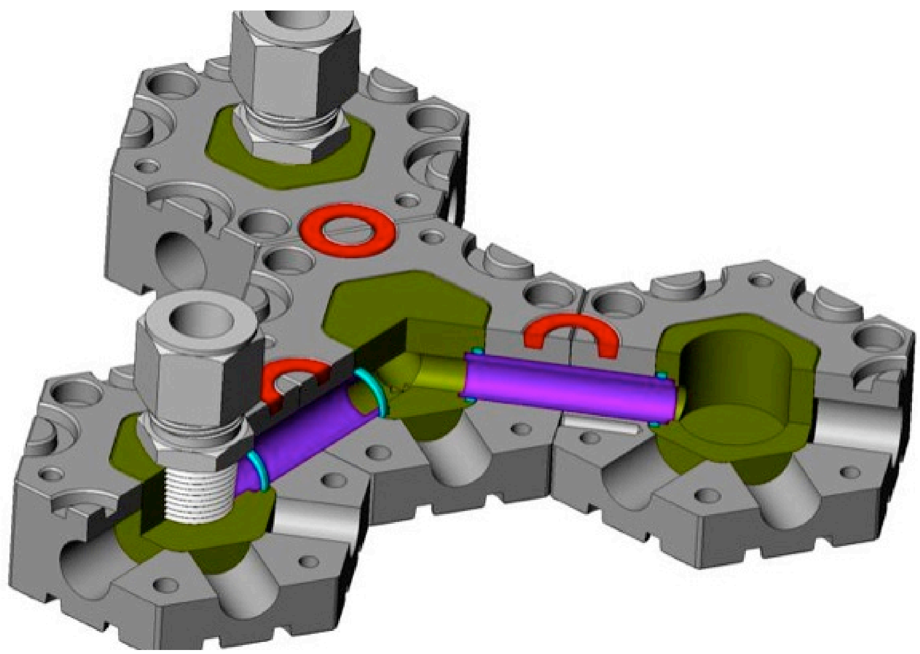
Ocean Fuels



November 26, 2007

Madison, Wisconsin

Executive Summary

Producing fuel from carbon dioxide (CO_2) could revolutionize how we produce, distribute and sell energy.

Making a liquid from a gas has been proven a long time ago, but now we have the opportunity to reshape how our country can utilize a greenhouse gas, to make the fuel that runs our engines, produces energy, and provides the basic chemical building blocks that run our industries.

Using oil and other fossil fuels as the basis of our energy system, has led to pollution, global warming and the interdiction of military forces in foreign lands to protect our interests which are the foundation of our industrial network. Not only does oil provide the fuel for our transportation, but also feedstock for other energy uses as well as industrial chemicals. Because our energy system is so dependent on oil, natural disasters such as hurricanes can literally wipe out production facilities refineries, which result in skyrocketing prices. The small number of refineries leads to shortages, wild price fluctuations, and the trickle down effect in raising costs to consumers. Not only can this lead to inflation, but it accosts the very fabric of our industrial infrastructure. Since natural gas is tied to the price of oil, other feedstocks can also be effected.

Currently the methanol market is controlled by Methanex, who uses natural gas as its feedstock to make methanol. Due to methanol refinery shutdowns and the price of natural gas, the price of methanol doubled from $.80 to $2.00 per gallon in just over a year.

The solution is converting CO_2 gas to methanol, a modular fuel production process developed by Greg Giese, of Madison, Wisconsin. There are a number of gas-to-liquid processes that he has developed, but the most promising is the reverse fuel cell. This concept takes a fuel cell with a special catalyst membrane, and converts CO_2 gas, water and electricity into methanol. With some adjustments in catalyst, it can also produce butanol, which is also an alcohol.

Methanol is an industrial feedstock. Methanol and butanol are alcohol's which can be used in any FlexFuel vehicle blended as M85. Butanol has been identified to be used in a 100 percent mixture, directly in any unmodified gasoline engine. It has also been suggested that butanol could be the future fuel that powers our jet turbines.

