

**THE
FEDERAL LABORATORY
CONSORTIUM FOR
TECHNOLOGY
TRANSFER**

THE FLC

- **MANDATED BY CONGRESS TO ASSIST COMMERCIALIZATION OF SCIENCE AND TECHNOLOGIES GENERATED IN THE FEDERAL LABORATORY SYSTEM.**
- **711 FEDERAL LABORATORIES FUNDED BY THE AGENCIES OF THE FEDERAL GOVERNMENT.**

FLC ADVISORY COUNCIL

- **VOLUNTEERS FROM ACROSS THE NATION WITH CROSS-CUTTING PROFESSIONAL, SCIENTIFIC, ACADEMIC, LABORATORY, MILITARY AND COMMERCIAL BACKGROUNDS AND EXPERIENCE.**
- **ADVISE LABORATORY COMMERCIALIZATION MANAGERS ABOUT PROTOCOL AND PROCEDURES.**

SPECIFIC INTERESTS

- **HOMELAND SECURITY AND DEFENSE**
- **FIRE AND WILDFIRE TECHNOLOGIES**
- **CLEAN CITIES PROGRAM**
- **TRANSPORTATION TECHNOLOGIES**
- **MANUFACTURING EFFICIENCIES**
- **HANDICAPPED TECHNOLOGIES**
- **WASTE TO ENERGY PROGRAMS**
- **SUSTAINABLE LIVING TECHNOLOGIES**

**SELECTED SMALL
BUSINESS TECHNOLOGIES
FOR FOREST HEALTH
COMMITTEE**

CONSIDERATION

STRATEGIC PARTNERSHIP

OEM MANUFACTURING

LICENSING

RETROFIT THROUGH DEALERS

INVESTMENT PARTICIPATION



SUPERDRIVE, INC.

PIQUA, OHIO

US DoE West Virginia University, TACOM



PATS BUS 73% FUEL IMPROVEMENT*

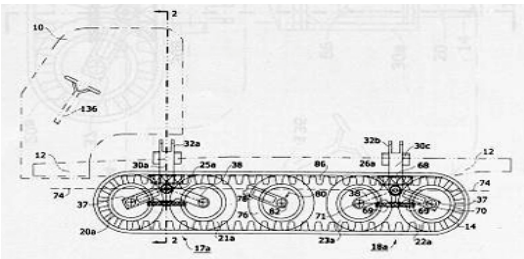
MLH KENWORTH 800 61% FUEL IMPROVEMENT*

SUPERDRIVE HAS PERFECTED, TESTED AND OWNS A SERIES OF PATENTED ENGINE AND POWERTRAIN MANAGEMENT SYSTEMS AND TECHNOLOGIES THAT IMPROVE FUEL ECONOMY BY 20% TO 60+%, WHILE SUBSTANTIALLY REDUCING GHG, NO_x, AND SUB-MICRON PARTICULATE EMISSION, OFTEN BY 50++%.

THE +% IS BASED ON THE SIZE AND WEIGHT, TORQUE GENERATED BY THE PRIME MOVER AND THE AXLE RING AND PINION RATIO OF A PARTICULAR CLASS OR CHARACTERISTIC OF A PRIVATE OR COMMERCIAL VEHICLE.

SUPERDRIVE SUCCESSFULLY SEPARATES THE ENGINE HP AND RPM SPEED FROM THE FRICTION REQUIREMENTS OF THE VEHICLE DRIVE WHEEL(S). THE VEHICLE ENGINE IS LODGED CONTINUOUSLY AT THE RPM THAT GENERATES MAXIMUM TORQUE. A SWASH-PLATE EQUIPPED HYDRAULIC PUMP IS CONNECTED TO THE ENGINE CRANKSHAFT THAT IS CONTINUOUSLY MANAGED BY THE SUPERDRIVE PROGRAMMED MICROPROCESSOR CONTROL MODULE. THE OPERATOR ACCELERATOR FOOT PRESSURE OR RELEASE OF FOOT PRESSURE IS ELECTRONICALLY CONVEYED TO THE HYDRAULIC DRIVE MOTOR(S) BY HYDRAULIC OIL. THE COMBINATION OF PRIME MOVER, OPERATOR ACCELERATOR DEMANDING TORQUE, AND PUMP MOTOR COMBINATION ARE ELEMENTS OF THE SUPERDRIVE CONTINUOUSLY VARIABLE HYDRAULIC MANAGEMENT SYSTEM (CVH).

*** FUEL IMPROVEMENT FIGURES BASED ON VEHICLE ENGINE CONTROL MONITOR RECORDINGS TAKEN BY INDEPENDENT TEST EVALUATORS .**



TORVEC, INC.

