the shaft port(s) to the inner shaft,
4. frictional loss for the flow down the inner shaft,
5. form loss for the inner shaft flow to the nozzle feed lines,
6. frictional loss for the nozzle feed lines, and
7. form loss for the nozzle feed lines to the nozzles.

Current analyses have assumed that the fluid density and viscosity are constant through the flow circuit. Figure 1 provides an illustration identifying these pressure drop elements. Prediction of the form loss for each of the turns is performed in a similar manner. The technique utilized was developed during the late 1960's as part of the NASA program with Aerojet General entitled "Injector Orifice Study – Apollo Service Propulsion System", contract NAS9-6925.

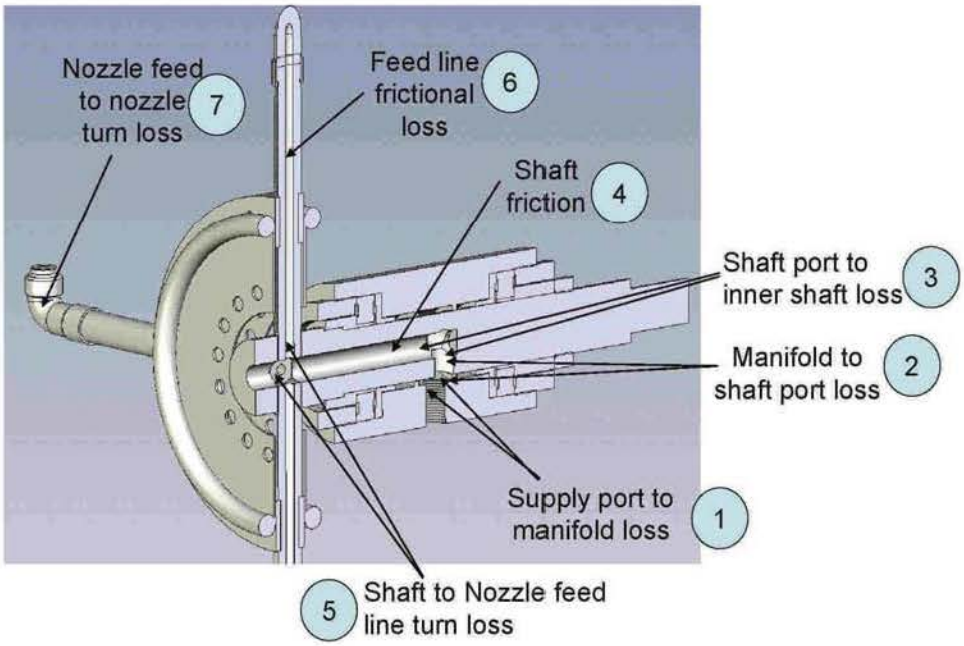


Figure 1. Definition of Components in Hydraulic Analysis

The technique provides a method for prediction of the size of the vena contracta at a turn or an area contraction (**Figure 2**). Utilizing the area of the vena contracta a 1-D velocity of the liquid is calculated along with a corresponding dynamic head. The pressure drop associated with this geometric feature (e.g. turn or flow contraction) is then calculated as a sudden expansion from the vena contracta to the local flow area using the standard sudden expansion form loss expression (Figure 3).

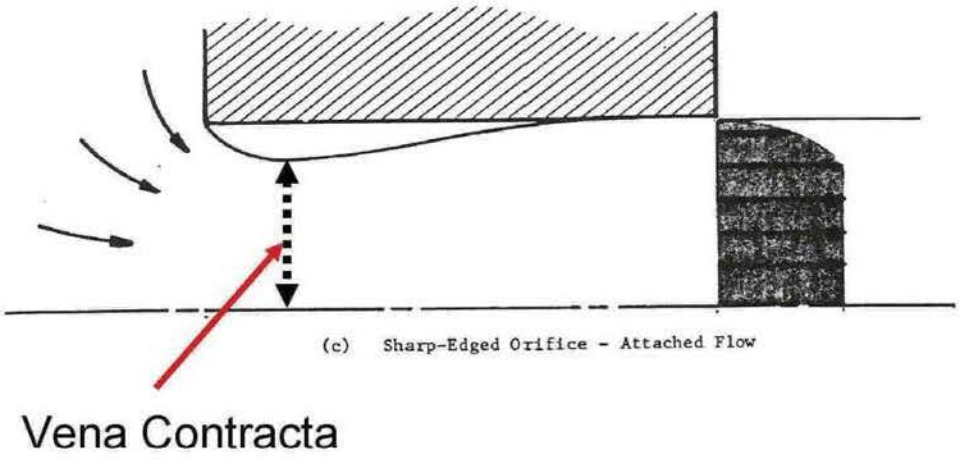


Figure 2. Sketch of Vena Contracta at the Entrance of a Sharp Edge Orifice

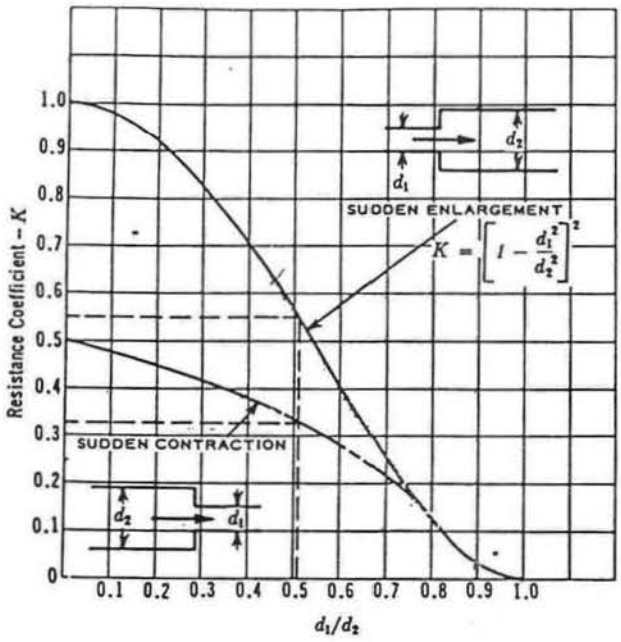


Figure 3. Form Loss Factors for Sudden Expansions and Contractions

The frictional pressure drop through the shaft and nozzle supply tubes is predicted using a standard friction factor coefficient correlation with a surface roughness of 32 micro-inches.

5. SYSTEM DESIGN TRADES

Four primary design variables were used during the system design trades - the generator operating speed, gear box ratio, the turbine radius, and the nozzle supply tube internal diameter. For each design trial, the steam pressure drop and required nozzle supply tube thickness were computed to achieve the required output power of 1 MW. With a system balance in place, the turbine efficiency was then estimated.

Figure 4 shows that the turbine efficiency increases with decreasing inlet steam temperature, but increased steam flow is required to achieve the desired power output. It is important to note that the minimum steam inlet temperature is above 760 F; at lower temperatures the nozzle exhaust velocity will not be sonic. Turbine specific power (Shaft Power / Mass Flow) improves with increasing steam inlet temperature. This should result in increased overall cycle efficiency, as reduced flow rates will also reduce pump power. Thus the figure of merit should be turbine specific power and not turbine component efficiency.

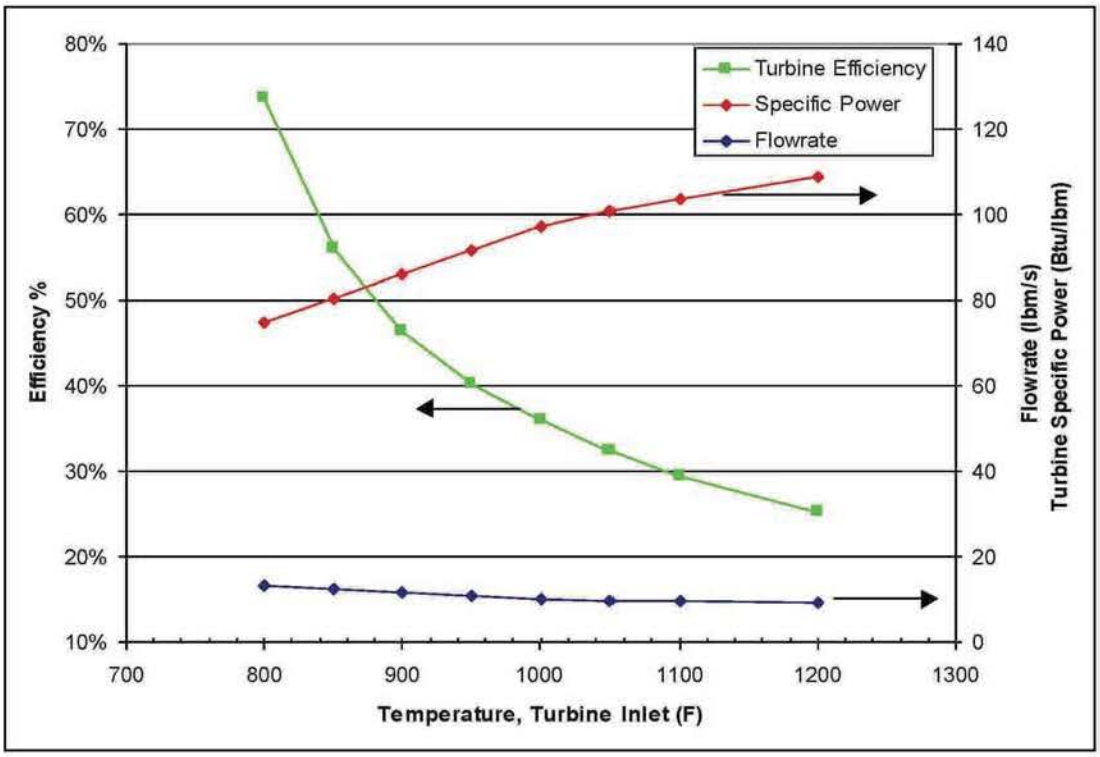


Figure 4. Turbine Efficiency and Flow Rate vs. Inlet Temperature

Figure 5 shows that the nozzle becomes more efficient at extracting enthalpy from the steam as the steam feed temperature increases. This also points to the importance of maintaining high fluid temperatures.

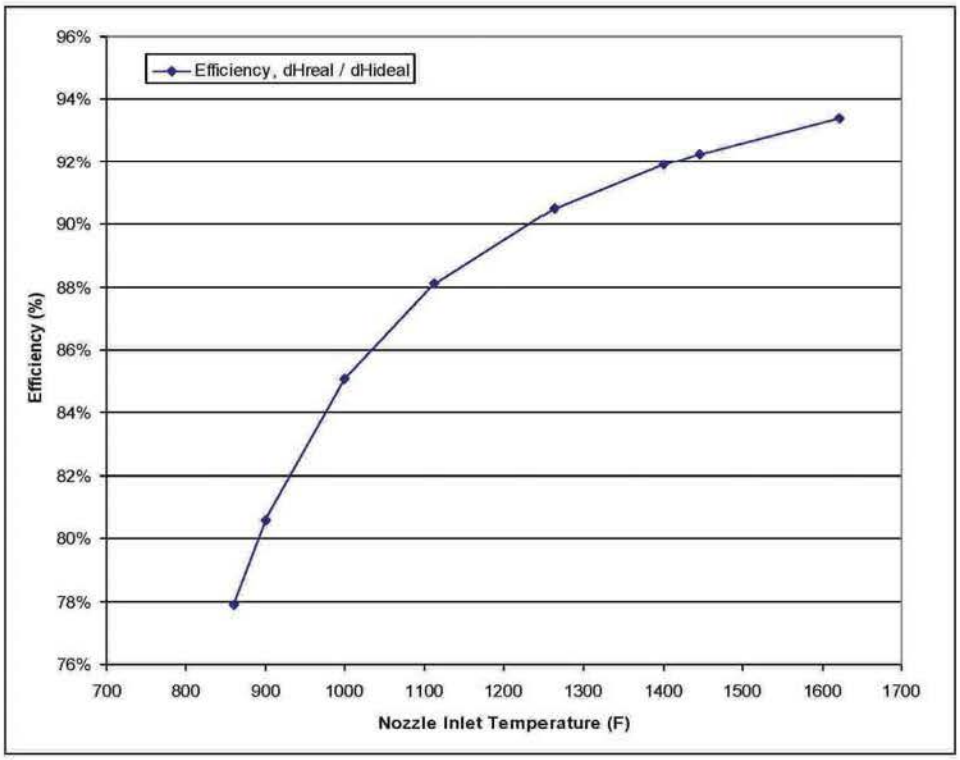


Figure 5. Enthalpy Extraction Efficiency of Nozzle

It should be noted that all efficiency calculations were performed assuming that the turbine is surrounded by dry air at 14.7 psia and 70 F. This selection effects the turbine performance in two ways. First, it defines the fluid that the turbine housing interacts with, producing drag. Second, the ambient pressure acts against the exit area of the turbine nozzle to reduce the delivered thrust. Reducing the surrounding gas to near vacuum conditions will reduce both the surface drag and the thrust loss, resulting in an estimated efficiency improvement from 43% to 52%.