Just as important as the gas-to-liquid process, is the infrastructure that provides the production and distribution of the methanol. The miniplant is a method to provide distributed fuel production, and point-of-use fuel production. A miniplant can be used in a vending machine to provide fuel for methanol fuel cells - which will power our digital devices. It can also be used at a gas station to provide blended fuel. Other uses include installing miniplant at the source of CO_2 industrial byproducts, such as grain based ethanol plants, powerplants, and natural gas processing plants, where huge amounts of CO_2 are vented to the atmosphere. Ultimately, we can harvest CO_2 from the surface of the sea water, where it is sixty times more plentiful than in air.

The benefits of such a process reach from the consumer and industry, to the environment. For the consumer, it provides a green alternative to oil, at a reduced cost. Cleaner burning means it's good for the environment, and since the feedstock is CO_2, it is a carbon neutral process. Ultimately, as CO_2 is made into a fuel, then combusted, it is returned to the ocean from rain, then harvested and the cycle completes itself.

This revolutionary process provides a complete solution - from CO_2 fuel production, distribution and utilization by the consumer or to industry.

Problem

The main problem with our existing fuel and industrial chemical infrastructure is supply disruptions and environmental risk.

When any part of the supply is disrupted, it is reflected by large price swings. This is compounded even worse by the stock market speculators, who trade futures in fuel and chemical commodities. In an equally bad turn of events, human interaction can also disrupt supply - for example if more than one refinery is shut down, prices go up. This happened recently with Methanex, when the wholesale cost of methanol increased in a matter of months from $.90 per gallon to over $1.90 per gallon.

With only 26 large petroleum refineries in and around the United States, just about any disruption results in price hikes. This includes shutdowns from equipment maintenance, fires, and even hurricanes.

In the worst case, such as the Exxon Valdez, human error can result in huge environmental catastrophes. But the biggest looming environmental risk will be global warming.

Our system of fuel production is antiquated, and in bad need of replacement.

Our system of energy acquisition - including coal, natural gas and oil, needs to be replaced by a system that has less impact on the environment, in the local as well as world scale.

The governments system to insure our access to foreign oil has untold inherency's, which have resulted not only in war, but in huge cost burdens to the U.S. taxpayer.

The recent surge in interest for hydrogen as a replacement fuel for our transportation system is full of problems, not the least of which is the fact that we can't produce it cheap enough, or have any vehicles that can actually now use the hydrogen as.

For industrial chemicals, Methanex has the monopoly in methanol production. This means they can control the price of the commodity, and can impact its price by adjusting production (whether it's voluntary or not). Just the shut down of two of its refineries resulted in a 100 percent increase in price.

Because of the price shocks of methanol, it is unlikely we'll ever see methanol-to-gas facilities in the United States, unless other, more stable sources of methanol can be found. The MTG process was developed by Mobil and tested successfully in a large plant in New Zealand.

In summary, the problem with our existing system is that it is prone to supply disruptions - whether it’s the supply of the feedstock (oil) or the distribution network (refineries). With the centralized refinery system that supplies our entire transportation and industrial network, any disruptions will incur price fluctuations. In addition, our current energy system is based on fossil fuels, which themselves lead to pollution and global warming.

Solution

The solution to the problem is to produce a fuel from carbon dioxide.

The original concept by Greg Giese was developed partially by Ocean Ethanol. The goal was to produce ethanol from CO2. Experimentation was done at Battelle, Pacific Northwest Labs in Hanford Washington under the direction of Ocean Ethanol. The result of the catalyst experimentation yielded success in combining carbon dioxide and hydrogen over a Fischer Tropsch catalyst. Because hydrogen was needed as part of this procedure, the original investor lost faith in the project, when inexpensive hydrogen was not found in the early stages and dropped funding. Part of the process was to recycle the carbon monoxide byproduct and in a water gas shift process, generate a significant portion of the hydrogen needed in the input. Unfortunately, results of that part of the experiment were never known because when funding stopped, they stopped all experimentation.

