



**Naval Surface Warfare Center (NAVSEA)  
Crane Division  
*Igniter for Exothermic Torch Rod*  
(Patent # 7,117,796)  
Mini Market Study Report  
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**Sponsored by:**



**Integrated Technology Transfer Network, California State University San Bernardino**

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## MARKET STUDY REPORT

### Technology Synopsis

This invention is a new design of an igniter cartridge which is used in conjunction with torch rods for a process called exothermic cutting. The exothermic cutting process releases energy in the form of heat by using an oxygen jet and a steel rod for fuel. The rod is usually ignited by a spark generated from a battery. Oxygen reacts with the fuel rods to create a burning reaction. An oxygen jet therefore blows the molten material away, generating a torch that is hot enough to burn through almost any material. A need for quicker, more reliable, and effective ignition methods for exothermic cutting is a burning issue that this technology can solve.

The igniter has 4 basic sections/bore regions. The first bore region houses part of the firing pin. The second bore region is filled with a primer material. The third bore region is air filled. The fourth bore region houses a pyrotechnic slug which burns and is converted into molten metallic reaction products. Users can simply remove a safety pin, strike the head of the firing pin and start the ignition. The firing pin triggers the primer to flash through the third region and ignite the pyrotechnic slug. As the slug burns, the molten metallic reaction products melt the closed end and contact the firing rod quickly and efficiently with the same capabilities and effectiveness underwater.

### Potential Applications

Industry Segments	Application Segments
<b>A. Military</b>	<ol style="list-style-type: none"> <li>1. Tactical breaching</li> <li>2. Demolition tasks</li> </ol>
<b>B. FBI and Police</b>	<ol style="list-style-type: none"> <li>1. Tactical breaching</li> </ol>
<b>C. Fire and Rescue</b>	<ol style="list-style-type: none"> <li>1. Compact automobile wreck extraction</li> <li>2. Heavy metal debris clearing</li> </ol>
<b>D. Demolition, Construction, and Renovation</b>	<ol style="list-style-type: none"> <li>1. Demolition contractors</li> <li>2. Salvage work and scrap clean-up</li> <li>3. Railroads and shipyards</li> <li>4. Underwater contractors</li> </ol>
<b>E. Metals Manufacturing</b>	<ol style="list-style-type: none"> <li>1. Steel mills</li> <li>2. Fabrication plants</li> </ol>

### Competing Technologies

Company Product	Product Description/Features
<b>RapidFire Cutting Rod Igniter</b>	<ul style="list-style-type: none"> <li>• Near-instantaneous</li> <li>• Non-electric lighting of torch rods</li> <li>• Can be used underwater</li> </ul>
<b>X-Cut Igniter Tube</b>	<ul style="list-style-type: none"> <li>• Ignites without electrical power source</li> <li>• Replaces need for striker plate</li> </ul>
<b>Arcair Slice Cordless Striker Pack</b>	<ul style="list-style-type: none"> <li>• Uses 2 small batteries for electrical power supply</li> <li>• Requires use of a striker plate</li> </ul>

## Caldo Mini Cutting Torch System

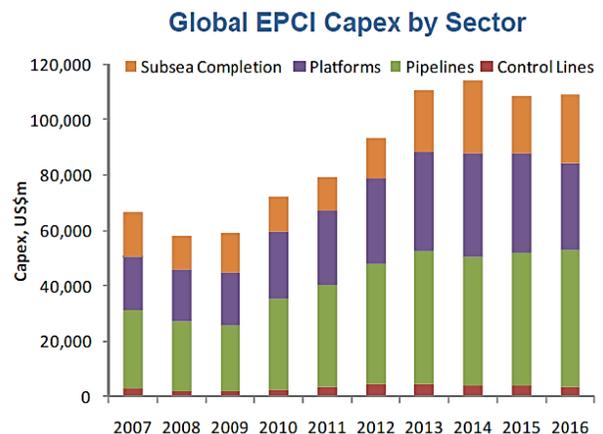
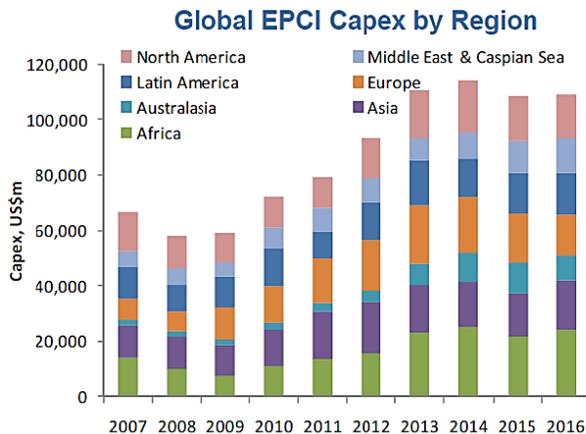
## Symex Hot-Rod Torch