It is certainly desirable to avoid using a gearbox, due to the high cost of an additional precision manufactured element in the system. Eliminating a gear box also permits use of a common induction motor/generator, which runs at constant speed and is low cost. But at this stage, it was necessary to determine whether use of a gearbox provided an improvement in overall turbine efficiency.

Figure 6 presents the summary of the design trade on gear box ratio, assuming 4 equally spaced nozzles. The results of the design trade indicate that an increasing gear box ratio, i.e. a faster turbine relative to the motor, also increases efficiency. A peak turbine efficiency is nearly 4% higher with a gear box ratio of 2:1 (46.1%) than for a similar case without a gear box (4 nozzles with a tube ID of 0.5 inches).

Figure 7 illustrates the impact of gear box ratio and radial tube inside diameter on radial tube outside diameter. The use of a gear box ratio of 2:1 increases the outside diameter to over 2.5 inches. This

would seem to be excessive, given the modest increase in turbine efficiency. Therefore, omission of a gearbox is recommended.

Figure 8 presents the predicted turbine efficiency as a function of generator drive speed for a gear box ratio of 1.0 and 4 equally spaced nozzles. These data indicate that there is some benefit of moving toward a higher generator drive speed. However, as shown previously, the higher drive speeds requires a thicker radial nozzle feed tube. A more detailed analysis of the impact of radial nozzle feed tube thickness should be investigated, along with cost and maintenance impacts of using a higher speed generator, should be included in the detailed design optimization.

Figure 9 presents the predicted turbine efficiency as a function of number of exhaust nozzles for a generator drive speed of 3600 RPM and a gear box ratio of 1.0. These data indicate that there is minimal increase in efficiency as the number of nozzles is increased. These data also indicate that there is a small benefit from reducing the internal diameter of the radial feed tubes.

Figure 10 presents the required bearing stiffness as a function of number of exhaust nozzles and the radial tube internal diameter for a gear box ratio of 1.0 and a generator drive speed of 3600 RPM. These bearing stiffness values are readily achievable.

Finally, Figure 11 presents the required radial tube outside diameter as a function of number of exhaust nozzles and tube inside diameter. Tube thickness increases with increased tube inner diameter, but pressure drop decreases. To ensure that these results are reasonable, an effort is required to do some detailed design of the exhaust nozzle manifolds and attachment to the radial feed tubes.

Table 2 and Table 3 present a numerical summary of the analysis results. These results, and the trends discussed above, imply that the best design would make use of the maximum number of steam nozzles allowable, as determined by structural analysis and mechanical design, and the smallest allowable tubes, as limited by steam flow velocities and pressure drop. This implies the need to establish the following design constraints that will be important in subsequent design optimization:

1. design limits on the maximum number of nozzles (the question of where flow interactions develop which may hinder turbine performance needs to be answered),
2. development of a list of acceptable materials for the use of tube and nozzle manifold fabrication (this feeds into the weight of the components and the associated structural sizing), and
3. cost limits for component and assembly manufacture (this may limit material sections).

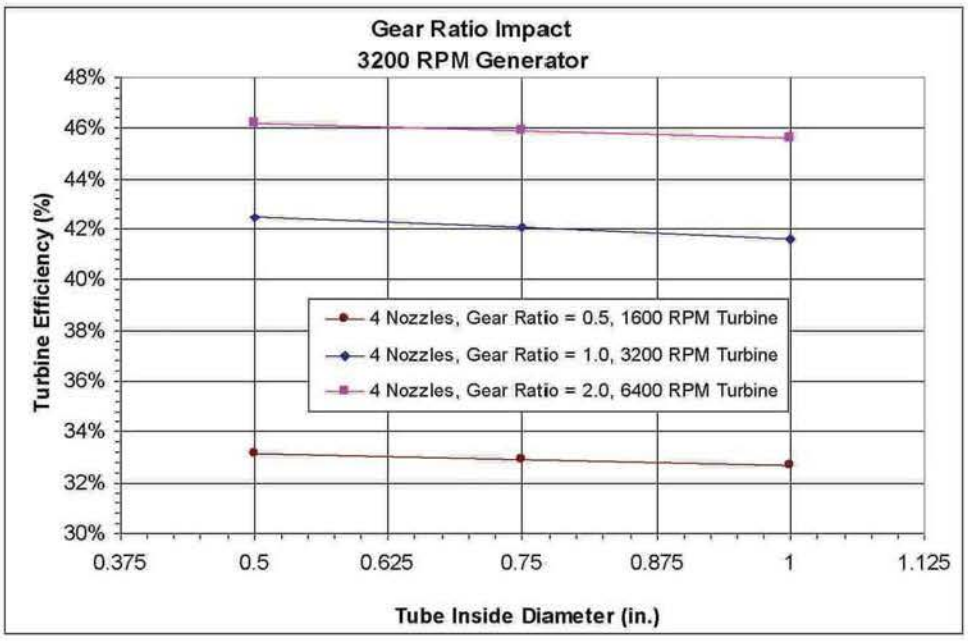


Figure 6. Effect of Gear Box Ratio on Turbine Efficiency

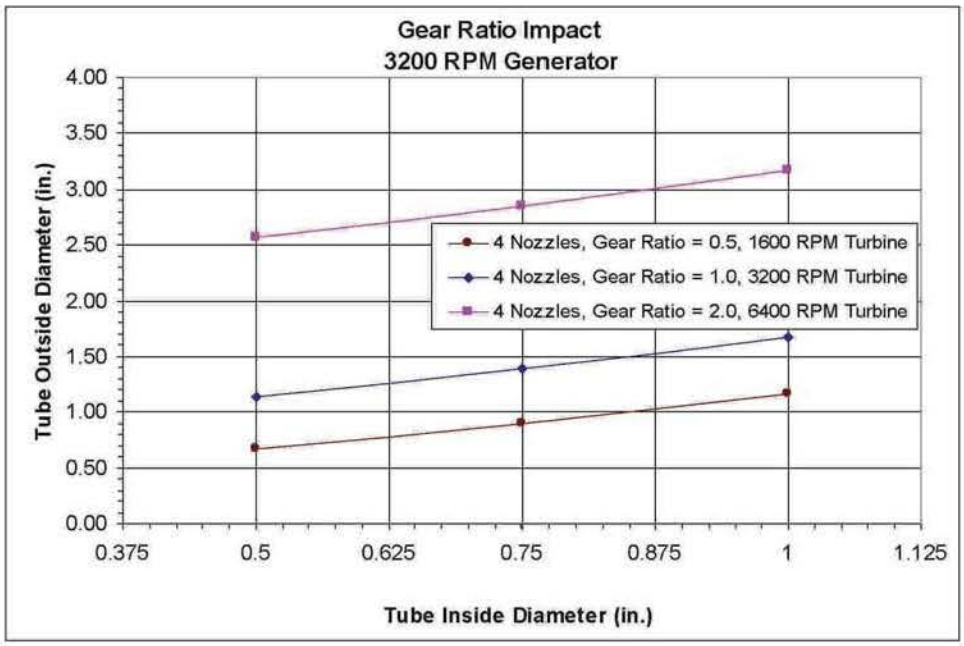


Figure 7. Effect of Gear Box Ratio on Radial Tube Outside Diameter

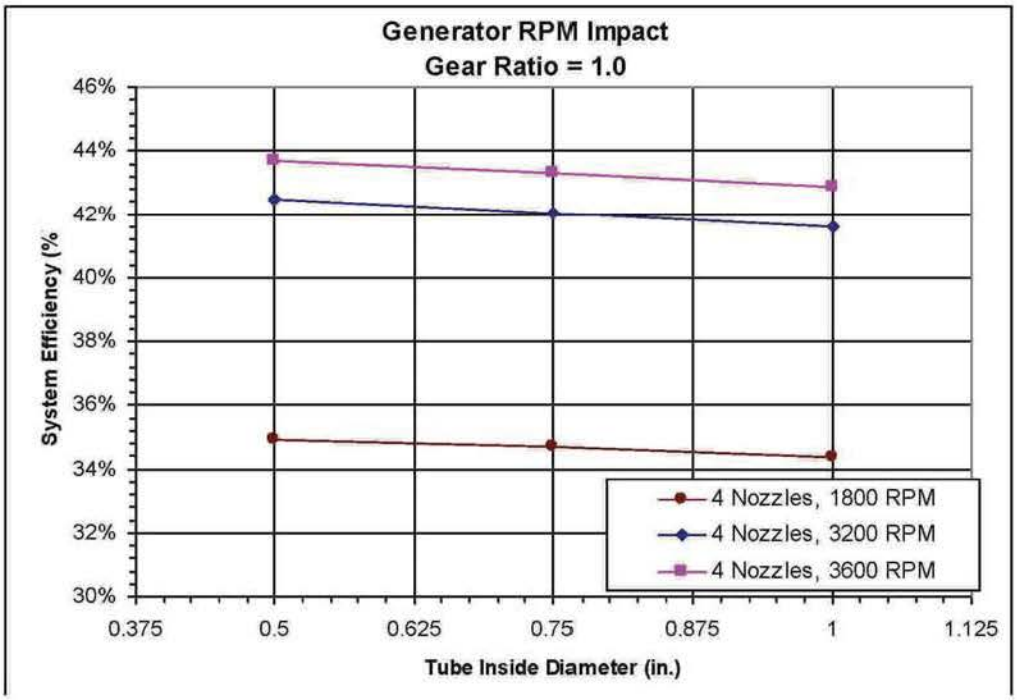


Figure 8. Effect Of Generator Drive Speed on Turbine Efficiency

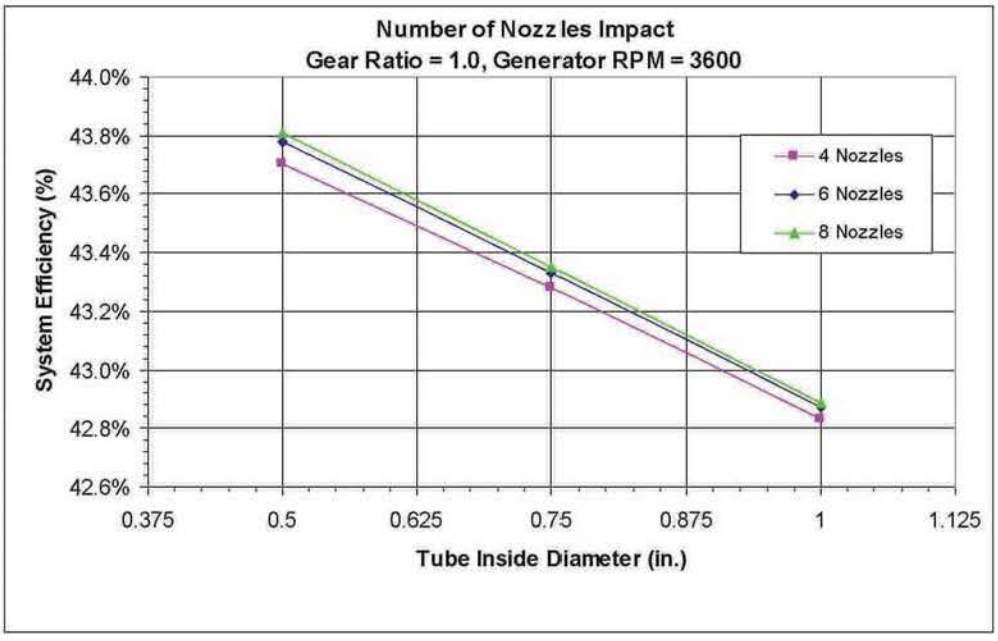


Figure 9. Effect of Exhaust Nozzle Quantity on Turbine Efficiency

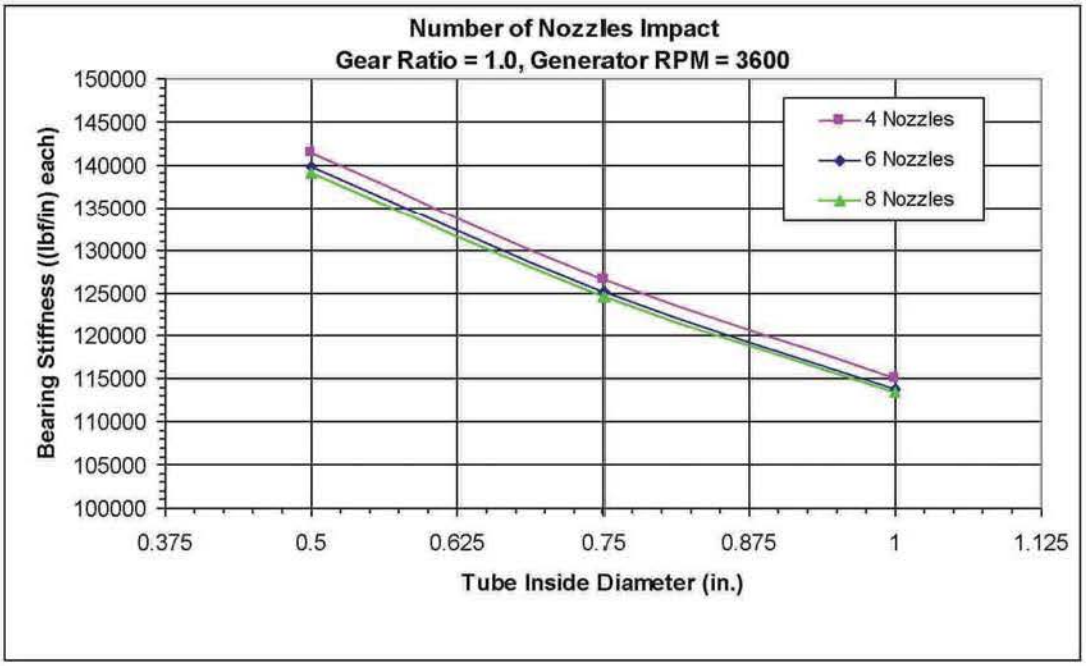


Figure 10. Bearing Stiffness Requirement as Function of Nozzle Quantity and Tube Internal Diameter