An interesting side experiment from the catalyst development above was a very active methanol producing formula. This was good for both CO2 and H2 feedstocks, as well as syngas.

The research and development shifted to focus on methanol when it was discovered that it was a much more efficient process, and that methanol could not only be used in any FlexFuel vehicle, but also was the feedstock for a methanol-to-gasoline (MTG) process developed by Mobil more than 20 years ago. In addition, the state and Federal tax credits were the same for methanol (or any alcohol for that matter).

In an effort to eliminate the need for external hydrogen gas to complete the process to produce alcohol, Mr. Giese suggested that a methanol fuel cell be reversed - essentially taking a proven process and running it backwards, so that all was need was CO2, water and electricity.

Initial experiments were carried out, and produced enough results to encourage further development. In initial estimates, it was calculated that 100-300 cubic feet of carbon dioxide was needed to produce a gallon of methanol. The electricity need to carry out the reaction was calculated anywhere between 10-15 kilowatts. Mr. Giese suggested that there might be a way to combine the catalyst formula from the original catalyst (Fischer Tropsch) experiments and apply them to the fuel cell membrane to increase efficiency.

The initial reverse fuel cell experiments also produced an alcohol very near butanol, which has been identified as a possible future turbine fuel.

With a process to produce methanol, a device was needed that could not only act as a reactor for the process, but also a method which could easily be modified to increase production.

For this, Mr. Giese has invented the Modular Block - basically a hexagonal metal block with pre-bored channels that can be interconnected by screws. Blocks can be easily interchanged and reconfigured for prototyping, pilot plants, maintenance and increasing fuel production. Used in the fashion of a small refinery, the blocks will form a miniplant.

The miniplant is compact, but will allow numbering up and scale up opportunities. Modular fuel production was then born. From an installation at a gas pump where methanol can be blended at point-of-use to consumers, to ethanol plants where the CO2 byproduct can produce industrial methanol, fuel production can now be decentralized and even containerized for use anywhere in the world where there is CO2 and electricity.

Business Model

The business model to carry out the modular fuel production is as follows:

A. Invent - Innovate

Start with a novel concept that capitalizes on existing technologies, but provides a innovative path to make a new and profitable process.

B. Design

Take the concept and put it on the computer in the form of CAD/CAM. Consult with experts to modify components of the concept so that it works in the real world.

C. Prototype

Take the concept and turn into reality. For the process, this means catalyst formulations and experimentation. For the process production, the Modular Blocks are reconfigured to match the process.

D. Test and Maximize Efficiency - Minimize Waste
Test the process with the Modular Blocks in various configurations - to maximize the output of the process with the least amount of feedstocks.

E. Patent

With a working concept, let the intellectual property experts file patents where necessary. Also secure any trademarks and web domain names which may apply.

F. License - Bring to Market

License the technology to provide revenue.

G. Redistribute

Use portion of revenue stream to complete cycle and add complimentary technologies to enhance existing work.

Note: In all of the stages above, there is a keen awareness to make the process modular and container mounted equipment whenever possible. This allows access to markets worldwide.

Underlying Magic

The underlying magic of this development is the ideas and innovation of the development team.

Ideas come from people to solve problems and the focus of the development will be to solicit unique and revolutionary concepts to make fuel from carbon dioxide.

The concept of the Modular Block give this project a huge jump on any other technologies, because it allows us to have fuel production on any scale. It also allows us to have faster prototyping since the blocks can be reconfigured just by refastening blocks to create improved catalyst structures.

Modular fuel production will allow us to focus on producing methanol from CO2 first on a very small scale, while simultaneously allowing us to multiply production without many of the inherency's with the current system of huge refineries.

The key elements to my modular fuel production are:

A. Tunable Catalyst

Innovative strategies allow us to tune a catalyst on-the-fly to configure a catalyst, or enhance production from that catalyst.