- Eliminates the need for 12-volt battery
- Requires a match / small flame for ignition
- Requires striker plate
- Requires 12-volt battery for electrical power supply

## Competitive Advantage

This invention is fairly unique and has several advantages over competing igniter systems and technologies. Typical torch rod igniters and ignition methods require an external electrical power source like a 12 volt battery, which can weigh 70 – 150lbs, in order to start the ignition. This igniter does not need an external electrical power source and the igniter can be used in and out of water environments. Also, the need for additional components such as striker plates is eliminated. The igniter uses a pyrotechnic material that is very reliable, easily ignited, non-toxic, produces little reaction gas, and produces substantial amounts of molten metallic reaction products for abundant cutting heat. Therefore, in addition to its underwater applications and use, the igniter's competitive advantage lies in its ability to work without an electrical power source, enabling quicker, more reliable ignition with a lightweight, less cumbersome design system.

## Market Opportunity



Abbreviations: Engineer, Procure, Construct, Install (EPCI); Capital Expenditures (Capex)

The market potential for the igniter technology is worldwide. Offshore applications alone have healthy growth potential for its engineering capabilities. Market projections in the engineering construction and destruction industries show that investment in these areas—even for offshore and underwater use—is sizable. Research shows how capital expenditures in this area will increase significantly over the next few years in many of the regions around the world. By 2014, capital expenditures in the sub-surface, platform, pipeline, and control line sectors are expected

to total nearly \$120 billion. Nearly \$450 billion of global engineering, procurement, construction, and installation (EPCI) capital expenditures is expected over the next five years.<sup>1</sup>

Looking at the cutting tool industry, there are promising trends in the overall market. The manufacturers of cutting tools, clamping tools and manufacturing, measurement and testing technology recorded a significant increase in incoming orders in the first half of 2010. In the case of cutting tools, companies have estimated sales will return to the same level of those of 2008, where 2008 was the 15<sup>th</sup> consecutive growth year.<sup>2</sup>

### ***Potential Targets for Licensing***

Preliminary agreements have been made with the torch rod manufacturing company OxyLance, who are currently undergoing discussions with the igniter's inventor and potential partnering companies. However, in case non-exclusive licensing agreements are reached, some of the potential companies to contact for partnership include:

- **Arcair**  
Arcair is a subsidiary under the larger conglomerate Thermadyne Industries, Inc. that is based in St. Louis, MO. Arcair is a world leader in air carbon-arc gouging products. Arcair provides a complete line of air-carbon arc products for the wide-ranging gouging needs of fabrication plants, shipyards, railroads and farms.
- **Remtechnology, Ltd.**  
Remtechnology is part of the Remtechstroy Group headquartered in Bulgaria with offices in Oklahoma and worldwide that manufactures, exports, imports, and provides services in a wide range of industrial enterprises including power engineering, ore mining, mineral processing, machine-building, shipbuilding, and the ship-repairing industry among others.
- **Broco**  
Broco, Inc. is a leading developer and manufacturer of high-quality cutting systems for both land and underwater applications, underwater wet welding consumables, battery welding systems, and other cutting and welding-related technologies. With headquarters in Rancho Cucamonga, CA, the company's divisions include Broco Underwater, Broco Industrial, and Broco Tactical.
- **C.H. Symington & Co., Inc.**  
C.H. Symington & Co. manufactures and distributes gouging equipment worldwide through 500 welding distributors, servicing foundries, shipyards, railroads and fabrication plants. C.H. Symington's main office is in Dublin, Ohio and the manufacturing facility and warehouse is located in Carroll, Ohio.