US001883

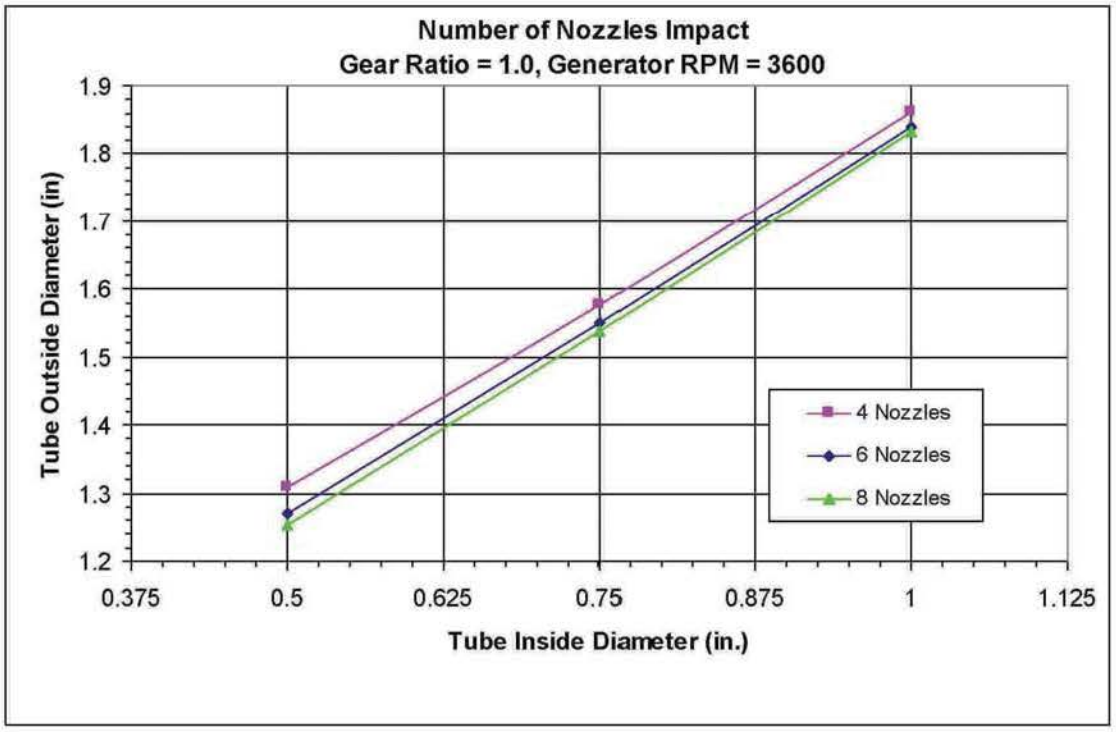


Figure 11. Effect of Exhaust Nozzle Quantity on Nozzle Feed Tube Outside Diameter

US001884

Table 2. Optimum Design Point for Conditions Considered

SYSTEM CHARACTERIZING PARAMETERS									
Power Output (kW)	No. of Steam Nozzles	Turbine Design Speed (RPM)	Gear Box Ratio	Nozzle Radial Supply Tube Inner Diameter (in.)	Nozzle Radial Supply Tube Outer Diameter (in.)	Nozzle Centerline Radius (in.)	Disc Axial Width (in.)	Total Steam Flowrate (lbm/sec)	System Efficiency (%)
1000	4	1800	1	0.5	0.702	44.6	0.772469	10.45	34.94%
1000	4	1800	1	0.75	0.937	44.6	1.030412	10.53	34.67%
1000	4	1800	1	1	1.202	44.0	1.322556	10.62	34.38%
1000	4	3200	1	0.5	1.132	29.1	1.245252	8.60	42.46%
1000	4	3200	1	0.75	1.396	29.0	1.535364	8.68	42.03%
1000	4	3200	1	1	1.677	28.8	1.844196	8.78	41.60%
1000	4	3600	1	0.5	1.309	26.1	1.440264	8.35	43.71%
1000	4	3600	1	0.75	1.577	26.0	1.734291	8.43	43.28%
1000	4	3600	1	1	1.860	25.9	2.046534	8.52	42.83%
1000	6	3600	1	0.5	1.271	26.2	1.397795	8.34	43.78%
1000	6	3600	1	0.75	1.550	26.0	1.704843	8.42	43.33%
1000	6	3600	1	1	1.840	25.9	2.024087	8.51	42.87%
1000	8	3600	1	0.5	1.254	26.2	1.379655	8.33	43.81%
1000	8	3600	1	0.75	1.538	26.1	1.692328	8.42	43.35%
1000	8	3600	1	1	1.832	25.9	2.014758	8.51	42.89%
1000	4	1600	0.5	0.5	0.674	48.1	0.741588	11.01	33.14%
1000	4	1600	0.5	0.75	0.900	47.9	0.990102	11.09	32.92%
1000	4	1600	0.5	1	1.168	47.5	1.284299	11.18	32.66%
1000	4	3200	1	0.5	1.132	29.1	1.245293	8.60	42.46%
1000	4	3200	1	0.75	1.396	29.0	1.535361	8.68	42.03%
1000	4	3200	1	1	1.677	28.8	1.844196	8.78	41.60%
1000	4	6400	2	0.5	2.567	14.4	2.823664	7.90	46.21%
1000	4	6400	2	0.75	2.853	14.3	3.138627	7.95	45.93%
1000	4	6400	2	1	3.173	14.3	3.490614	8.00	45.61%

Table 3. Predicted System Hydraulic Conditions for Configurations Listed in Table 2

SYSTEM CHARACTERIZATION PARAMETERS					STEAM PRESSURE DROP							
Power Output	No. of Steam Nozzles	Turbine Design Speed	Gear Box Ratio	Nozzle Radial Supply Tube Inner Diameter	TOTAL PRESSURE DROP	Supply Port to Manifold	Manifold to Shaft Port	Shaft Port to Inner Shaft	Frictional Pressure Drop in Shaft	Shaft to Nozzle Feed Line Turn	Frictional Pressure Drop in Nozzle Feed Line	Nozzle Feed Line to Nozzle Turn
(kW)		(RPM)		(in.)	(psid)	(psid)	(psid)	(psid)	(psid)	(psid)	(psid)	(psid)
1000	4	1800	1	0.5	139.860	0.146	3.831	0.975	0.032	31.623	86.912	16.342
1000	4	1800	1	0.75	34.775	0.144	0.000	0.350	0.032	6.276	11.206	16.766
1000	4	1800	1	1	38.258	0.133	0.010	0.246	0.033	1.946	2.637	33.255
1000	4	3200	1	0.5	79.294	0.000	2.042	0.692	0.101	21.179	38.714	16.566
1000	4	3200	1	0.75	33.012	0.000	0.000	0.200	0.104	3.830	5.012	23.866
1000	4	3200	1	1	37.345	0.000	0.007	0.123	0.107	0.894	1.198	35.015
1000	4	3600	1	0.5	71.807	0.014	1.779	0.583	0.142	19.909	32.793	16.586
1000	4	3600	1	0.75	32.880	0.017	0.001	0.149	0.146	3.277	4.253	25.037
1000	4	3600	1	1	37.233	0.022	0.010	0.086	0.150	0.701	1.018	35.247
1000	6	3600	1	0.5	40.287	0.013	0.022	0.249	0.142	8.416	14.822	16.624
1000	6	3600	1	0.75	36.997	0.017	0.004	0.104	0.145	1.120	1.947	33.660
1000	6	3600	1	1	39.601	0.021	0.028	0.217	0.150	0.120	0.471	38.593
1000	8	3600	1	0.5	33.212	0.013	0.000	0.172	0.141	4.312	8.475	20.099
1000	8	3600	1	0.75	38.283	0.016	0.012	0.103	0.145	0.486	1.125	36.396
1000	8	3600	1	1	41.012	0.021	0.044	0.282	0.149	0.065	0.274	40.177
1000	4	1600	0.5	0.5	161.361	0.190	4.422	1.016	0.026	35.394	104.071	16.242
1000	4	1600	0.5	0.75	37.633	0.185	0.001	0.368	0.026	6.962	13.307	16.784
1000	4	1600	0.5	1	38.468	0.178	0.011	0.261	0.027	2.204	3.147	32.641
1000	4	3200	1	0.5	79.294	0.000	2.042	0.692	0.101	21.179	38.714	16.566
1000	4	3200	1	0.75	33.012	0.000	0.000	0.200	0.104	3.830	5.012	23.866
1000	4	3200	1	1	37.345	0.000	0.007	0.123	0.107	0.894	1.198	35.015
1000	4	6400	2	0.5	47.825	1.459	0.501	0.025	1.691	11.143	16.164	16.842
1000	4	6400	2	0.75	35.596	1.494	0.015	2.613	1.719	0.023	2.091	27.641
1000	4	6400	2	1	43.163	1.538	0.074	3.378	1.757	0.171	0.500	35.745

IAUS Annual Solar-to-Electric Efficiency

As before mentioned, the long-term real data from CSP plants in the field is extensive. In the following section we will insert overlapping data from other CSP studies that apply to IAUS's CSP technology and combine these numbers with the efficiencies of both IAUS's Propulsion Turbine and Solar Panels to accurately view the net annual solar-to-electric efficiency of an IAUS solar power plant.

Annual Efficiency Data	SEGS VI	Solar Tres	Dish 10	IAUS
Solar Field Optical Efficiency	53.30%	56.00%	85.00%	83.79%
Receiver thermal efficiency	72.90%	78.30%	90.00%	90.00%
Transient effects	100.00%	100.00%	92.00%	92.00%
Piping loss efficiency	96.10%	99.50%	96.10%	96.10%
Storage Efficiency	100.00%	98.30%	100.00%	100.00%
Turbine power cycle efficiency	35.00%	40.50%	35.00%	43.50%
Electric loss efficiency	82.70%	86.40%	86.00%	86.00%
Power plant availability	98.00%	92.00%	94.00%	96.00%
Annual Solar to Electric Eff	10.59%	13.81%	19.14%	23.94%

(Table 1)

Table 1 gives a detailed efficiency comparison of IAUS's technology to other CSP technologies such as solar troughs (SEGS VI), solar dishes (Dish 10) and power towers (Solar Tres). It is a complete list of all the real energy losses CSP technologies encounter in the field. As Table 1 illustrates, there are many efficiency similarities between IAUS's CSP technology and the dish.

Solar Field Optical Efficiency

IAUS's solar field optical efficiency is more compatible to the dish due primarily to its dual-axis tracking capabilities. Table 2 breaks down the optical efficiency comparison between IAUS's system and the dish. The dish's mirror reflectivity of 93.5% is higher than IAUS's panel refraction transmittance of 90%, but unlike the dish, IAUS has no receiver interception. Although, due to the height and non-parabolic shape of IAUS's panel the affects of dust in the field appear to be less insidious than that of the dish, it is prudent to be conservative since IAUS's field data is not as thorough in relation to this factor. Therefore, we listed the affects of dust equal. In the end, the overall optical efficiencies of the two are very similar, the dish being nearly 1.8% higher.