B. Modular Block

The Modular Block allows for rapid configuration of any process. Standard channel sizes also allow the merging of our process technology, along with existing gas and liquid technologies.

C. Miniplant

The miniplant concept is the combination of several Modular Blocks when put together, perform a complete process.

D. Distributed Production

Using miniplants, we can produce methanol anywhere from 1 liter per hour, to thousands of liters per hour.

E. Point of Use

Instead of refining oil to make fuel, transporting it, storing, and then dispensing it, this concept produces fuel when and where it’s needed. This can significantly reduce and in some cases eliminate transportation and storage costs, as well as the hazards associate with transporting, storing and handling volatile fuel.

Marketing and Sales

Initially, the marketing and sales of the process will be to existing industries that have carbon dioxide as a byproduct of their manufacturing process.

This can be any industry from ethanol plants, to natural gas processing facilities.

Each year millions of tons of carbon dioxide are vented to the atmosphere from natural gas processing facilities. These same facilities have a need for methanol.

Ocean Fuels would license the technology and act primarily as the research and development group.

A separate organization could be set up to handle worldwide functions, which would include:

A. Licensing

License the technology to industry and fuel production companies.

B. Sell Production

Build modular fuel production container modules that produce methanol. These could be set up right at the facilities that produce carbon dioxide as a byproduct, or could be located at the source of CO_2 separation facilities (including natural gas aggregation facilities, sea water to freshwater distillation plants, powerplants, ethanol plants, oil refineries, factory ships which harvest CO_2 from the surface of the sea water).

C. Sell or Trade Tax Credits and Carbon Credits

In combination with production modules, CO_2 credits would be available to sell or trade through the Chicago Climate Exchange, or for direct purchase from The World Bank Carbon Fund, if located internationally.

D. License Modular Blocks

License and sell the Modular Block technology to science labs and industry.

Competition

The only existing competitor for methanol production and sales is Methanex. They currently hold the monopoly in the United States for the production of methanol produced from natural gas.

They currently sell methanol on the industrial scale at $1.80 per gallon. For smaller users of methanol, such as biodiesel producers, they can pay as much as $3.00-4.00 per gallon. Science labs pay upwards of $10.00 per gallon for methanol.

Other alternative fuel producers include:

A. Biomass to Fuels

Still at the experimental stage. Several very small pilot projects include making a diesel fuel and ethanol from biomass. In general, biomass is very difficult to work with, since you need to collect (harvest) it, transport it, store it, and reduce the size so that it conveys easy into a gasifier. Most of these projects require some sort of air permitting and incur substantial transportation and storage costs.

B. Hydrogen - Virent Energy

Virent Energy is a firm in Madison, Wisconsin that produces hydrogen from renewable biomass and are heavily subsidized by Cargill and U.S. Federal Grants. Even with large amounts of development funds, the cost of producing hydrogen is higher than conventional means. This means that nobody will want to buy and nobody has any use for hydrogen at the current time. Their strategy is flawed in that there is no market for their product. Recently Madison Gas and Electric partnered with Virent to run a small hydrogen gas generator to produce electricity. The cost of that electricity is probably on the order of $1.00 or more per kilowatt.

C. Grain or Agri-based Fuels

With the popularity of corn-based ethanol on the rise, corn prices have rapidly increased. Even if all our corn resources were utilized, it would not amount to more than ten percent of the transportation requirements for fuel. On a lesser extent, grain based fuels will have the same shortcomings as petroleum based fuels. There's only a certain amount of acreage dedicated to grain production, and supply disruptions can easily occur, from drought to floods which effect production and cost.

D. Coal Based Fuel - Fisher Tropsch

In Montana, there has been a push for coal based diesel fuel. These projects remain on a small experimental size. Emissions cleanup on traditional coal plants remains expensive and they produce large quantities of CO_2. Part of the problem with coal is the high sulfur content. Sulfur is a catalyst killer, and needs to be removed.