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<sup>1</sup> "Credit Suisse." Engineering & Construction Conference. McDermott International, Inc. 2011, June 2.  
<http://phx.corporate-ir.net/External.File?item=UGFyZW50SUQ9NDI5MjI5fENoaWxkSUQ9NDQ2NDc2fFR5cGU9MQ==&t=1>

<sup>2</sup> <http://www.abrasiveshub.com/index.php?page=10&lang=EN&article=-1>

## ***Keys to Commercialization***

The primary goal is to get this technology on the market as soon as possible before the window of opportunity begins to close. One of the objectives includes pinpointing companies that have experience producing and manufacturing products in the energetics industry, with the capability to produce the igniter legally. Because, negotiations are already in place such that OxyLance has an agreement to produce the torch rods that are designed to function with the new igniter, it is important to locate a strategic partner who will manufacture the igniter in partnership with OxyLance Corporation's rod manufacturing. With this scenario, it is important to find the best fit igniter manufacturer for OxyLance for the exclusive licensing to achieve maximum potential. Should a non-exclusive license agreement be pursued, the goal should be to focus on those companies that have the capacity to produce the igniter cartridges on a large scale, have the necessary infrastructure, and have the capability to integrate the igniter within their product line. Therefore, one of the main keys to commercialization is to integrate this technology into the torch rod product line for potential applications within the military and police sectors.

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## **APPENDICES**

***A. Inventor Interview Summary***

***B. Market Study & Technology Notes***

Introduction

The Office of Research and Technology Applications at the NAVSEA-Crane Naval Surface Warfare Center's Technology Transfer Office is conducting a market study for the igniter for exothermic torch rod technology. The study is sponsored by the Integrated Technology Transfer Network's (ITTN's) entrepreneurial program at California State University San Bernardino.

This report involves a market study for a commercialization project regarding the igniter technology. The feasibility study is being conducted in order to better understand how to optimize the technology's path to commercialization.

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Introductory Question:

Q: Basically, what is the invention? What is your baby? And, why is it cute? Why is it so valuable?

A: It is an igniter for exothermic torches. It does not require a battery or striker plate for ignition.

Background Questions:

Q: Why exactly was this technology invented?

A: Existing igniters require the use of pyrophoric materials, or striker plates. This igniter is an energetic that is better for faster and more reliable ignition.

Q: What drove the internal need for the invention?

A: Users needed a replacement for the short shelf life problem. Also, there was a need to have something that would be quicker to use, quicker to start, because many times they needed over three rods (therefore over 3 ignitions) for every use.

### Technology Questions:

Q: Is the igniter reusable? Or, can the firing pin be taken out of a used igniter chamber and placed into a new igniter chamber?

A: No, each igniter is used once.

Q: Will the percussion primer material (the second bore region) have the ability to be impacted repeatedly for multiple uses?

A: No.

Q: What do you think is most interesting about the technology?

A: That it works. It has very high reliability.

Q: What have others found interesting about the technology?

A: That it works, and it is reliable.

Q: How has the technology been tested? Under what conditions has the igniter been tested?

A: It's been tested in many different environments in accordance with military standards.

### Application Questions:

Q: What applications do you think the technology has?

A: Mainly above ground use. It could be used in emergency rescues such as compact car wreck rescue situations.

Q: Who are the end users for this technology? Who would have a need for the igniter?

A: The navy, anyone who needs to cut any piece of metal. Rescuers in car crash situations, emergency situations, etc.

Q: What do you see as the key application for this technology?

A: It's used to ignite torch rods, for cutting systems for exothermic torch rod systems.

### Alternative Solutions / Competing Technologies:

Q: What are some of the existing alternative solutions to the problem?

A: Some igniter systems require a striker plate to start the ignition. Other igniters use a chemical based system where powdered compounds are housed separate from each

other until the desired ignition, but these systems are unreliable and they have limited shelf lives. Battery-based high current systems are also unreliable and are difficult to use underwater.

Q: What key advantages do you think this technology has over the others?

A: You can't use striker plates underwater however with this technology can ignite rods under aqueous conditions. So some advantages it has over the others is that it works, it's reliable, and quicker than car battery striker plate systems.

Development, Market & Market Entry Questions:

Q: How is the technology fielded?

A: It has not been commercialized.

Q: Since a partnership has been secured, what challenges have OxyLance, Inc. faced in successfully commercializing the igniter?

A: OxyLance hasn't worked out because they need an energetics partner instead of a torch rod manufacturer, who can press pyrotechnics legally for the government and for military applications.

Q: What do you know about the market for exothermic cutting and exothermic igniter systems?

A: For OxyLance, they would love to refine the design by making it cheaper, as well as team with someone else for igniter production. They have several solicitations out already and could reach agreements within the next few weeks. We don't want to contact the company that did not get the license and have them wondering why they were excluded or did not get the deal over the others.

