

THE REVOLUTIONARY AND AWARD  
WINNING CYCLONE ENGINE – A  
TREMENDOUSLY PROMISING  
DISRUPTIVE TECHNOLOGY

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Systems, Inc.

# WHAT IS A DISRUPTIVE TECHNOLOGY?

- Usually a new paradigm – requires a new thought process
- Unconventional, novel, new, different
- Changes the way things are done and perceived
- Presents new and different possibilities
- May directly replace existing technologies
- Presents both an opportunity and a threat to existing organizations

# SOME HISTORICAL PERSPECTIVES

- Integrated Circuits
  - \$1 million in Air Force Funding to Texas Instruments - 1959
  - ICs absolutely necessary for all modern war-fighting
  - Generated more than \$1 trillion in military and civilian procurement
  - A fundamental basis for US war-fighting dominance

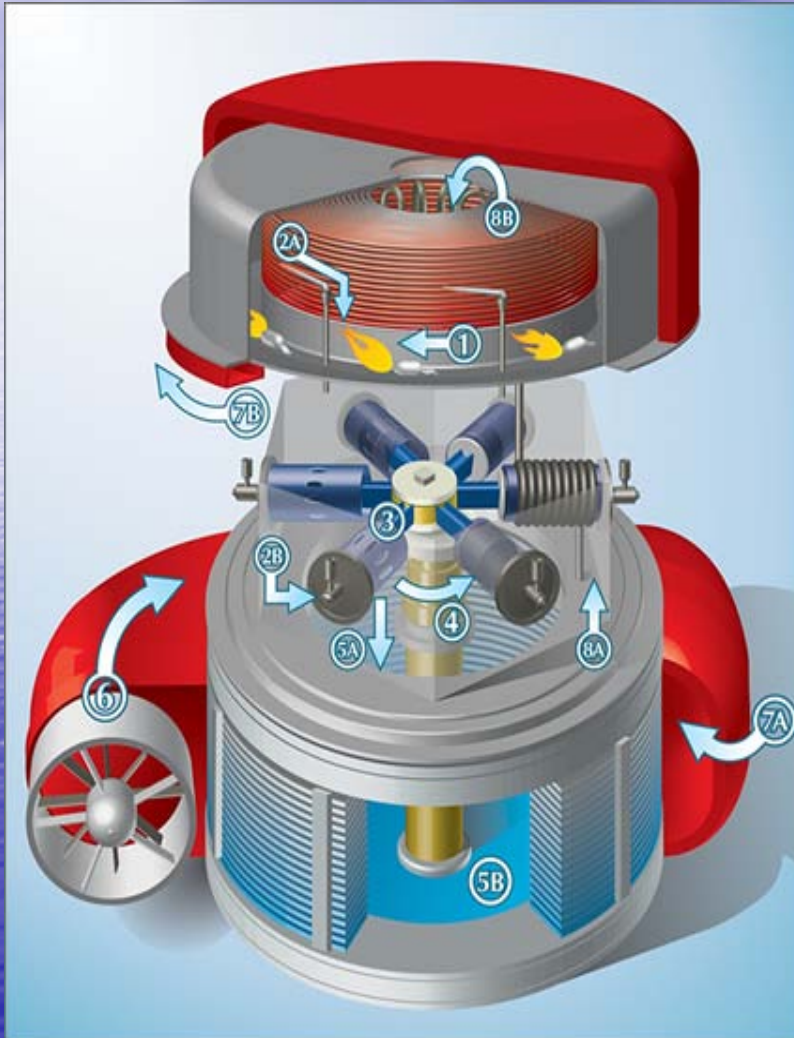
# MORE HISTORY - WORLD WAR II AND FUEL

- Fuel availability was a central war consideration
- Japan claimed it went to war because it would soon run out of oil after U.S. embargo
- After strategic bombing of German oil resources at Ploesti and elsewhere the Wehrmacht and Luftwaffe ground to a halt
- Patton ran out of fuel on his advance across Europe
- Fuel cost and availability still critical issues
- A national priority is reduction of imported oil
- The Cyclone engine technology is a game changer, because it is broadly multi-fuel.
- With a Cyclone engine can use whatever local fuel is available, without regard to quality