(e) Gas-To-Liquids Companies -

There are a few small companies who are installing landfill gas methane-to-ethanol facilities. Methane from landfills has a window of production and with the emphasis on removing biomass before getting to the landfills decreases landfill gas formation. Other companies are focussing on coalbed methane which has a large set of problems of its own, since production is often in remote areas (such as national parks and wildlife areas).

Team

My concept of a project team is what I term distributed development. That is every team member is a valuable component of the development process. Each team member forges and manages their component, while most of the actual work is subcontracted out. This allows the decision makers to spend more time on providing direction and ideas, than the day-to-day process of putting together routine tasks (such as assembling reactors to test catalysts, etc.).

Instead of building a lab, populating it with people and expensive equipment, our ideas are distilled into existing facilities who do the testing under strict supervision and daily guidance.

Positions

Work-for-hire positions pay $200,000 per year full time - if positions are part time, fees are adjusted accordingly. Each position is considered a contractor, however positions other than Greg Giese will have the option to have a percentage (predetermined by a formula which includes time in service, IP, etc.) in the company.

Primary Staff

Inventor - Developer - Manager: Greg Giese

Chief Scientist: Available with signed NDA

Metallurgy - Prototypes Machinist - CAD/CAM designer: Available with signed NDA

Outside Contractors

Legal and IP: DeWitt, Ross and Stevens - Craig Fieschko and Bryan Esch

Fuel Cell Labwork: Chief Scientist will coordinate

Machine Shop Work: Metallurgy will coordinate

Catalyst Preparation - Industrial Scale: Catalyst Company

Projections

Methanol is widely used in the transportation network and industrial infrastructure of the United States.

Who will buy CO2 produced methanol ?

A. Science Labs: labs all over the country use very small quantities of methanol and pay more than $4.00 per gallon.

B. Natural Gas Processing Plants: These facilities have a very unique opportunity, since they separate CO2 gas from the natural gas stream before it goes into commercial pipelines. They also hare large users of methanol. The other year Kerr-McGee was asked if they would purchase a machine that could convert CO2 gas into methanol - their answer was a very excited yes.

C. Gasoline Stations: Stations could either produce methanol on demand to blend with fuel, or purchase from a producer.

D. Biodiesel Plants: Methanol is a component of the biodiesel process.

E. Ethanol Plants: CO2 is a byproduct of production. Methanol could not only produce extra revenue, but also gain access to valuable tax and carbon credits.

F. Powerplants and Refineries: Any industry that has combustion will have CO2 emissions.

G. Sea water CO2 Harvesting: Currently reverse osmosis sea water to freshwater plants separate out CO2 as part of the process. In addition, there are many areas of the world where the sea water has CO2 hotspots (large CO2 concentrations) that could be harvested to provide mid ocean refueling.

H. Methanol Kiosks: With the incredible demand for handheld digital devices and their corresponding insatiable demand for power, methanol fuel cells will someday replace convention battery technology. Those methanol fuel cells will need to be fueled. A kiosk with a miniplant could provide methanol at the point-of-use. Hooked up to a water supply and electricity, only beverage grade CO2 cylinders would need to be replaced to supply the kiosk with feedstock to make the methanol.

Corporate Structure

The corporate structure would be determined according to amount of required funding that was provided.

Status and Timeline

The current status of development and timeline is as follows:

Phase I

Completed.

Catalyst research. Reverse fuel cell proof of concept. Modular Block development and patent work.

Phase II

$5 million - Funding required to complete.

Development of reverse fuel cell and integration into the Modular Block miniplant. Continued research of catalysts to make process more efficient. Duration testing. Pressure testing of Modular Blocks.

Phase III

$20 million - Modular Fuel Production Plants and Additional Research.

Containerized modular fuel production plant. Expanded research into enhancing catalyst for methanol, and butanol.

Conclusion

As the threat of global warming looms, along with large price fluctuations due to supply disruptions, a cost effective solution needs to be implemented.