Q: Where do you see the largest market potential?

A: Probably in search and rescue, or emergency response.

Q: Have you spoken to any potential end users for the technology?

A: Yes, users in the navy and military.

Q: What kind of feedback have you gotten for the technology?

A: They like it. It's quick and easy.

Q: What have others found to be lacking in the technology? What caused them to back out and not take interest in the technology? Were there any turn-offs to the technology?

A: No turn-offs.

Q: Who are the key players in the market? Who are the industry leaders?

A: Ultra Tech produces them, but they are defaulting on their contract, so the tech transfer office should not try to contact them.

Q: Who have shown interest in the technology?

A: Mostly the military. Oxy lance bidders have interest, but there are no users interested to buy them.

Q: What have the discussions and concerns been?

A: Linking companies to Oxy lance. Oxy lance needs a partner with energetics experience and capabilities. Whatever company gets it will need to buy the rods and pieces for the complete system.

Q: Which companies do you think would the technology be ideal for as a new product offering?

A: N/A

Q: What is the estimated cost to produce the igniter?

A: Rod and igniter is approximately \$35 apiece.

Q: What is the estimated price point?

A: \$10-15 with a redesign

Essence of the technology:

What is it for?

The igniter is an essential component of exothermic torch rod systems. It generates the ignition for the torch rod cutting process.

What problem does it solve?

The igniter eliminates the need for external electrical power sources (i.e. 12-volt batteries which can weigh 70-150 lbs) that accompany existing exothermic torch rod systems. Also, this igniter solves the problem of not being able to effectively and efficiently ignite exothermic torch rods underwater.

Who needs it?

Entities that will need this technology include anyone who uses exothermic cutting (especially underwater, or in water-filled/aquatic environments), as well as steel mill manufacturers, fire departments, police departments, military, and the FBI. Therefore, underwater contractors who use exothermic cutting would especially need this technology.

Why is it important?

This igniter technology is important because it provides effective means to function in a whole new environment where existing igniter technologies are lacking. Additionally, it offers quick reliable, battery-free ignition for users.

What are the current alternatives to solving this problem?

Alternative exothermic cutting systems include energetic compound igniters which use powdered chemical compounds that only mix at ignition; however these systems are not reliable and have a limited shelf life. Another technology uses high electrical current and smoldering tube igniters which are usually useless, unreliable, or difficult to use in underwater environments.

What is the magnitude of the market or value added by this solution (in a popular expression or a simplified statement)?

Quick, reliable, and efficient ignition for torch rod cutting both in and out of water environments.

Keys to commercialization:

Finding out:

- Who else will license it?
- Who has the energetics experience and capabilities to legally produce the igniter?
- Who could make a strategic partnership with Oxylance's torch rods?
- Who needs this specific technology?
- Who makes alternatives to the technology?

Therefore, target licensees will include igniter cartridge manufacturers and igniters for subcomponents to firing rods for rod manufacturers.

Gaps, inconsistencies, and questions:

- Is the igniter reusable? Or, can the firing pin be taken out of a used igniter chamber and placed into a new igniter chamber?
- Will the percussion primer material (the second bore region) have the ability to be impacted repeatedly for multiple uses?

Notes, Highlights, and Observations:

- Used at the end of torch rod
- Igniter does not need external electrical power source like a 12 volt battery (70 – 150 lbs)
- Can be used both in and out of water
- Energetic compound igniters use powdered chemical compounds which only mix at ignition, however these systems are not reliable and have a limited shelf life
- High electrical current and smoldering tube igniters are usually useless, unreliable, or difficult to use in underwater environments
- Our igniter contains 4 bore regions with a specially designed waterproof seal between the firing pin and the first bore region. The igniter uses a slug of pyrotechnic material which is also specially sealed and converts to a molten metallic reaction.
- The waterproof seal for the pyrotechnic slug may come from an epoxy seal, threaded seal, and/or an O-ring seal.
- Igniter's good results:
  - Low gas production of reaction products
  - Ease of ignition
  - High thermal stability
  - Non-toxic
  - Good production of molten, metallic, reaction products
- Oxylance, Inc. has a nonexclusive license agreement but has not generated any expected or significant royalties since December 2006.

Initial research:

- Who would license this technology?
- Who needs the technology? What applications does the technology have?

- Who makes alternatives to the technology? What are these alternative technologies capable of?