Dish Optical Efficiency

Mirror Reflectivity	93.50%
Average Mirror Cleanliness	93.10%
Receiver Interception	98.00%
Overall Optical Efficiency	85.31%

IAUS Optical Efficiency

Panel Refraction Transmittence	90.00%
Average Cleanliness	93.10%
Receiver Interception	100.00%
Overall Optical Efficiency	83.79%

(Table 2)

Receiver Thermal Efficiency

The receiver thermal efficiency listed in Table 1 is virtually identical to the dish as well. Both have similar design features. They are both encapsulated, coated coils with greater surface area than other CSP technology receivers. IAUS hired out an independent review of its receiver, and not surprisingly, the results were the same as studies done for the dish.

SOLAR ENERGY RECOVERY OF ZINC OXIDE TO ZINC FOR ZINC AIR BATTERIES

The solar lens receiver system with the addition of an intermediate solar concentrator system the temperature at the receiver can exceed 2500° F. Using this system it is possible to break the oxygen bond from the zinc oxide to form zinc and oxygen. This process is extremely efficient use of the thermal energy produced from the solar lens system. The theoretic possibility is sixty percent efficient solar energy to zinc conversion. Zinc is an excellent fuel that can be used to produce electrical energy through the use of zinc fuel cell. The fuel cell converts the zinc back to zinc oxide and releases electrical energy in the process. To charge the zinc fuel cell just add zinc much like adding gasoline to the gas tank of an internal combustion engine. This system now makes it possible to produce transportation energy using solar energy where the storage is zinc. With the use of IAUS's unique lens technology and the compound parabolic mirror concentrator and the unique zinc oxide receiver system zinc can be produced economically while the specific heat of the process can still be used by IAUS's turbine to produce electricity.

Transient Clouds

The affects of transient clouds on the solar troughs and towers were included within the turbine power cycle efficiency numbers; therefore, in Table 1 these two are listed as zero loss. The dish studies had this portion broken out into its own category. Since IAUS's turbine cycle study did not include affects of transient clouds, it is listed out as well.

Piping Loss Efficiency

The piping loss efficiency of IAUS's system is similar to both the solar troughs and dish. The storage efficiency is

non-applicable to this study; therefore, it is listed as a 0% loss. IAUS will utilize heat storage in the future, however, it is not necessary to address it in this report.

Electric Loss Efficiency

The electric loss efficiency or parasitic load has more compatibility to the solar tower and the dish due to the piping configuration and other features.

Plant Availability

IAUS's plant availability lies between the solar dish and trough. It is higher than the dish due to IAUS's ability to economically install a redundant turbine back-up to switch on during routine turbine maintenance of the primary turbine. It is lower than the trough, however, due to the fact that the trough's numbers include a natural gas hybrid back-up. IAUS can use a natural gas hybrid configuration as well, but like the heat storage, it is not necessary to include it in this report.

Turbine Cycle Efficiency

IAUS's turbine power cycle efficiency is taken from its own independent review. The efficiency more closely resembles the solar tower due to higher temperature steam. However, as mentioned above the tower includes the losses from transient clouds in its turbine power cycle efficiency numbers, therefore, it is lower.

Conclusion

As addressed earlier in this report, IAUS is familiar with the material and construction cost of its system in the field. Based upon its low-cost design, IAUS's solar power plant needs to convert to electricity only 5% of the gross annual solar energy hitting its panels in order to compete with the lowest price solar technology available today. As detailed in this report, IAUS's annual solar-to-electric efficiency is nearly 24%. However, for argument's sake, even if we are to reduce IAUS's efficiency by 20%, which lowers it to an overall 20% annual solar-to-electric efficiency, it is still 400% higher than necessary to compete with the currently lowest price solar available.

Summary

IAUS believes that it has unprecedented advantages in nearly every area necessary for a renewable energy product to compete with fossil fuels such as a vast renewable resource, low cost equipment, durability, high-volume mass production capabilities, ease of construction, inexpensive and reliable energy storage, low cost operations, and longevity.

According to the International Energy Agency, over $11 Trillion will need to be invested into the global electricity market in order to bring electricity to the 1.6 billion people who currently live without power.

Currently, less than 1% of the world's energy comes from solar, yet the sun's energy is more abundant than all other energy sources combined and it's free. However, solar energy needs to reach a price of $1,500-$2,500 per KW in order to better compete with fossil fuels. IAUS'S solar power technology is expected to enter the market within this price range, but with room still to cut its costs again.

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RaPower3

OPERATION AND MAINTENANCE AGREEMENT

Alternative Energy Systems

This Operation and Maintenance Agreement (the **"Agreement"**) is entered into this day

04/18/2016
(the **"Effective Date"**) by and between **LTB, LLC** (the **"Operator"**), a Nevada Limited Liability Company with principal offices at 3838 Raymert Drive, Suite #10, Las Vegas, Nevada 89121, and

PRESTON OLSEN, 9351 S. DUTCH VALLEY DRIVE, SOUTH JORDAN 84095, Utah United States (the **"Owner"**).

RECITALS

WHEREAS pursuant to an Equipment Purchase Agreement (the **"Purchase Agreement"**) between the Owner and **RaPower-3, LLC** (**"RaPower"**), a copy of which is attached as Attachment A, the Owner has purchased certain solar thermal energy equipment which consists of

90% Lens Purchase

(The **"Number of Owner's Alternative Energy Systems"**) **Alternative Energy Systems** (the **"Owner's Alternative Energy Systems"**) which are particularly described in the Purchase Agreement that will be installed at a Power Plant and/or other facilities hereafter associated therewith (collectively, the **"Project"**) at a location designated by the Equipment Purchase Agreement (the **"Installation Site"**).

WHEREAS, the Owner desires to rent to Operator and Operator desires to rent from Owner, the Owner's Alternate Energy Systems.

WHEREAS, the Owner desires to contract with the Operator for Operator to provide operation and maintenance services in respect of the Project.

WHEREAS, the Operator, at the Operator's sole discretion, may also be operating and maintaining solar thermal energy equipment other than the Alternative Energy System of the Owner, at the Installation Site.

WHEREAS, the Operator is willing to provide such services on the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual covenants and agreements hereinafter set forth and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

ARTICLE 1

EXHIBIT 121
WIT: Olsen
DATE: 8-10-16
Danica M. Thomas, CRR/RPR

DEFINITIONS

1.1 **Alternative Energy System.** Solar energy concentrator system.

1.2 **Imbedded Definitions.** The definitions of other key terms are as stated in the text of this Agreement.

ARTICLE 2

OPERATOR SCOPE OF WORK

2.1 Appointment.

The Owner appoints the Operator and the Operator accepts the appointment to perform the following services subject to and in accordance with the provisions of this Agreement (collectively, the **"Work"**):

2.1.1 Routine O&M Services;

2.1.2 Additional Services; and

2.1.3 Transition Services.

2.2 Effective Date.

The Operator shall begin performing the Work on the date the Owner's Alternative Energy Systems are installed at the Installation Site (the **"Effective Date").**

2.3 Operation and Maintenance Services.

The Operator will perform the Work in accordance with the standard of a reasonable and prudent operator in the state wherein the Installation Site is located and in compliance with the Safety and Operating Guidelines ("Guidelines") provided by RaPower to Operator, except to the extent that a reasonable and prudent operator would be unable, or would be hindered in its ability, to perform such obligations. Operator and Owner agree that RaPower may modify or amend the Guidelines from time to time in the sole discretion of RaPower. The Guidelines, as amended and modified hereafter in the sole discretion of RaPower, are hereby incorporated by reference into this Agreement and Operator and Owner hereby agree to be bound thereby.

2.4 Appointment of Liaison.

The Operator may appoint a representative who will represent the Operator under this Agreement and be responsible for receiving approvals or instructions from the Owner that may be required from time to time.

The Owner shall be entitled to rely on the actions of such representative for the purposes of this Agreement.

2.5 Governmental Approvals.

The Operator shall apply for and use reasonable efforts to obtain and maintain all Governmental Approvals that are required to be in the Operators name and that are necessary for the Operator to perform its obligations under this Agreement. The Operator shall assist the Owner, to the extent reasonably necessary, in obtaining Governmental

Approvals that the Owner is required to obtain pursuant to Article 3.

2.6 Work Force.

The Operator is responsible for hiring, employing, training and managing, and additionally, in respect of employees employed by Affiliates of the Operator, overseeing the work force necessary to operate, maintain and repair the Project in accordance with this Agreement.

2.7 Access.

The Operator shall at all times provide access to the areas of the Project to the designated representatives of the Owner, provided that such access is in compliance with the Equipment Purchase Agreement and is coordinated with the Operator to ensure that it does not unreasonably interrupt or interfere with the performance of the Work or the safe operation of the Project and is at the sole risk and expense of the Owner, as applicable.

2.8 Legal Requirements.

The Operator shall comply in all material respects with all applicable law in the performance of the Work.

2.9 Property Tax.

The Operator shall comply with and pay all property tax on the Alternate Energy Systems.

ARTICLE 3

OWNER SCOPE OF RESPONSIBILITIES

3.1 Delivery of the Project.

Once this Agreement becomes effective, the Owner shall grant the Operator and its designated and identified Affiliates, employees, agents and representatives, access to the Installation Site and the Project, as are necessary or desirable for the Operator to carry out the Work and to comply with the Operators obligations hereunder.

3.2 Appointment of Liaison.

The Owner may appoint a representative who will represent the Owner under this Agreement and be responsible for giving approvals or instructions to the Operator that may be required from time to time. The Operator shall be entitled to rely on the approvals or instructions of such representative.

3.3 Governmental Approvals.

The Owner shall apply for and use reasonable efforts to obtain and maintain all Governmental Approvals that are required to be in the Owners name and that are necessary for the Owner to perform its obligations under this Agreement. The Owner shall assist the Operator; to the extent reasonably necessary, in obtaining Governmental Approvals that the Operator is required to obtain pursuant to Article 2.

3.4 Compliance with Applicable Law.

The Owner shall comply in all material respects with all applicable law in connection with the performance of this Agreement.

ARTICLE 4

SAFETY AND OPERATING GUIDELINES

4.1 Safety and Operating Guidelines.

Pursuant to the Equipment Purchase Agreement between the Owner and RaPower, RaPower has provided Safety and Operating Guidelines ("Guidelines") for operating and maintaining the Project, which Guidelines include but are not limited to a description of the services to be provided by Operator to Owner.

The services are categorized by the Guidelines into Routine O&M Services, Additional Services, and Transition Services. The Guidelines written and set forth by RaPower are subject to modification or amendment by RaPower without prior notice, in the sole discretion of RaPower. Operator shall perform the Work in accordance with and in full compliance with the Guidelines, as modified or amended by RaPower from time to time, which Guidelines are incorporated by reference into this Agreement.

4.2 Health, Environmental and Safety Standards.

The Operator agrees that the Project shall be operated in compliance with all applicable laws and with the OSHA Standards and that the Operator shall not be obligated to perform the Work in a manner that does not meet the OSHA Standards or that would violate applicable law.

ARTICLE 5

COMPENSATION AND PAYMENT

5.1 Owner's Alternative Energy System(s) Production.

In consideration for the performance by Operator of the services set forth in this Agreement, from the Effective Date of this Agreement until the Date of Termination of this Agreement as provided below, as for so long as Operator is in possession and control of the Project, Operator shall be entitled to receive all revenue from the use or sale of thermal energy or electric power generating using the Alternative Energy Systems.

5.2 Rental payment.

Once the Owner's Alternative Energy System(s) are installed and producing revenue, then at the end of each quarter a rental payment will be due and owing from Operator to Owner. The Operator shall send to Owner, on a quarterly basis, the rental payment by check or wire transfer to an account specified by Owner.

The rental payment from Operator to Owner will culminate into an annual payment equal to $150 (One Hundred Fifty Dollars) per Alternative Energy System. All Payments shall be in dollars unless otherwise agreed. Each

Payment shall be delivered to Owner within thirty calendar days following the end of the quarter.

5.3 Late Payments.

Late payments under this Agreement shall bear interest at a rate calculated from day to day on the basis of a 360 day year equal to one percent per annum above the Discount Rate. The payment of interest shall not excuse or cure any late payment hereunder.

5.4 Lease of Structural Components

Operator will provide a structure that holds the Owner's Alternative Energy Systems and a receiver to collect the energy from the Owner's Alternative Energy Systems. The Operator has agreed to lease space on the structure to the Owner , at $1.00 per year per Alternative Energy System for ninety-nine years or until the Owner of the Alternative Energy Systems chooses to move the Alternative Energy Systems to another location.