Ocean Fuels is the solution to steady supply disruptions by having distributed fuel production. Using carbon dioxide as the feedstock, we can help neutralize, and in time reverse the mitigation of global warming.

Point-of-use fuel production from the modular block and miniplant will help stabilize the production, distribution and sales of methanol for both transportation and industrial needs.

With the rapidly growing demand for carbon credit trading, Ocean Fuels will be strategically positioned to take advantage of these credits in an environmentally friendly manner.

Modular fuel production is a revolutionary process that is not only good for the consumer, but also effects of energy usage on the planet by reducing pollution. The process presented here provides a secure foundation which allows energy demands to be met without further depletion of our national resources or dependence on foreign petroleum products.

Appendix

Methanex methanol wholesale prices. As of November 26, 2007.

Date	Methanex Non-Discounted Reference Price (MNDRP) $/gal	Methanex Non-Discounted Reference Price (MNDRP) $/MT	Methanex European Posted Contract Price (EPCP) €/MT	Methanex Asian Posted Contract Price (APCP) $/MT
Aug-04	$0.84	$279	€ 230	$272
Sep-04	$0.84	$279	€ 230	$272
Oct-04	$0.84	$279	€ 230	$272
Nov-04	$0.90	$299	€ 230	$272
Dec-04	$0.95	$316	€ 230	$292
Jan-05	$0.95	$316	€ 230	$302
Feb-05	$0.95	$316	€ 230	$302
Mar-05	$0.95	$316	€ 230	$302
Apr-05	$0.95	$316	€ 230	$302
May-05	$0.95	$316	€ 230	$302
Jun-05	$0.95	$316	€ 230	$290
Jul-05	$0.90	$299	€ 220	$280
Aug-05	$0.90	$299	€ 220	$270
Sep-05	$0.90	$299	€ 220	$260
Oct-05	$0.96	$319	€ 235	$280
Nov-05	$0.96	$319	€ 235	$280
Dec-05	$1.02	$339	€ 235	$295
Jan-06	$1.02	$339	€ 268	$320
Feb-06	$1.07	$356	€ 268	$330
Mar-06	$1.07	$356	€ 268	$330
Apr-06	$1.07	$356	€ 285	$330
May-06	$1.03	$343	€ 285	$310
Jun-06	$1.03	$343	€ 285	$310
Jul-06	$1.00	$333	€ 250	$305
Aug-06	$1.03	$343	€ 250	$310
Sep-06	$1.33	$442	€ 250	$420
Oct-06	$1.80	$599	€ 400	$550
Nov-06	$1.80	$599	€ 400	$550
Dec-06	$1.80	$599	€ 400	$520
Jan-07	$1.80	$599	€ 420	$520
Feb-07	$1.65	$549	€ 420	$490
Mar-07	$1.55	$516	€ 420	$490
Apr-07	$1.01	$336	€ 250	$320
May-07	$1.01	$336	€ 250	$320
Jun-07	$1.01	$336	€ 250	$320
Jul-07	$0.93	$309	€ 220	$285
Aug-07	$0.93	$309	€ 220	$285
Sep-07	$0.96	$319	€ 220	$300
Oct-07	$1.70	$565	€ 390	$520
Nov-07	$2.00	$665	€ 390	$620
Dec-07				

Appendix

NSF review of Modular Block.

electronic business

Home News Comments nsf.gov

Review #2

PROPOSAL NO.: 0512328
INSTITUTION: G, Giese
NSF PROGRAM: SMALL BUSINESS PHASE I
PRINCIPAL INVESTIGATOR: Giese, Gregory C
TITLE: SBIR Phase I: Modular Block Utilization for Rapid Prototyping
RATING: Good

REVIEW:
What is the intellectual merit of the proposed activity?

