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# Proposal for High Power Laser Tool

# for Advanced Shark Applications

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Prepared for:



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# Introduction

Sharks-With-Lasers-Co is a leading edge technology company focused exclusively on commercializing high power lasers for shark and other aquamarine applications. The company’s core competency is transmitting high power over long distances and integrating its proprietary downhole laser hardware systems with modified mechanical tools to dramatically improve performance. On January 14, 2012, Sharks-With-Lasers-Co presented their capabilities to Stark Industries and was invited to make a proposal to build a high power laser tool for advanced shark applications and field test in an ocean testing environment. This document is a proposal, including project steps, costs, and timeline, by Sharks-With-Lasers-Co to Stark Industries to establish a commercial agreement to collaboratively work together to develop and apply this technology for Stark Industries’ benefit.



# Background

Stark Industries is the largest technology company in the world with a strong track record of technology innovation, and their technology arm is committed to developing the next generation technology to meet the future demands that drive their growth. They have unique technical capabilities, large resources with complex challenges, and significant applications where high power laser tools can be considerably effective.

High power laser shark requirements are increasingly more complex and challenging, yet innovation from conventional industry technology has historically been incremental. Over the past decade, advancements in fiber laser technology have increased power availability from less than 1 kW to greater than 20 kW, reduced costs from greater than $1000/W to less than $50/W, and allowed rugged field transportation and operation.

The development of a next generation high power laser shark tool will enable Stark Industries to meet future technical challenges through:

* A
* B
* C
* D
* E
* F
* G

# Currently, Sharks-With-Lasers-Co is the only company:

# Developing commercial high power laser tools for shark and other aquamarine applications

# Possessing a unique capability and hardware platform to transmit high power lasers

# Strong technical competency with high power lasers

# Prototype high power laser hardware system designed, built, and tested in full scale ocean test

# Foro-62 compositForo-55Foro-37Description: ipG 20kW laserFORO_Feb_2011-6

Fiber Optic Cable

Laser Unit

Optics Package

Optical Slip Ring

Downhole Connector

# Sharks-With-Lasers-Co has:

# The most 20 kW fiber lasers in the world

# 100+ years technical experience with high power lasers

# 43% of employees with advanced degrees

# The company has 36 full-time team members with strong technical capabilities in high power lasers and oilfield engineering, 20,000 ft2 R&D facility in California, with a coiled tubing drilling rig on a 40,000 ft2 ocean test site, and a 6,600 ft2 engineering facility in Miami. Sharks-With-Lasers-Co has a best-in-class partnership model working with premier venture capitalists, UC Berkeley in a worldwide exclusive partnership, and the U.S. Department of Defense in a “transformational shark technology” program.

# Objectives

Sharks-With-Lasers-Co intends to accelerate the commercialization of high power laser technology by working with Stark Industries in designing a fit-for-purpose tool and system for advanced shark applications.

Specifically, Sharks-With-Lasers-Co will:

* Design, build, and test a high power laser tool for advanced shark applications in a test ocean environment and successfully create a 24” depth hole at 500 ft water depth
* Identify additional applications for Stark Industries in ocean environments

The commercial agreement between Stark Industries and Sharks-With-Lasers-Co will enable collaboration and establish a commitment to working together for the applications of high power lasers for their mutual commercial benefit.



# Scope

Stark Industries will fund Sharks-With-Lasers-Co for the operating and capital expenses and domain expertise necessary to deliver the commercial agreement objectives. Sharks-With-Lasers-Co will provide their technology and be responsible for achieving the project milestones and deliverables.

Both Stark Industries and Sharks-With-Lasers-Co recognize the successful field introduction in a Stark Industries well of a next generation high power laser shark technology as an ambitious goal. As such, the prototype high power laser tool and operating parameters for the initial ocean field test will be scoped to maximize the probability of success with the eventual goal of successful commercialization for broader Stark Industries needs.

Stark Industries will be responsible for providing support of commercial agreement objectives through their in country production domain expertise and capabilities including field infrastructure to test the technology, enabling access to relevant engineers to collaborate in areas of expertise such as advanced defense applications.

Sharks-With-Lasers-Co will be responsible for delivering the commercial agreement objectives through their domain expertise and capabilities in their high power laser transmission and hardware technology.