ARTICLE 6

INDEMNIFICATION

6.1 Scope of Indemnification.

- The Owner shall indemnify, defend and hold harmless the Operator, its Affiliates and its and their respective directors, officers, employees and agents **("Operator Indemnified Persons")** from and against any liability, loss, damage, claim, cost, charge or expense of any kind or nature, including reasonable attorneys fees, expenses and other costs of litigation (collectively, **"Damages")** incurred by any Operator Indemnified Person in connection with (i) injury to or death of any person or damage to property (including the Project and any facilities related to the Project) and (ii) any claims by third parties, in each case, as a result of or otherwise relating to (A) the breach by the Owner of any of its obligations under this Agreement, (B) the gross negligence or willful misconduct of the Owner, its Affiliates and its and their respective directors, officers, employees and agents, or (C) the Project; provided that the Owner shall not be liable to indemnify any such Operator Indemnified Person for any Damages to the extent that such Damages are to be indemnified by the Operator pursuant to Section 6.1(b)(ii) or are the result of the gross negligence or willful misconduct of the Operator or, in respect of any such Operator Indemnified Person, such Operator Indemnified Person.
- Subject to the limitation of liability under Article 10, the Operator shall indemnify, defend and hold harmless the Owner, its Affiliates and its and their respective directors, officers, employees and agents **("Owner Indemnified Persons")** from and against any Damages incurred by any Owner indemnified Person in connection with (i) injury to or death of any person or damage to property (including the Project and any facilities related to the Project) and (ii) any claims by third parties, in each case, as a result of (A) the breach by the Operator of any of its obligations under this Agreement or (B) the gross negligence or willful misconduct of the Operator, its Affiliates and its and their respective directors, officers, employees and agents; provided that the Operator shall not be liable to indemnify any such Owner Indemnified Person to the extent Damages are the result of the gross negligence or willful misconduct of the Owner or any such Owner Indemnified Person or the breach by the Owner of any of its obligations under this Agreement.

- **Limitation of Liability.**

The limitation of liability under Article 10 shall not apply to or include the amount of insurance proceeds received by the Operator under insurance obtained in accordance with this Agreement other than insurance obtained and paid by the Operator unless the amount paid by the Operator is reimbursed by the Owner hereunder.

- **No Effect on Insurers.**

The provisions of this Article 6 will not be construed to relieve any insurer of its obligations to pay any insurance claims in accordance with the provisions of any valid insurance Policy.

- **Gross Negligence.**

No Party shall have its liability limited hereunder for its own gross negligence or willful misconduct.

- **Survival.**

The Parties obligations under this Article 6 survive any termination of this Agreement.

ARTICLE 7 INSURANCE

7.1 Insurance Required of the Operator.

The Operator shall procure and maintain the insurance listed below:

- Workers compensation insurance, or the equivalent, as required by law.
- Comprehensive general liability coverage, or the equivalent, including bodily injury and physical damage, with a per occurrence limit of US $1,000,000.00.

ARTICLE 8

FORCE MAJEURE

8.1 Event of Force Majeure.

Any failure by the Operator or the Owner to carry out any of its obligations under this Agreement will not be deemed a breach of contract or default, other than obligations to pay monies due and payable pursuant to this Agreement, if such failure is caused by an Event of Force Majeure, that Party having taken all appropriate precautions, due care and reasonable alternative measures with the objective of avoiding such failure and of carrying out its obligations under this Agreement. If any activity is delayed, curtailed or prevented by an Event of Force Majeure, then, anything in this Agreement to the contrary notwithstanding, the time for carrying out the activity thereby affected and the term of this Agreement will each be extended for a period equal to the total of the periods during which such causes or their effects were operative, and for such further periods, if any, as are necessary to make good the time lost as a result of such Event of Force Majeure.

8.2 Notice; Cooperation.

The Party whose ability to perform its obligations is affected by an Event of Force Majeure shall notify as soon as practicable the other Party in writing, stating the cause, and the Parties shall endeavor to do all reasonable acts and things within their power to remove such cause. No Party is obligated to resolve or terminate any disagreement

with third parties, including labor disputes, except under conditions acceptable to it or pursuant to the final decision of any arbitral, judicial or statutory agent having jurisdiction to finally resolve the disagreement. As to labor disputes, any Party may request the other Party to cooperate in a joint endeavor to alleviate any conflict which may arise.

ARTICLE 9

TERM AND TERMINATION

9.1 Term of Agreement.

This Agreement becomes effective as of the Effective Date and, unless terminated by either Party pursuant to this Article 9, will terminate upon the termination of the Equipment Purchase Agreement.

9.2 Termination by the Owner.

This Agreement may be terminated at any time by the Owner if the Operator breaches any of its material obligations under this Agreement and Operator fails to cure such breach within 90 days of the receipt of written notice from the Owner; provided that the exercise of any termination right to be effective must occur within 90 days after the Owner becomes aware that its termination right exists. The Operator will have the opportunity, within 90 days of receiving notice of the event or breach to cure the event or breach, or, if such event or breach is not reasonably capable of being cured within such period, to submit to the Owner a plan (an **"Operator Remedial Plan"**) calculated to cure such event or breach within an additional reasonable period of time. The Owner may terminate this Agreement if, having commenced actions to cure the event or breach in accordance with an Operator Remedial Plan, the Operator fails to pursue such actions diligently or is unable to effect a cure within the period contemplated in the Operator Remedial Plan; provided that if the existence of such event or breach is disputed, such termination may occur only following resolution of the dispute regarding the existence or non-existence of a breach. The Date of Termination shall be the date that all conditions and contingencies to termination have been satisfied and the Owner is entitled to terminate this Agreement.

9.3 Termination by the Operator.

This Agreement may be terminated at any time by the Operator if the Owner breaches any of its material obligations under this Agreement, and Owner fails to cure such breach within 90 days of the receipt of written notice from Operator. The Operator shall have the right to immediately suspend performance hereunder in the event of any such default, until the same is cured by the Owner, and the Owner shall have no rights against the Operator in respect of such suspension until the time of such cure. Additionally, the Operator may terminate this Agreement if any change in ownership results in the Operator no longer being an Affiliate of the Owner. The exercise of any termination right to be effective must occur within 90 days after the Operator becomes aware that its termination right exists. The Date of Termination shall be the date that all conditions and contingencies to termination have been satisfied and the Operator is entitled to terminate this Agreement.

9.4 Transition to New Operator.

In the event of any termination under Section 9.2, the Owner may request that the Operator continue to maintain a sufficient number of local and expatriate employees to assist in training a replacement operator and to perform such other transition work as the Owner may reasonably request, and the Operator shall comply with any such request for a period not to exceed three months.

ARTICLE 10

LIMITATIONS OF LIABILITY

Neither of the parties shall have liability for consequential damages to the other arising out of this agreement or the transactions, events or occurrences related thereto and each hereby waives any and all such claims for consequential damages against the other.

ARTICLE 11

CONSULTATION AND ARBITRATION

11.1 Arbitration.

- If any Dispute arising out of this Agreement cannot be resolved by the Parties, then such Dispute shall be resolved by binding arbitration pursuant to the Commercial Arbitration Rules of the American Arbitration Association. The arbitration shall be the sole and exclusive forum for resolution of such Dispute, and the award rendered shall be final and binding. Judgment on the award rendered may be entered in any court having jurisdiction thereof.
- The arbitration shall be conducted in the English and shall be held in Salt Lake City, Utah.
- Any award of the arbitrator(s) (i) shall be in writing, (ii) shall state the reasons upon which such award is based and (iii) may include an award of costs, including reasonable attorneys fees and disbursements.
- The arbitrators shall have no authority to award consequential damages or punitive damages or any other damages not measured by the prevailing Partys actual direct damages, and the arbitrators may not, in any event, make any ruling, finding or award that does not conform to the term and conditions of this Agreement.
- Any Party may make an application to the arbitrators seeking injunctive relief to maintain the status quo until such time as the arbitration award is rendered or the dispute, controversy or claim is otherwise resolved. Any Party may also apply to any court having jurisdiction and seek injunctive relief in order to maintain the status quo until such time as the arbitration award is rendered or the dispute, controversy or claim is otherwise resolved. In the course of resolving Disputes, to the extent practicable, the Parties shall continue to perform the terms and conditions of this Agreement that are not in dispute.

ARTICLE 12

REPRESENTATIONS AND WARRANTIES

12.1 By the Owner.

In order to induce the Operator to enter into this Agreement the Owner makes the following representations and warranties as of the date hereof, which survive the execution and delivery hereof:

- the Owner is an individual having all requisite power and authority to enter into and perform this Agreement;
- the execution, delivery and performance of this Agreement (i) have been duly authorized by all necessary actions on the part of the Owner, and (ii) will not result in any violation of or conflict with or constitute a default under any provision of applicable law or of any judgment, decree or order of a court or Governmental Instrumentality applicable to the Owner or any material agreement or other instrument to

which the Owner is a party or by which it is bound, including the Energy Sales Contract; and
- this Agreement constitutes a valid and binding obligation of the Owner.

12.2 By the Operator.

In order to induce the Owner to enter into this Agreement, the Operator makes the following representations and warranties as of the date hereof, which survive the execution and delivery hereof:

- it is a corporation duly organized, validly existing and in good standing under the laws of the State of Nevada and has all requisite corporate power and authority to enter into and perform this Agreement;
- the execution, delivery and performance of this Agreement (i) have been duly authorized by all necessary corporate action on its part and (ii) will not result in any violation of or conflict with or constitute a default under any provision of applicable law or its charter or by-laws or any judgment, decree or order applicable to it or any material agreement or other instrument to which it is a party or by which it is bound; and
- this Agreement constitutes a valid and binding obligation of the Operator.

ARTICLE 13 MISCELLANEOUS

13.1 Governing Law.

This Agreement is governed by and construed in accordance with the laws of the State of Utah, United States of America.

Signature

IP Digital Signal: 108.171.132.160

Seller

By: Neldon Johnson - RaPower-3

Neldon Johnson - Director -

Signature

EQUIPMENT PURCHASE AGREEMENT

This Equipment Purchase Agreement ("Agreement") is made and entered into this 18 day of December 2008 by and between International Automated Systems, Inc., a Utah corporation with offices at 326 North Highway 6, Salem, UT 84653, hereinafter referred to as "Seller", and, Ilios, LLC, a Florida limited liability company whose address is 3016 S.E. Dune Drive Stuart, Florida 3499[illegible], hereinafter referred to as "Purchaser".

BACKGROUND

Seller is the owner of certain proprietary alternative energy technology, hereinafter "IAS Technology", which technology relates to solar energy collection and which technology is utilized for the design and fabrication of certain equipment and components which are referred to below and which are hereinafter collectively referred to as "Alternative Energy System".

Seller and Purchaser now desire to enter into an agreement whereby Seller will sell Purchaser Alternative Energy Systems specifically described below.

AGREEMENT

NOW, THEREFORE, the parties hereto agree as follows:

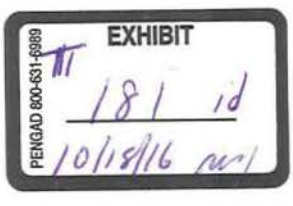
1. Seller hereby sells to Purchaser and Purchaser hereby purchases from Seller each Alternative Energy System and its components, which includes IAS Technology, and this Agreement shall serve as the Bill of Sale for the Alternative Energy Systems. The number of Alternative Energy Systems purchased by Purchaser from Seller under this Agreement shall be 50. Seller shall furnish, deliver, install and startup the Alternative Energy System at a site provided by Seller in Delta, Utah, hereinafter referred to as the "Installation Site".

2. Seller agrees to complete the following for each Alternative Energy System in accordance with the schedule stated:

a. Seller shall furnish, deliver, install and startup each Alternative Energy System at the Installation Site by December 31, 2008, hereinafter referred to as the "Installation Date" and represents that it has obtained or will obtain prior to the Installation Date all necessary permits, approvals and licenses needed or required to install and operate, at all times hereunder, each Alternative Energy System.

b. Seller shall provide to Purchaser all required documentation relating to each Alternative Energy System and its components in Seller's possession and as requested by Purchaser from time to time for federal, state and local review of the Alternative Energy System for potential tax benefits or any other purpose.