An intellectual merit of this proposal is in a concept of reconfigurable and reusable hexagonal block modules to replace the laboratory arrays of piping and fittings. A rapid prototype hexagonal modules will be designed which will allow the researchers to quickly implement these hexagonal blocks with multiple channels that allow simultaneous gas and liquid processes management. The goal is to move away from piping and fixtures and replace it by creating an effective gas sampling block. The hexagonal modular block, cover and adapter will be standardized and interchangeable parts and the assembly will be created which will require fewer parts and fasteners. Main contribution of the project is to identify the shape, structure and sealing properties between the modular blocks. The design concept has to address sealing of blocks at high temperatures and pressures. The design should be able handle both liquid and gas samplings simultaneously.

What are the broader impacts of the proposed activity?

If successful, this development of the hexagonal modular block may enhance the ability for research laboratories and commercial entities to reduce time and materials for implementation of gas and liquid process analytical and laboratory instrumentation flow control systems. Ideally, it should reduce the space requirement coupled with reduction in the flow paths. Since the assembly is simple, it should speed up experimental set-up time, there by increasing the efficiency of the research activity. In chemical industries and laboratories this development should have a potential impact to make the chemical liquid and gas sampling in the processes more effective.

Summary Statement

The SBIR proposal is based the work performed at the New Sample/Sensor Initiative, which originated at the Center for Process Analytical Chemistry (CPAC) at the University of Washington. A concept of hexagonal block modules is proposed to replace the existing traditional pipe and fitting systems. These modules can be bolted together hexagonal blocks with multiple channels that will allow simultaneous gas and liquid processes. This manner, laboratory personnel will have flexibility in putting the process set up quickly.

The major the investigator is discussing is the design of the actual multiple inlet modular blocks, matching covers and adapters. These blocks will have to put together in such a fashion that the gas and liquid lines are sealed at high temperatures and pressures. Phase I is defined and issues

Appendix

Letter of support.

CIRCOR Instrumentation Technologies

μMS³

'A new form of matter'

12/7/2004

RE: NSF Grant - Modular Blocks - Global Energy (Gregory Giese)

Letter of Technology Support.

Proposal shows technological merit and would find market-driven support in process industry applications and with commercial instrumentation equipment manufacturers. The end users of the proposed technology would be the many catalyst production companies and the customers of these companies who utilize these catalysts. Its potential for commercialization is significant since current (ANSI/ISA 76) but technologically-limited similar product is experiencing triple-digit percentage market growth. The proposed technology targets the private sector where there is tremendous growth potential in modular block hardware design marketplaces.

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Appendix

Modular Block patent.

US007146999B2

(12) **United States Patent**
Giese et al.

(10) **Patent No.: US 7,146,999 B2**
(45) **Date of Patent: Dec. 12, 2006**

(54) **MODULAR FLUID HANDLING DEVICE**

(75) Inventors: **Gregory C. Giese**, P.O. Box 5617, Madison, WI (US) 53705; **Tye Travis Gribb**, Madison, WI (US)

(73) Assignee: **Gregory C. Giese**, Madison, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 59 days.

(21) Appl. No.: **11/075,313**

(22) Filed: **Mar. 8, 2005**

(65) **Prior Publication Data**

US 2006/0201563 A1 Sep. 14, 2006

(51) **Int. Cl.**
F16K 11/20 (2006.01)

(52) **U.S. Cl.** **137/269**; 137/884; 285/124.5; 422/99

(58) **Field of Classification Search** 137/269, 137/884, 271; 251/367; 285/124.1, 124.5; 422/99, 103, 104
See application file for complete search history.