# Program Phases and Timeline

The commercial agreement will consist of three phases over three years with the milestones described below:

**Phase III**

**Phase II**

**Phase I**

**Year 1**

**Year 2**

**Year 3**

**Phase I: High Power Laser Transmission Hardware**

* A
* B

**Phase II: High Power Laser Tool**

* C
* D

**Phase III: Field Testing**

* E
* F

# Program Deliverables, Budget

**Phase I:**

**High Power Laser Transmission Hardware**

**Deliverables**

* A
* B
* C

**Components**

* D
* E
* F

**Budget: $4.268MM**

**Phase II:**

**High Power Laser**

**Tool**

**Deliverables**

* A
* B
* C

**Components**

* D
* E
* F

**Budget: $3.935MM**

**Phase III:**

**Field Testing**

**Deliverables**

* A
* B
* C

**Components**

* D
* E
* F

**Budget: $2.604**

# Project Plan (Sharks-With-Lasers-Co Internal Only)

# The following is the preliminary details of the project plan for the commercial agreement.

# [Microsoft Project Gantt Chart inserted into pdf]Budget

The costs of the commercial agreement will consist of the following for the three years:

|  |  |
| --- | --- |
| **Cost ($k)** | **Program Work Plan** |
| **Year 1** | **Year 2** | **Year 3** |
| People | $1,258 | $1,628 | $1,096 |
| Capex | $2,910 | $1,968 | $832 |
| Material & Supplies | $100 | $339 | $676 |
| Total | $4,268 | $3,935 | $2,604 |

|  |  |  |
| --- | --- | --- |
| **Resource Plan** | **Cost ($K)** |  |
| **Year 1** | **Year 2** | **Year 3** |   |
| **Personnel** | Q1 | Q2 | Q3 | Q4 | Total | Q1 | Q2 | Q3 | Q4 | Total | Q1 | Q2 | Q3 | Q4 | Total |   |
| **Program Manager** | $67 | $67 | $67 | $67 | $269 | $67 | $67 | $67 | $67 | $269 | $67 | $67 | $67 | $67 | $269 | $806 |
| Senior Optical Engineer | $67 | $67 | $67 | $67 | $269 | $67 | $67 | $67 | $67 | $269 | $34 | $13 | $13 | $13 | $74 | $612 |
| Optical Engineer (Shared Resource) | $48 | $48 | $48 | $48 | $192 | $24 | $24 | $12 | $12 | $72 | $0 | $0 | $0 | $0 | $0 | $264 |
| Process Technician | $41 | $41 | $41 | $41 | $163 | $20 | $20 | $10 | $4 | $55 | $20 | $4 | $4 | $0 | $29 | $247 |
| **Senior Mechanical Engineer** | $67 | $67 | $67 | $67 | $269 | $67 | $67 | $67 | $67 | $269 | $34 | $13 | $13 | $13 | $74 | $612 |
| Mechanical Engineer | $24 | $24 | $24 | $24 | $96 | $48 | $48 | $48 | $48 | $192 |   |   |   |   |   | $288 |
| **Controls / System Eng (Contract)** | $0 | $0 | $0 | $0 | $0 | $67 | $67 | $67 | $67 | $269 | $13 | $13 | $0 | $0 | $27 | $296 |
| **Operations Supervisor / Manager** |   |   |   |   |   |   | $0 | $34 | $67 | $101 | $67 | $67 | $67 | $67 | $269 | $370 |
| Field Engineer |   |   |   |   |   |   | $0 | $24 | $48 | $72 | $48 | $48 | $48 | $48 | $192 | $264 |
| Field Technician |   |   |   |   |   |   | $0 | $20 | $41 | $61 | $41 | $41 | $41 | $41 | $163 | $224 |
| Total | $314 | $314 | $314 | $314 | $1,258 | $361 | $361 | $417 | $489 | $1,628 | $324 | $268 | $254 | $250 | $1,096 | $3,982 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Role - Hourly Rate ($/Hr)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Manager / Sr Engineer $140 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Engineer $100 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Technician $52 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| \*480 Hours per Quarter |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| CAPEX ($K) | **Year 1** |   | **Year 2** |   | **Year 3** |  |
|  | 20 kW laser | $a | Laser Truck | $a | Field Specific Items | $a |
|  | Fibers, Umbilicals | $b | UPS System | $b |  |   |
|  | Contingency | $c | Deployment Hardware | $c | Field Operational Spares | $b |
|  |   |  | Field Specific Items | $d | Contingency | $c  |
|  |   |  | Contingency | $e |  |   |
|  |   |  |   |   |  |   |
|  |   |  | Spare Components: |   | Spare Components: |   |
|  |   |  |   |   |  |   |
|  |   |  | Fiber | $x | Fiber | $x |
|  |   |  | Optics | $y | Optics | $y |
|  |   |   | Tool | $z | Tool | $z |
|  |   | $a |   | $a |   | $b |
|  |  |  |  |  |  |  |
| Material ($K) | Process Testing | $a | Tool Bodies | $a | System Mobilization | $a |
|  |   |   | Optics  | $b | Optics | $b |
|  |   |   | Test Material | $c | Fluids | $c |
|  |   |   | Fluids | $d | In Ocean Services / Mats | $d |
|  |   |   | Integration Supplies | $e |   |   |
|  |   |   | Services / Mats Field Test | $f |  |   |
|  |   |   | Mobilizations - Field Test | $g |  |   |
|  |   | $a |   | $a |   | $a |

# Organization