3. Purchaser shall pay to Seller the sum of $30,000 for each Alternative Energy System, hereinafter referred to as the "Purchase Amount" which includes the IAS Technology, the cost of delivery, installation, startup and the cost of all warranty and repair work performed during the Warranty Period as described below. The Purchase Amount shall be paid as follows:



a. Upon execution for this Agreement, Nine Thousand Dollars ($9,000) for each Alternative Energy System for a total of Four Hundred and Fifty Thousand Dollars ($450,000) ("Initial Down Payment").

b. Commencing after the 5th anniversary of this Agreement and for thirty (30) years thereafter, Seven Hundred Dollars ($700) for each Alternative Energy System ("Annual Installments") and payable at any time from revenue received from the energy sold as contemplated in Section 5 below or by Purchaser, but in no event later than December 31 of the year in which payment is due. 35,000

c. The Initial Down Payment and Annual Installments shall be made payable to Seller and forwarded to Seller's address listed above or any other address as directed by Seller at any time hereafter.

4. Each Alternative Energy System shall be installed in a workmanlike manner and operated only at the Installation Site and shall be operated, managed and maintained during the Warranty Period by an independent Operations and Management Company, namely LTB, LLC, with principal offices at Las Vegas, Nevada, hereinafter referred to as "Operations and Management Company". In the event that Operations and Management Company shall cease to operate and manage the Alternative Energy System for any reason during the Warranty Period, a substitute operations and management company or person shall be selected and employed by Purchaser to operate and manage the Alternative Energy System.

5. The Seller guarantees that the energy generated from each Alternative Energy System shall be sold after the Installation Date and all amounts received from the same shall be paid to Purchaser. Unless otherwise elected by Purchaser, all amounts generated from the sale of the energy as contemplated hereunder shall be collected by the Operations and Management Company or any substitute operations and management company or person selected by Purchaser. . If collectively the Alternative Energy Systems do not generate a minimum of $35,000 per year for each year that Purchaser owes an Annual Installment, Purchaser may terminate this Agreement upon written notice to Seller at Seller's last known address and upon termination Purchaser shall be released and forever discharged from any and all amounts then due or due thereafter and from any other obligations under this Agreement.

6. The Seller represents that each Alternative Energy System will be installed and operational no later than December 31, 2008 and in sufficient time to meet IRS standards of an active investment. In the event Seller fails to meet these active investment standards or if the IRS deems the investment as passive precluding Purchaser from obtaining the tax benefits expected or contemplated hereunder by Purchaser, this Agreement may be terminated by Purchaser upon written notice by Purchaser to Seller, and the Initial Down Payment shall be promptly, but in no event more than fourteen (14) days after receipt of such written notice, refunded to Purchaser.

7. If Seller shall fail, for any reason, to deliver, install and startup each Alternative Energy System at the Installation Site by December 31, 2008, Seller, upon written request from Purchaser, shall promptly, but in no event more than fourteen (14) days after receipt of such written notice, refund to Purchaser the Initial Down Payment.

8. Seller hereby warrants commencing on the Installation Date and for thirty-five (35) years thereafter ("Warranty Period") that the Alternative Energy System shall be free of defects and maintained and repaired as needed and at all times remain in a good operating condition. Seller shall initiate within ten (10) business days or as soon as practical after becoming aware that an Alternative Energy System is not in good operating condition, the maintenance or repair of any non-functioning component of the Alternative Energy System. Seller shall be responsible for the cost and expense of the maintenance and repair of each Alternative Energy System during the Warranty Period.

9. Seller and Purchaser acknowledge that the Target Production Rate from the Alternative Energy System is 250,000,000 (Two-Hundred and Fifty Million) British Thermal Units ("BTU's") per year and the Warranty Production Rate is ninety-five percent (95%) of the Target Production Rate per year. Seller hereby warrants that for the initial five-year period from the Installation Date to a date five years following the Installation Date, the energy production for the Alternative Energy system, shall be no less than five times the Warranty Production Rate. However, if the average cloud cover for the initial five year period exceeds by more than ten percent (10%) of the ten year average cloud cover for the Installation Site as measured at the nearest weather station maintaining cloud cover records for the ten calendar year period immediately preceding the year of the Installation Date, the Warranty Production rate, for the initial five year period, shall be reduced to the ratio of the ten year average cloud cover to the actual average cloud cover for the initial five year period, multiplied times the Warranty Production Rate. This reduced production rate shall be referred to hereafter as the Adjusted Warranty Production Rate.

In the event that the actual energy production rate from the Alternative Energy System during the initial five year period is less than the Warranty Production Rate, or the Adjusted Warranty Production Rate if an adjustment is made as described above, Purchaser shall have the option to terminate this Agreement and relinquish the Alternative Energy System to Seller. Purchaser shall thereafter have no further obligation under this Agreement to make any further payment or to perform any other obligation to Seller arising under this Agreement, except to cooperate with and assist Seller in obtaining possession of the Alternative Energy System. If Purchaser elects to terminate this Agreement as provided above, Purchaser shall not be entitled to a reimbursement of any portion of the Initial Down Payment. The foregoing option to terminate must be exercised by Purchaser in writing and within sixty (60) calendar days following the expiration of the 5th year after the date of this Agreement.

10. Except for Purchaser's rights for a the return of the Initial Down Payment and related to Seller's obligations to maintain and repair the Alternative Energy System, Purchaser hereby waives any and all claims against Seller, including but not limited to claims for damages due to delays in preparing plans, delays in applying for or obtaining approvals or permits, delays in the delivery, installation, or start-up, or delays in performing warranty work beyond the reasonable control of Seller. This waiver includes any and all direct and indirect consequential damages.

11. Purchaser hereby waives any and all claims against Seller for delays, including but not limited to claims for damages due to delays in preparing plans; delays in applying for or obtaining approvals or permits; delays in the delivery, installation, or start-up; or delays in performing warranty work. This waiver includes any and all direct, indirect or consequential damages.

12. The Operations and Management Company shall maintain Comprehensive General Liability Insurance or other applicable insurance in limits not less than $1,000,000 insuring against bodily injury, property damage, product liability or other claims related to the design, manufacture, delivery, installation, start-up, operation or maintenance of the Alternative Energy System and naming Purchaser as an additional insured.

13. This Agreement shall not be assigned by Purchaser without the express written consent of Seller. Seller may assign its rights and obligations under this Agreement but Seller shall remain liable to Purchaser for the failure of its assignee to perform the obligations of Seller under this Agreement.

14. This Agreement shall be binding upon the successors and assigns of each of the parties.

15. Seller makes no representations or warranties, expressed or implied, including the implied warranty of merchantability and fitness, except as expressly stated in this Agreement.

16. Unless required by law or to prevent a known harm or deterioration of the Alternative Energy System, Purchaser shall not repair, modify or adjust the Alternative Energy System or any component thereof and Purchaser agrees to prohibit anyone other than Seller's authorized personnel to repair, modify or adjust the Alternative Energy System or any component thereof.

17. Purchaser shall promptly and without delay notify Seller of any accidents, casualties, disabilities, failures or like information concerning the Alternative Energy System.

18. Purchaser agrees that the Alternative Energy System shall be used and operated only at the Installation Site and in accordance with the "Safety and Operating Guidelines" which shall be written and set forth by Seller. A copy of which shall be delivered to Purchaser. The Alternative Energy System shall not be relocated by Purchaser without the written consent of Seller.

19. Any notice under this Agreement shall be deemed sufficient if it is in writing and it is delivered to Purchaser, personally or sent by mail addressed to Purchaser at the address set forth above.

20. Seller reserves the right to file or record such documents and instruments as it may deem necessary from time to time to protect its rights, liens, title and interest in the Alternative Energy System. Purchaser agrees to reasonably cooperate with Seller and to execute such documents as may be required or requested by Purchaser to assist Seller in protecting its rights, liens, title and interest in the Alternative Energy System.

21. In the event of the breach of this Agreement by either party, the prevailing party shall be entitled to recover its costs, attorney fees, arbitration costs and arbitration fees incurred in enforcing this Agreement and in pursuing appropriate remedies.

22. Seller and Purchaser acknowledge that they each understand that the Alternative Energy System may qualify for certain tax incentives and benefits under the 2005 Energy Policy Act and other statutes. Purchaser agrees to obtain the evaluation and opinion of its own tax attorney or accountant as to any tax matters relating to this Agreement and to the Alternative Energy System. Seller does not guarantee any tax incentive or benefit to Purchaser. Seller

hereby transfers to Purchaser any and all energy tax credits, if any, related to the Alternative Energy System. Seller shall not claim any such energy tax credits. Seller and Purchaser agree that the respective initial value of the Alternative Energy System is listed on the attached Exhibit "A".

23. In the event of a dispute arising out of this Agreement or the transactions, events or occurrences related thereto, either party shall have the option of electing to have such dispute resolved by binding arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association with all hearings and other proceedings in that arbitration being conducted in Salt Lake City, Utah.

24. This Agreement shall be construed in accordance with the laws of the State of Utah.

25. This is the entire agreement between the parties. This agreement shall not be modified except by written amendment signed by Purchaser and Seller.

PURCHASER
#ILIOS, LLC

By: Patricia Lambrecht
Title: Member

SELLER
INTERNATIONAL AUTOMATED SYSTEMS, INC.

By:
Its: CEO for International Automated Sys. Inc.

Alternative Energy System Purchase Referral Fee Contract
(BONUS)

This Referral Fee Contract is made by and between RaPower-3 of 4035 South 4000 West, Deseret, UT 84624, and: **PETER C. GREGG**
Hereinafter referred to as ("Purchaser"), with an address of:

38490 BICKFORD STREET SANDY, OR 97055

In consideration for; (a) the purchase by Purchaser of Alternative Energy Systems as evidenced by the execution of the Equipment Purchase Agreement dated: **4/12/2011** (hereinafter referred to as "Equipment Purchase Agreement"); (b) the payment by Purchaser to RaPower-3 of the Purchase payment at the time of signing the Equipment Purchase Agreement; and (c) Purchaser agreeing to make the Systems available to IAS as a reference for marketing and sales purposes to show and demonstrate to potential customers ("New Customers"), Purchaser has earned and shall thereafter receive a referral fee (the "Referral Fee," is more fully explained below) for services performed by allowing access and use for sales purposes, for each System purchased, the Referral Fee shall be zero point zero and zero and zero six percent (0.0006%) on referral amounts up to One Billion Dollars ($1,000,000,000) of gross revenue received by International Automated Systems (IAS).

As evidenced by the execution of the Equipment Purchase Agreement, the total number of Systems purchased by Purchaser is: **26**

The total Referral Fee is **0.0156%**

This agreement is based upon proof of purchase and is paid in full on Order ID:

38-1091-4122011911

PURCHASER: **PETER C. GREGG** DATE: **4/12/2011**

RAPOWER-3: _____ DATE: 4/12/2011
MANAGING PARTNER

RAPOWER-3 SPONSOR: **ROGER FREEBORN**

EQUIPMENT LEASE AGREEMENT

This Equipment Lease Agreement ("Agreement") is made and entered into this 28 day of Dec, 2005 by and between International Automated Systems, Inc., a Utah corporation with offices at 326 North Highway 6, Salem, UT 84653, hereinafter referred to as "Lessor", and MJM Holding, whose address is 843 West 2400 South, hereinafter referred to as "Lessee".

BACKGROUND

1. Lessor is the owner of certain proprietary alternative energy technology, hereinafter "IAS Technology", which technology relates to solar energy collection and which technology is utilized for the design and fabrication of certain components which are identified below and which are hereinafter collectively referred to as the "Alternative Energy System".

2. Lessor and Lessee now desire to enter into an agreement whereby Lessor will lease to Lessee the Alternative Energy System specifically described below.

AGREEMENT

NOW, THEREFORE, the parties hereto agree as follows:

1. Lessor hereby leases to Lessee and Lessee hereby leases from Lessor for a period of 72 months, hereinafter referred to as the "Lease Period", from the Installation Date stated below, the Alternative Energy System consisting of the system components identified on the attached Exhibit "A". Lessor shall furnish, deliver, install and startup the Alternative Energy System, at a site provided by Lessee at Fresno, California, hereinafter referred to as the "Installation Site".

2. Lessor agrees to complete the following for the Alternative Energy System in accordance with the schedule stated:

a. Lessor shall, by ~~Undetermined~~ ("Plan Date") provide plans, specifications and other documentation and engineering as required to obtain approval for the Alternative Energy System by local, state and federal agencies and to obtain necessary building permits and other permits and to obtain environmental, land use and zoning approval. Lessor agrees to represent Lessee in applying, on behalf of Lessee, for regulatory agency approval and in obtaining required building and other permits for the Alternative Energy System. Lessee shall cooperate with Lessor and assist Lessor, including executing required documents, as needed in obtaining the required regulatory agency approval and in obtaining the required permits. Application and permit fees shall be paid by Lessor on behalf of Lessee.

b. Lessor shall, by 3-1-06 or within six (6) months of the Plan Date, hereinafter referred to as the "Permit Date", obtain, on behalf of Lessee, all required regulatory agency approvals, land use and zoning approvals, building permits and other permits.

c. Lessor shall furnish, deliver, install and startup the Alternative Energy System at the Installation Site, by 6-1-06, or within six (6) months of the Permit Date, whichever is later, hereinafter referred to as the "Installation Date".

d. Lessor shall provide to Lessee all required documentation relating to the Alternative Energy System and its components as requested by Lessee for federal, state and local review of the Alternative Energy System for potential tax benefits.