# WHAT IS THE CYCLONE TECHNOLOGY?

- Super high tech steam engine
- External combustion for complete clean fuel burning
- Heavily patented in US and overseas
- Engine validated by personal vetting of over 70 engineers and scientists:  
**“There is no reason why it should not work. It obviously does work. It does not remotely push any laws of physics or thermodynamics. It is a simply brilliant invention.”**

# THE INNOVATIVE CYCLONE TECHNOLOGY



## HEAT PROCESS

(1) Fuel is atomized and injected into the patented centrifugal combustion chamber where a spark ignites the fuel-air mixture into a flame that spins around the heat coils. Thermocouples control the duration of combustion to keep the heat in the combustion chamber at a constant temperature. (2A) Water contained in the coils becomes super-heated steam (up to 1200°F) which is piped to the cylinders, (2B) where it enters through a patent-pending valve system (not pictured).

## MECHANICAL PROCESS

(3) Steam enters the six radial-configured cylinders under pressures up to 3200 psi to push the pistons in sequence. Note, no motor oil is used – water is both the working fluid and engine lubricant. Also, because of the valve design, the engine starts without the need of a starter motor. (4) The rotating action of the pistons connected through a patent-pending spider bearing (not pictured) turns the crank shaft. Note, because the greatest amount of torque occurs at the first rotation, the shaft can be directly connected to a drive train without a transmission.

## COOLING PROCESS

(5A) Steam escapes the cylinders through exhaust ports and enters the patent-pending condensing unit where it turns back into water, and (5B) collects in a sealed pan at the bottom of the condenser. Note, this is a closed-loop system – the water does not need to be replaced or topped-off. (6) Blowers spin fresh air around the condenser to speed the cooling process.

## REGENERATIVE PROCESS

(7A) Air which has been pre-heated from the condensing unit, (7B) continues up to a second heat exchanger located in the exhaust port of the combustion chamber, further pre-heating the air used for combustion while also cooling the exhaust fumes (to about 320°F). (8A) A high pressure pump (not pictured) pipes water from the collecting pan to the heat coils via heat exchangers surrounding each of the cylinders (only one pictured), and then (8B) to the center of the coils to start the heat cycle again.

# CYCLONE ENGINE CHARACTERISTICS

- External combustion – clean burning, efficient
- Water lubricated, closed system
- Burns any fuel – JP5 OR 8, Diesel, dirty Diesel, bio-diesel, gasoline, alcohol, algae fuel, orange peels, garbage, biomass, powdered coal
- Operates like the most modern steam power plants
- Typical operating temps of 1200 F, and 3,200 psi
- Quiet, low vibration, low IR signature
- High thermal efficiencies – 30% now, up to 40% later
- Lite weight and compact - ~ half the volume and weight of a full Diesel system.
- Very high torque – 7+ foot pounds/horsepower @ 1 rpm
- Almost invulnerable to IEDs, shrapnel, or small arms fire

# THE "MISSING ENGINE"

- The Cyclone Engine is missing all the following components/systems and has:
  - No sophisticated fuel injection system
  - No sophisticated spark ignition system
  - No high pressure fuel pump
  - No oil, oil pump, oil pan
  - No external radiator, hoses, water pump, coolant, or fan
  - No catalytic combustor
  - No transmission



# LAND BASED MILITARY APPLICATIONS

## SOME OF THE MANY MILITARY APPLICATIONS



ABRAMS MAIN BATTLE TANK



STRYKER ARMORED VEHICLE



HUMVEE



CYCLONE APU

# LAND APPLICATIONS

- Drive engines for tanks, HUMVEES, trucks
- Auxiliary power units for these vehicles
- Gensets – 1 to 1,000 kilowatts
- Power source for hybrid electric vehicles
- Small man portable units-80 to 1,000 watts  
(tremendous cost savings/logistic support ease over batteries) for field use/special forces
- Autonomous ground vehicles

# GENIE 80 TO 200 WATT MAN-PORTABLE POWER PLANT

The drawing consists of two cross-sectional views of the engine assembly, labeled 'SECTION D-D', and a 3D perspective view. The cross-sections show the internal components, including the combustion chamber, piston, and crankshaft, mounted on a base with four feet. The 3D model shows the external appearance of the engine, which is a cylindrical unit with a yellow top and a blue body.