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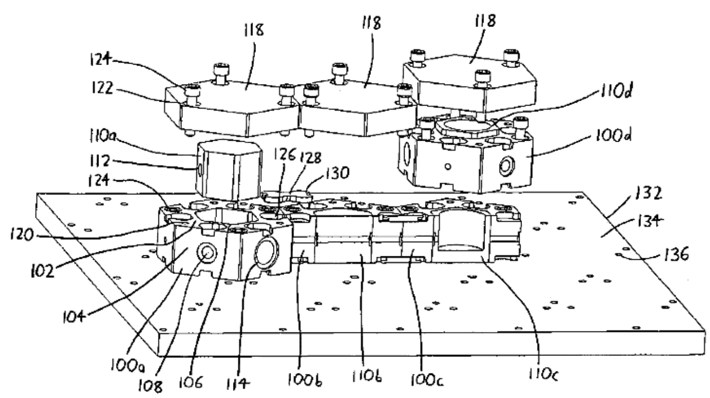
Primary Examiner—John Fox
(74) *Attorney, Agent, or Firm*—Craig A. Fieschko, Esq.; DeWitt Ross & Stevens S.C.

(57) **ABSTRACT**

A modular fluid handling device includes at least one block having opposing block faces shaped as tessellating regular polygons, and a series of block sides therebetween. Each block includes a central bore extending between the block faces, and channels extending into the block sides and intersecting with the central bore. The blocks may be rapidly horizontally and/or vertically affixed with their channels and/or bores in communication to form a fluid handling device having the desired configuration (e.g., with the channels/bores forming a desired process flow path, fluid circuit, or the like). Inserts complementarily fit within the bores of selected blocks can then bear components such as valves, filters, turbines or stirrers, heating or cooling elements, pumps, sensors, or other equipment, so that a block can be adapted to fulfill desired purposes by simply installing the desired inserts.

22 Claims, 2 Drawing Sheets



Appendix

Letter of support.

Dec. 8. 2004 10:42AM BIOREFINIG INC No.0921 P. 2

BIOREFINING INC
WWW.BIOREFINING.COM
Renewable resources for life

December 8, 2004

Proposal Reviewer:

This is an endorsement letter form Biorefining, Inc. is support of the research grant application by Gregory Giese of Global Energy to commercialize a miniplant for ethanol production form carbon monoxide.

Biorefining, Inc. is a potential customer of this technology, as well as commercial development partner, and we urge you to support this research effort with a grant.

The commercial value of a miniplant to produce ethanol from carbon dioxide is the kind of 'process intensification' application that Biorefining, Inc. is interested in utilizing. This type of technology is exactly what American industry needs to stay in the forefront of energy generation if we are to continue to participate in the future world economy.

Respectfully,

Douglas Van Thorre

Dr. Douglas Van Thorre
President and Chief Technology Officer

4979 Olson Memorial Highway • Golden Valley, MN 55422 • (763) 746-0200 • FAX (763) 746-0201 • info@biorefining.com

Appendix

Letter of support.

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Mequon WI 53097

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www.WaterCI.com

Water Consultants International

Mr. Greg Giese
Global Energy / Ocean Ethanol
PO BOX 5617
Madison, WI 53705

7 December 2004

Dear Gregory:

The work you propose for distributed production of Fuel Grade Ethanol from CO2 is of interest for our field of expertise. As we have discussed I see commercial merit in combining the ethanol production technology with certain advanced water treatment processes. These advanced water treatment processes either currently and routinely release sequestered CO2 into the atmosphere, or can be readily converted to yield CO2 as a useful by-product for your process.

Please continue to keep my apprised of your progress.

Regards,

John Tonner

Appendix

Letter of support.

12/08/04 01:08am P. 002

Middle Georgia BioFuels

355 Parker Dairy Rd.
Dublin, GA 31021

Fueling a Renewable Tomorrow

December 7, 2004

Mr. Greg Giese;

Regarding the modular unit concept for ethanol fuel production. I would be very interested in purchasing a unit when they become available. I would also be interested in obtaining a agreement to sell the units in the southeast United States as I believe the market would be in the hundreds of millions of dollars.

When the proof of concept or pilot unit is operational, please contact me so if there is any way that my company can work with you in the commercial application of these units. I can foresee the commercial application of these units not only being rewarding monetarily, but also I believe they would go a long way in helping to secure the security of the United States

Sincerely,

Dan Young

Dan Young
Owner
Middle Georgia BioFuels