3. Lessee shall pay to Lessor the sum of $18,000^{00}, hereinafter referred to as the "Total Lease Amount" for the lease of the Alternative Energy System for the Lease Period stated above. This includes the cost of delivery, installation and startup, as well as the cost of warranty work performed during the warranty period described below. The Total Lease Amount shall be paid in accordance with the following schedule:

a. Initial Payment in the amount of one half (½) of the Total Lease Amount, which shall be paid at the time that this Agreement is entered into.

b. Final Payment in the amount of one half (½) of the Total Lease Amount to be paid within ten (10) days following the Installation Date.

4. In the event that Lessee fails to pay the Final Payment or any portion of the final payment. when due, interest shall accrue on the overdue amount at the rate of one and one-half percent (1-1/2 %) per month until paid. If the Final Payment or any portion thereof shall become past due by more than thirty (30) days, Lessor shall be entitled, at its sole discretion, to enter the Installation Site and repossess the Alternative Energy System or any or all of the components thereof, and to recover its attorney fees, court costs, arbitration costs, collection costs, repossession fees and expenses incurred in pursuing any or all remedies against Lessee at law or equity, including but not limited to in repossessing the Alternative Energy System or any components thereof.

5. If Lessee fails to pay the Final Payment or any portion thereof when due, or if Lessee becomes subject to any state or federal insolvency, bankruptcy, receivership, trusteeship or similar proceeding, or if Lessee shall default in any other term of this Agreement, Lessor may immediately terminate this Agreement by notice in writing to Lessee and repossess the Alternative Energy System and all of the components thereof as stated above, but Lessee shall nevertheless remain liable for all sums then due and unpaid, plus a reasonable amount for attorneys' fees and such expenses as may be expended in the repossession of the Alternative

Energy System. The remedies provided herein in favor of Lessor shall not be deemed exclusive, but shall be cumulative and shall be in addition to all other remedies existing at law or in equity.

6. If Lessor shall fail, for any reason, to furnish, deliver, install and startup the Alternative Energy System at the Installation Site, by December 31, 2007, or within six (6) months of the Permit Date, whichever is earlier, hereinafter referred to as the "Refund Date", Lessor shall refund to Lessee, within ten (10) days following the Refund Date, the Initial Payment amount as well as the full amount of any other payments made by Lessee on the Total Lease Amount.

7. Lessee shall be responsible to operate, at Lessee's cost, the Alternative Energy System and to use reasonable care at all times to maximize the energy output of the Alternative Energy System. Lessee's obligation to operate the Alternative Energy System shall include the routine service of Alternative Energy System equipment in accordance with service instructions and service schedules provided by Lessor.

8. Lessor shall warrant, for a one year period following the Installation Date, hereinafter referred to as the "Warranty Period", the Alternative Energy System and each of the components thereof, from defects in materials and workmanship. Within five (5) business days following the receipt of written notice from Lessee, Lessor shall initiate reasonable efforts to ascertain repair or replacement requirements, to order replacement parts and equipment needed for repair, and to deploy qualified maintenance personnel. The cost of warranty parts, replacement equipment and labor shall be borne by Lessor.

9. Except as provided under the warranty for the Warranty Period, Lessee shall be responsible to maintain, at Lessee's cost, the Alternative Energy System and shall initiate reasonable efforts to ascertain maintenance requirements, to order replacement parts and equipment needed for maintenance, and to deploy qualified maintenance personnel immediately within five (5) business days of discovery of an apparent maintenance requirement. Except as provided under the warranty for the Warranty Period, the cost of repair parts, replacement equipment and labor shall be borne by Lessee.

10. Lessee hereby agrees to waive any and all claims against Lessor for delays, including but not limited to claims for damages due to delays in preparing plans; delays in applying for or obtaining approvals or permits; delays in the delivery, installation, or start-up; or delays in performing warranty work. This waiver includes any and all direct, indirect or consequential damages.

11. Unless otherwise agreed in writing by the parties, the term of the lease shall be the Lease Period stated above. Extensions of the Lease Period shall only be upon mutual written agreement of the parties entered into prior to the end of the Lease Period.

12. Neither of the parties shall have liability for consequential damages to the other arising out of this agreement or the transactions, events or occurrences related thereto and each hereby waives any and all such claims for consequential damages against the other. Lessor's liability for any breach under this agreement shall be limited to any amounts actually paid by Lessee and received by Lessor under this Agreement.

13. At the end of the Lease Period, or within ten business days thereafter on a date and time selected by Lessor during normal business hours, Lessee shall provide unlimited access by Lessor to the Installation Site for Lessor to take possession of the Alternative Energy System. In the event that Lessee fails to provide access to the Installation Site or otherwise wrongfully retains possession of the Alternative Energy System, Lessee shall pay to Lessor a monthly Holdover Lease Amount equal to two (2) times the Monthly Payment amount stated above.

14. Lessee shall be solely responsible for all damage to the Alternative Energy System resulting from causes from other than normal wear and tear, including any and all damage to or destruction of the Alternative Energy System or any component thereof, during the Lease Period until the Alternative Energy System is recovered by Lessor at the end of the Lease Period. Lessor and Lessee agree that the value of the respective components of the Alternative Energy System are listed on the attached Exhibit "A". Any such damage or destruction shall be remedied by Lessee within ten (10) days of the event causing such damage or destruction. Lessee, at its option, may elect to maintain property damage insurance to insure the interest of Lessee in the Alternative Energy System during the Lease Period. If Lessee subleases the Alternative Energy System to a sub-lessee expressly approved by Lessor, as provided below, with the provisions of any such sublease being essentially identical to the terms of this Agreement, thereby resulting in the sub-lessee assuming all of the obligations of the Lessee under this Agreement, Lessee shall be liable to Lessor for such damage or destruction only to the extent of the liability of the sub-lessee to Lessee and only to the extent of Lessee's ability to collect from the sub-lessee.

15. Lessor may, at its option, maintain property damage insurance on the Alternative Energy System, insuring Lessor's interest in the Alternative Energy System. The existence of insurance coverage insuring the interest of Lessor shall not relieve Lessee of its responsibility for damage to or destruction of the Alternative Energy System. Lessor shall have no obligation to provide property damage insurance with coverage for the interest of Lessee in the Alternative Energy System.

16. Lessor may, at its option, maintain liability insurance to insure Lessor against bodily injury, property damage, product liability or other claims related to the design, manufacture, delivery, installation, start-up, operation or maintenance of the Alternative Energy System. Lessor shall have no obligation to provide liability insurance with coverage of any kind for Lessee.

17. This Agreement shall not be assigned by Lessee without the express written consent of Lessor. However, Lessor and Lessee agree that Lessee may, in the sole discretion of Lessee, sublease the Alternative Energy System to LTB LLC. Lessor may assign its rights and obligations under this Agreement but Lessor shall remain liable to Lessee for the failure of its assignee to perform the obligations of Lessor under this Agreement.

18. This Agreement shall be binding upon the successors and assigns of each of the parties.

19. Lessor makes no representations or warranties, expressed or implied, including the implied warranty of merchantability and fitness, except as expressly stated in this Agreement.

20. Lessor shall use reasonable care in installing and starting up the Alternative Energy System to see that it is in proper working condition before turning operation of the Alternative Energy System over to Lessee. Upon two (2) business days notice from Lessor, Lessee shall designate one or more representatives to witness the operation of the Alternative Energy System to verify that it is in good working condition and that installation and start up are complete.

21. Lessee agrees to operate, maintain and service the Alternative Energy System in accordance with Lessor's Operation and Maintenance Manual and any updates or modifications thereof that may be issued from time to time hereafter, to use the Alternative Energy System and each of its components within their rated capacity as provided by Lessor, to restrict its use to Lessee's authorized personnel, and to prohibit anyone other than Lessor's authorized personnel to repair, modify or adjust the Alternative Energy System or any component thereof. Except for warranty work, Lessor shall invoice Lessee at Lessor's normal hourly rates for such work, including Lessor's applicable rates for work performed after normal business hours or on weekends or holidays.

22. Lessee shall notify Lessor immediately of accidents, disabilities, failures or like information concerning the Alternative Energy System.

23. In the event the Alternative Energy System becomes inoperable for any reason, except as otherwise provided under the warranty during the warranty period, Lessor shall not be obligated to furnish a substitute Alternative Energy System or any component thereof. In any event, Lessor shall not be liable at any time for down time or special or consequential damages of any nature resulting from such inoperability.

24. Lessee agrees that the Alternative Energy System shall be used and operated only at the Installation Site and shall not be relocated by Lessee without the written consent of Lessor.

25. Any notice under this Agreement shall be deemed sufficient if it is in writing and it is delivered to Lessee, personally or sent by mail addressed to Lessee at the address set forth above.

26. This is an Agreement for rental only and nothing herein conveys to Lessee any right, title or interest in or to the Alternative Energy System or any component thereof, except as a Lessee. Lessor reserves the right to file or record such documents and instruments as it may deem necessary from time to time to protect its ownership rights, title and interest in the Alternative Energy System. Lessee agrees to cooperate with Lessor and to execute such documents as may be required or requested by Lessee to assist Lessor in protecting its rights, title and interest in the Alternative Energy System.

27. At the end of the Lease Period, Lessor shall dismantle and remove the Alternative Energy System and all of the components thereof from the Installation Site, and Lessee shall have no further right to the possession or use of the Alternative Energy System.

28. In the event of the breach of this Agreement by either party, the injured party shall be entitled to recover its costs, attorney fees, arbitration costs and arbitration fees incurred in enforcing the agreement and in pursuing appropriate remedies.

29. Lessor and Lessee acknowledge that they each understand and expect that the Alternative Energy System may qualify for certain tax incentives and benefits under the 2005 Energy Policy Act and other statutes. Lessee acknowledges that it has reviewed a tax opinion letter obtained by Lessor from Lessor's accountant. However, Lessee acknowledges and agrees that the tax opinion letter of Lessor's accountant was prepared for the sole use of Lessor and that Lessee shall not rely on the content of that opinion letter. Lessee agrees to obtain the evaluation and opinion of its own tax attorney or accountant as to any tax matters relating to this Agreement and to the Alternative Energy System. Lessor hereby transfers to Lessee any and all energy tax credits related to the Alternative Energy System. Lessor shall not claim any such energy tax credits. Lessor and Lessee agree that the respective values of the components of the Alternative Energy System are listed on the attached Exhibit "A".

The following information is provided for use by Lessee in claiming tax credits as advised by Lessee's tax attorney or accountant:

a. Taxpayer I.D. account number:
   Lessor:_____
   Lessee

b. IRS District Director's office where tax return is filed:
   Lessor: Ogden, Utah
   Lessee: Ogden, Utah

c. Date the property is to be transferred to Lessee; Installation Date
   (Installation Date is defined above - actual Installation Date not known at time this Equipment Lease Agreement is signed)

d. Estimated useful life of Alternative Energy System and components: Fifteen (15) years

Class life (IRC 168(e)(3)(B)(vi): Four(4) to ten(10) years

30. In the event of a dispute arising out of this Agreement or the transactions, events or occurrences related thereto, Lessor shall have the sole option of electing to have such disputes resolved by binding arbitration in accordance with the Commercial Arbitration Rules of the American Arbitration Association with all hearings and other proceedings in that arbitration being conducted in Salt Lake City, State of Utah. Lessor shall have the right to elect arbitration at any time up to and including the time that either party files an Answer in pending litigation between the parties relating to such disputes.

31. This Agreement shall be construed in accordance with the laws of the State of Utah.

32. This is the entire agreement between the parties. This agreement shall not be modified except by written amendment signed by Lessee and Lessor.

LESSEE

By:

R. Gregory Shepard
(Signature)
Title: Partner - MJM Holding

INTERNATIONAL AUTOMATED SYSTEMS, INC.