| REV | DESCRIPTION | ECR# |
|-----|-------------|------|
|     |             |      |
|     |             |      |

SECTION D-D

UNLESS OTHERWISE SPECIFIED:  
 DIMENSIONS ARE IN INCHES  
 TOLERANCES:  
 ANGULAR MATCHES .0150(±)  
 .1 .005  
 .2 .01  
 .5 .02  
 1.0 .05  
 1.5 .075  
 2.0 .10  
 3.0 .15  
 4.0 .20  
 5.0 .25  
 6.0 .30  
 7.0 .35  
 8.0 .40  
 9.0 .45  
 10.0 .50  
 12.0 .60  
 15.0 .75  
 20.0 1.00  
 25.0 1.25  
 30.0 1.50  
 40.0 2.00  
 50.0 2.50  
 60.0 3.00  
 70.0 3.50  
 80.0 4.00  
 90.0 4.50  
 100.0 5.00  
 120.0 6.00  
 150.0 7.50  
 200.0 10.00  
 FINISH: FINISH ALL SHARP EDGES UNLESS OTHERWISE SPECIFIED  
 PATENTED.  
 U.S. PATENT NO. 7,080,512,  
 8,740,792  
 OTHER PATENTS PENDING  
 U.S. AND FOREIGN  
 MATERIAL: N/A

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| NAME                           | DATE     |
|--------------------------------|----------|
| DRAWN: MH                      | 1-1-2008 |
| CHECKED: HLS                   |          |
| ENG APPR: HLS                  |          |
| MFG APPR:                      |          |
| G.A.                           |          |
| POB PROCESS:                   |          |
| FINISH: 310 MACHINE FINISH 125 |          |

TITLE: CYCLONE POWER TECHNOLOGIES INC.  
 GENIE  
 ENGINE ASSEMBLY

SIZE: B  
 DWG. NO. G-248-1  
 REV  

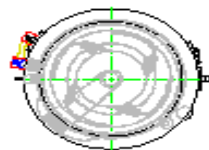
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 WEIGHT:    
 SHEET 1 OF 1