LESSOR

By: Neldon P. Johnson

(Signature)
Title: President

EXHIBIT A

ALTERNATIVE ENERGY SYSTEM COMPONENT LIST

Quantity	Description of Component	Model No.	Serial No.'s	Value

JUSTIN D. HEIDEMAN (USB #8897)
HEIDEMAN & ASSOCIATES
2696 North University Avenue, Suite 180
Provo, Utah 84604
Telephone: (801) 472-7742
Fax: (801) 374-1724
Email: jheideman@heidlaw.com
Attorney for RAPower-3, LLC, International Automated Systems, Inc., LTB1, and Neldon Johnson

IN THE UNITED STATES DISTRICT COURT FOR
THE DISTRICT OF UTAH

UNITED STATES OF AMERICA, Plaintiff, vs. RAPOWER-3, LLC, INTERNATIONAL AUTOMATED SYSTEMS, INC., LTB1, LLC, R. GREGORY SHEPARD, NELDON JOHNSON, and ROGER FREEBORN, Defendants.	**INTERNATIONAL AUTOMATED SYSTEMS, INC. RESPONSES TO UNITED STATES' FIRST INTERROGATORIES** Civil No. 2:15-cv-00828-DN-BCW Judge David Nuffer Magistrate Judge Brooke C. Wells

Defendant, International Automated Systems, Inc., by and through counsel of record, Justin D. Heideman of the law firm Heideman & Associates, and provides the most complete responses given the time provided, and will be supplemented accordingly, to the following Interrogatories pursuant to Rule 33 of the Federal Rules of Civil Procedure.

Plaintiff Exhibit
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GENERAL OBJECTIONS AND QUALIFICATIONS

Defendant objects to Plaintiff's discovery requests based on the following grounds:

1. Defendant objects to each and every discovery request to the extent that it seeks information prepared in anticipation of litigation or protected by the attorney-client privilege, the

work product doctrine, or any other applicable privilege or immunity. To the extent that any discovery request may be construed as seeking privileged information, Defendant claims such privilege. The fact that Defendant does not specifically object to the discovery request on the grounds that it seeks privileged information shall not be a waiver of the applicable privilege or immunity. Communications between Defendant and the law firm of Heideman & Associates are privileged and together with work performed by that firm or by individuals retained by that firm or retained by Defendant for the purposes of this litigation will not be disclosed and will not be described in any further detail except as may be required by Rule 26(b)(5) or by any scheduling order or other order entered by the Court in this matter. The internal work and communications of Defendant in anticipation of litigation are also privileged and will not be disclosed. Any such documents prepared from the time litigation counsel was consulted with respect to this matter will not be described in any further detail.

2. Defendant objects to each and every discovery request to the extent that it seeks discovery regarding matters that are not relevant to the subject matter of the pending action or that are not reasonably calculated to lead to the discovery of admissible evidence and that further is protected as a matter of trade secret.

3. Defendant objects to each and every discovery request to the extent it purports to impose a burden of identifying documents not in Defendant's possession or control, or that cannot be found in the course of a reasonable search.

4. Defendant objects to each and every discovery request that can reasonably be construed to be overly broad, vague, ambiguous or unduly burdensome.

5. Defendant incorporates, by reference, each of these General Objections and Qualifications into the specific responses to Plaintiffs' discovery requests.

INTERROGATORIES

1. Identify all of your officers, directors, principals, owners, employees and registered agents.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 1 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 1 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 1 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant shall provide information subject to this Court's ruling on Defendant's Protective Order, and will supplement information as needed.

2. Identify all entities in which you have an ownership interest, including the name of the entity, the ownership percentage, the address of the entity and the business in which the entity is engaged.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 1 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 1 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 1 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without

waiving these or the foregoing objections, Defendant responds as follows: : Defendant shall provide information subject to this Court's ruling on Defendant's Protective Order, and will supplement information as needed.

3. Identify all debts that you owe any person or entity for any activity related to a Lens, System or Component and any debts owed to you by any person or entity for any activity related to a Lens, System or Component. Include the dates of origination, terms of repayment, interest rate and amount currently owed.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant is attempting to gather the information requested by Interrogatory No. 15 and will supplement this response as additional information is received.

4. Identify which customers have visited any System, Component or Lens and which customers have not visited any System, Component or Lens.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 3 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to

Interrogatory No. 3 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 3 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant keeps no record of who may or may not have visited any System, Component or Lens and which customers have not visited any System, Component or Lens. Defendant will supplement this response as additional information is received.

5. Identify by name, address, telephone number, and email address, any person or entity that hosts a website you have owned or operated since January 1, 2005.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 4 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 4 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 4 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Rapower3.com and hosted by wix.com. Iaus.boards.net is hosted by Proboards.com. Greg Shepard is responsible for maintaining these websites. Defendant will supplement this response as additional information is received.

6. Identify all websites (whether public or private), by URL address, web host and person(s) responsible for maintaining the website, that promote any System, Lens, or Component or any

business activity involving a System, Lens, or Component, regardless of whether you maintain the website or it is owned or maintained on your behalf.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 5 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 5 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 5 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Rapower3.com and hosted by wix.com, Iaus.boards.net is hosted by Proboards.com, and Greg Shepard is responsible for maintaining these websites. Defendant will supplement this response as additional information is received.

7. Identify all social media accounts, by username and any other information required to access such account (including, but not limited to, Facebook, Twitter, Instagram, Snapchat, Tumblr, YouTube, Periscope, Pinterest, Google Plus, Flipboard, LinkedIn etc.) and email addresses you controlled or operated since January 1, 2005.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 5 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 5 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 5 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without

waiving these or the foregoing objections, Defendant responds as follows: facebook.com/rapower3llc, twitter.com/rapower3, Rapower3.tumblr.com, linkedin.com/company/rapower3llc, google.com/+rapower3llc, youtube.com/user/rapower3llc, pinterest.com/rapower3. Defendant will supplement this response as additional information is received.

8. Identify any electricity grid access agreements, interconnection agreement, or any other agreement in which you obtained the right to provide electricity to any entity. Your response should include the names of the entity or person you entered into the agreement with, the date and the terms of the agreement.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 8 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 8 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 8 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant never entered into any agreements with the entities described in Interrogatory No. 8. Defendant will supplement this response as additional information is received.

9. Identify what efforts, if any, you made to make any application to the United States Department of the Treasury under Section 1603 of the American Recovery & Reinvestment Act of 2009 with respect to any Lens, System or Component. Your response should include the date of

any application and date of response from the Government.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 5 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 5 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 5 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant did not make any applications described in Interrogatory request No. 9. Defendant will supplement this response as additional information is received.

10. Identify the product (i.e., electricity, heat, hot water, cooling, desalinization, solar process heat or any other product) that the Lens, Systems, and Components are intended to produce, either in the past, currently, or in the future. To the extent that any product has been produced or is being produced, identify when it was produced, in what form, in what measurable amount and the revenues received for such product.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 2 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 2 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 2 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. In

particular, Defendant objects because Interrogatory No. 2 contains information that is of a proprietary nature and will be disclosed at the time of a proper protective order or valid non-disclosure agreement between the parties.

11. Identify what, and how many Lenses, Systems and Components have been placed in service, as defined in 26 U.S.C. § 48(a)(1) and Treas. Reg. § 1.46-3(d). Your response should include the dates any Lens, System or Component was placed in service.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 2 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 2 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 2 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. In particular, Defendant objects because Interrogatory No. 2 contains information that is of a proprietary nature and will be disclosed at the time of a proper protective order or valid non-disclosure agreement between the parties.

12. Identify the costs you incurred to produce each lens, including the cost of procuring materials and manufacturing the final product that you sold to customers.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 2 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 2 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 2 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. In

particular, Defendant objects because Interrogatory No. 2 contains information that is of a proprietary nature and will be disclosed at the time of a proper protective order or valid non-disclosure agreement between the parties.

13. Identify how you determined the price each customer must pay per lens, to include the amount of profit, amount of down payment, and the terms of repayment.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 2 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 2 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 2 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. In particular, Defendant objects because Interrogatory No. 2 contains information that is of a proprietary nature and will be disclosed at the time of a proper protective order or valid non-disclosure agreement between the parties.

14. Describe how lenses are accounted for, including how you determine which lens(es) belong to which customer, recording when each lens was placed in service (as defined in 26 U.S.C. § 48(a)(1) and Treas. Reg. § 1.46-3(d)), whether or not each customer's down payment was paid, the outstanding principal remaining due for each lens, the revenue produced by each lens, and the amount of rental income due to each customer.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing,

compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: To the best of Defendants knowledge, serial numbers were tracked through invoices of lens purchases. Defendant will supplement this response as additional information is received.

15. Identify by name, address and telephone number every domestic and foreign bank and/or financial institution in which you have an account or over which you have signatory authority or other such control, and provide the account number, and type of account. In addition, identify the record owner or title of each account.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant is attempting to gather the information requested by Interrogatory No. 15 and will supplement this response as additional information is received.

16. Identify the gross income you have received in each year since 2005 from any source, by

source, for any activity related to any System, Lens or other Component.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant is attempting to gather the information requested by Interrogatory No. 15 and will supplement this response as additional information is received.

17. Identify each instance in which a customer complained that the customer was not receiving adequate rental income from their Lens or Lenses.

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: To the best of Defendants knowledge, serial numbers were tracked through invoices of lens purchases. Defendant will supplement this response as additional information is received

18. Identify all attorneys or other tax advisors you consulted or from whom you received tax advice regarding any Lens, System or Component, including the dates consulted, the dates any advice was received, and the form of the advice (*i.e.*, oral, email, memoranda, opinion letters, other written correspondence, etc.).

RESPONSE: In addition to the objections set forth above and incorporated herein by reference, Defendant objects to Interrogatory No. 14 on the grounds that it is vague, confusing, compound, ambiguous, facially overbroad, unduly burdensome. Defendant further objects to Interrogatory No. 14 (or parts thereof) because it is not reasonably calculated to lead to the discovery of admissible evidence. Defendant also objects to Interrogatory No. 14 because Plaintiff exceeds the number of Interrogatories allowed by rule, including all discrete subparts. Without waiving these or the foregoing objections, Defendant responds as follows: Defendant is attempting to gather the information requested by Interrogatory No. 15 and will supplement this response as additional information is received.

VERIFICATION OF RESPONSES

Pursuant to 28 U.S.C. §1746, I declare under penalty of perjury that the foregoing responses to the UNITED STATES' FIRST INTERROGATORIES TO INTERNATIONAL AUTOMATED SYSTEMS, LLC are true and correct.

EXECUTED this 11th day of July, 2016.

INTERNATIONAL AUTOMATED SYSTEMS, LLC

DATED and SIGNED this 14th day of July, 2016

HEIDEMAN & ASSOCIATES

/s/ Justin D. Heideman
JUSTIN D. HEIDEMAN
Attorney for Defendants

CERTIFICATE OF SERVICE

On this 14th day of July, 2016, I hereby certify a true and correct copy of the forgoing **DEFENDANT'S INTERNATIONAL AUTOMATED SYSTEMS, LLC's RESPONSE TO UNITED STATES' FIRST INTERROGATORIES** was served on the following:

Party/Attorney	Method
Former Attorneys for Defendants James S. Judd Richard A. Van Wagoner Rodney R. Parker Samuel Alba Snow Christensen & Martineau 10 Exchange Place 11th FL P.O. Box 45000 Salt Lake City, Utah 84145 Tele: (801) 521-9000 Email: jsj@scmlaw.com rvanwagoner@scmlaw.com rparker@scmlaw.com sa@scmlaw.com	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice and Email
Attorney for Defendants R. Gregory Shepard Roger Freeborn Donald S. Reay Reay Law PLLC 43 W 9000 S Ste B Sandy, Utah 84070 Tele: (801) 999-8529 Email: donald@reaylaw.com	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice and Email
Pro Hac Vice Attorney for Plaintiff Erin Healy Gallagher US Department of Justice (TAX) Tax Division P.O. Box 7238 Washington, DC 20044 Phone: (202) 353-2452 Email: erin.healygallagher@usdoj.gov	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice and Email

Pro Hac Vice Attorney for Plaintiff Erin R. Hines US Department Justice Central Civil Trial Section RM 8921 555 4th St NW Washington, DC 20001 Tele: (202) 514-6619 Email: erin.r.hines@usdoj.gov	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice and Email
Attorney for Plaintiff John K. Mangum US Attorney's Office (UT) Tele: (801) 325-3216 Email: john.mangum@usdoj.gov	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice and Email
Pro Hac Vice Attorney for Plaintiff Christopher R. Moran US Department of Justice (TAX) Tax Division PO Box 7238 Washington, DC 20044 Tele: (202) 307-0234 Email: christopher.r.moran@usdoj.gov	Hand Delivery U.S. Mail, postage prepaid Overnight Mail Fax Transmission X Electronic Filing Notice

HEIDEMAN & ASSOCIATES

/s/ Suzanne Peterson
Suzanne Peterson Legal Assistant