# ROBOTIC APPLICATIONS

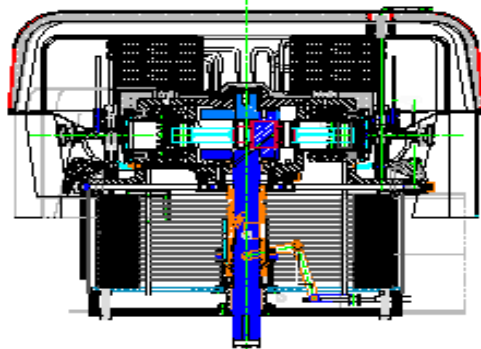


# FROM SMALL TO LARGE CYCLONE ENGINES

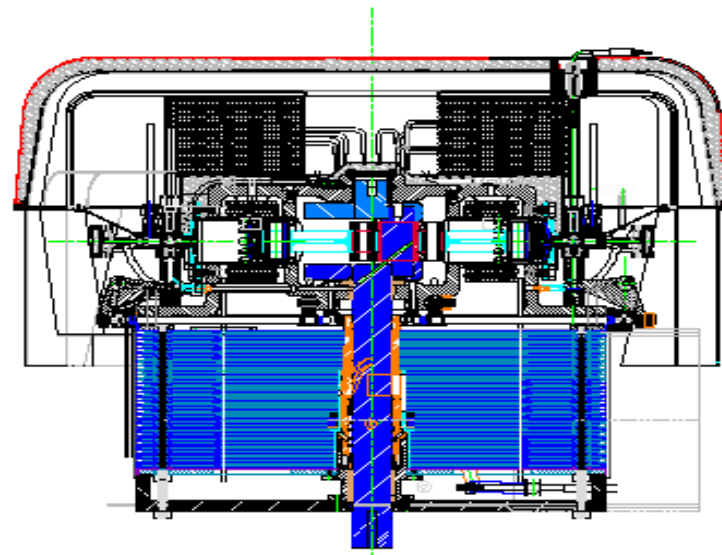
## CYCLONE ENGINES / GENSETS



1 KW - MAN PORTABLE  
APU



100 HP ENGINE



300 HP ENGINE

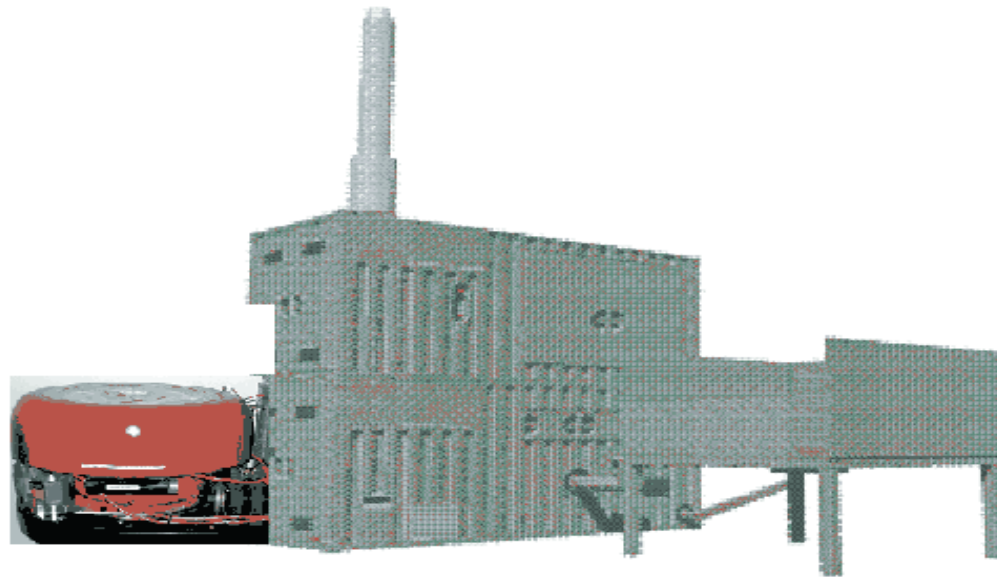
# NAVAL AND AIR APPLICATIONS

- Naval Applications:
  - Drive motors for boats and ships
  - APUs for boats and ships
  - New engines for torpedoes
  - Engines for underwater craft, manned and unmanned
  - Bottom dwelling weapons platforms
- Air Applications:
  - UAVs and UCAVs

# FIXED BASE APPLICATIONS

- To burn garbage and generate power
- To run on algae fuel for base power
- To run on other available biomass
- To substantially reduce costs
- To provide local energy independence

# DIRECT COMBUSTION OF BIOMASS TO PRODUCE ELECTRICITY



**BIOMASS FUELED ELECTRIC POWER GENERATOR**



# SO WHY IS THIS A GAME CHANGER?

- Can drastically improve fuel logistics in combat or forward base areas since Cyclone engines will burn practically anything
- Huge cost savings-burning algae fuel or other biomass
- Savings on repairs, maintenance, parts
- Greater flexibility of vehicle design
- Drastic reduction in vehicle vulnerability, because no external radiators (3 minute rule)

# WHERE ARE WE AND WHAT DO WE NEED?

- Working with five of ten largest defense contractors
- Raytheon has been publicly named
- Developing a variety of engines, mostly on private funds
- Badly need military funding to accelerate pace and range of engine development
- Military applications should lead to major cost savings from fuel logistics and lower cost fuels
- Spinoff to private sector will generate large tax revenues, as in integrated circuit case.

# APS SENIOR MANAGEMENT

- Dr. Phillip F. Myers – Founder, President, CEO – BIE, MBA – Ohio State, Doctorate – Harvard Business School. 30+ years business/management experience, in small, medium, and large companies. Formed 12 new companies. Extensive consulting, teaching, public service experience. Former Air Force Captain, Engineering Officer, and War Planner
- Allyn Armstrong – Sr. V.P. – Chemical Engr, Executive M.B.A. – Ohio State. Heavy consulting + management experience.
- Steve Lebishak – Coast Guard Academy, MIT, Wharton – V.P.- Finance
- Rich Belaire – Retired Ford Superstar Engine Engineer
- Brij Bhargava – One of top generator designers in world

# CONTACT INFORMATION

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