PITTSFORD, NEW YORK



- **Full Terrain Vehicle (FTV™)**
- Torvec's introduction of the FTV™ is a pioneering concept. The a tracked vehicle with truly unique capabilities for work/duty utility, speed, size, maneuverability, and comfort.
- The Torvec Full Terrain Vehicle (FTV™), introduces a completely new and innovative vehicle that can revolutionize the transportation industry. Moreover, the FTV™, has applications for off-road work/duty cycles required by agriculture, utilities, security, forestry, rescue, and construction employment.
- From U.S. Patent #6,135,220
- The FTV™ steers as easily as a truck through the use of a steering wheel. The steering is accomplished by changing the relative speeds of the two tracks. For example, when moving straight forward, both tracks are moving at the same speed; when turning, the inside track slows down while the outside track speeds up proportionately. The vehicle turns in the direction of the slower track. Our unique steering mechanism separates the mechanical function of driving the vehicle forward for high speed, from the steering function, as needed. The two functions operate independently and simultaneously.
- An FTV™ can operate at high-speed (up to 60 mph) as a traditional work/duty tired vehicles. but maintains the high-traction capabilities of a tracked vehicle. The FTV™ is a rubber tracked vehicle that, by design, is environmentally sensitive since it has low ground pressure (less than 2.0 PSI) and does not damage paved road surfaces or leave ruts in unpaved roads like wheeled vehicles. The FTV™ can traverse almost any terrain at relatively high speeds and has tremendous stability in uneven terrain.
- The FTV™'s payload capacity of 2000 lbs increases commercial uses, and it can tow up to 8000 lbs in a matching tracked trailer which enhances agricultural, wildfire, first response homeland security, on-site communication and command site control, border and infrastructure patrols, ABC identification, and as a troop carrier. The FTV™ can potentially be controlled by remote operation.

WESTERN RENEWABLE ENERGY

EAGAR, ARIZONA

USDA National Forest Service



The Challenge

Bolstering homeland energy security

While rebuilding natural resource sustainable economies in rural communities under an uncertain regulatory framework.

Recognize that sound stewardship and existing policies dictate the amount and types of raw materials available to sustain a natural resource economy.

Work cooperatively with state and federal agencies, industry, and private interest to develop a new natural resource economy that respects limitations, and builds a small business structure that fits within the framework of available supply.

WRE designs, builds and where required operates small, distributed 5 to 10 megawatt bio-fueled electricity generation or cogen facilities.

WASTE TECHNOLOGY TRANSFER, LLC

TUCSON, ARIZONA



WTT Bio Crude Oil has been proven in over 60 biomass feed stock runs

Waste Transformation Technology, Inc. (WTT) announces the commercialization of its proprietary, patented technologies that transform organic wastes into an infinitely renewable “new biodegradable and sulfur-free crude oil.” The bio-crude is produced from a wide variety of waste material streams. The WTT technologies convert organic wastes to the new bio-crude oil by means of an oxygen-free, non-combustion process that does not require water or produce odors or smoke. WTT bio-crude oil can be refined to a sulfur-free, high lubricity bio-diesel fuel or number 2-diesel additive, and be employed in a wide variety of value-added products analogous to petrochemical products. Such products include plastics, fibers, adhesives and other items that are today produced from fossil petroleum feedstock.

The WTT technologies are a result of nearly thirty years of research and development originating and developed through collaboration between the United States Bureau of Mines and Department of Energy (DOE) and the University of Arizona Tucson. The WTT bio-crude technologies are immediately ready for implementation.

Don White, Ph.D., P.E., the inventor and patent holder of WTT technologies and the founder and professor emeritus of the Department of Chemical Engineering at the University of Arizona states:

“The time has come for us to aggressively pursue opportunities for significant new technologies that provide clean and renewable sources of energy and chemicals, without huge new investment in infrastructure. We must find and build facilities that are independent of traditional processes that use fossil fuels and avoid certain regions of the world where these commodities are extracted. Additionally, it is critical that the citizens and political entities in the United States support and finance new sustainable and distributed technologies that consider and re mediate regional organic waste streams. WTT technologies provide solutions that can be implemented today to begin to solve these ever-growing problems. Our technology will contribute renewable, environmentally sensitive, and biodegradable fuels, energy and bio-oil feedstock to drive our economic engines, decrease societal wastes, and provide substantial economic waste to energy

benefits throughout the nation’s urban, suburban and rural communities.”

WTT processing facilities are readily replicated and scalable to consider regional resources. The systems are designed for low-cost installation and operation in literally thousands of locations to reduce transportation costs for wastes streams in and new bio-crude products out of the facilities.

The WTT pilot plant has demonstrated both batch and continuous run capabilities utilizing multiple feed-stocks, e.g., construction and green wood wastes, municipal wastes, animal manure and agricultural residues, rubber tires, and waste plastics. In addition to the production of 99% liquids for energy and chemicals, the process is a closed system that can be scaled for large tonnage permanent facilities or for portable and rapid response employment by aircraft, etc. The WTT process is a smoke-free, non-combustion technology that offers a net gain of water, and may be used for cogen and greenhouses as the WTT process waste streams are CO₂ and steam.

ZELINI, LLC

INDIANAPOLIS, INDIANA

EXPANSION GAS MOTOR (EGM) NON-COMBUSTION PRIME MOVER

Orientation:

This overview outlines the development of an entirely new non-combustion prime-mover system for transportation vehicles or stationery applications that produces torque/work from low-pressure thermal waste stream gases (LPTGS).

Background:

The Zelini EGM technology has advanced from concept to manufacturing over the past 17 years. The development process has included many model designs and prototypes, laboratory evaluation and field-tests in domestic and international locations.

Intellectual Property:

Several patents, provisional and utility patents, modification and challenge filings are filed with the USPTO. More IP filings are to follow as new commercial applications for EGM are confirmed. Blueprints are complete and manufacturing of the EGM Super 6, that produces its torque from low-grade steam down-stream from a manufacturing, processing or boiler/turbine operation has commenced.

The Technology:

The EGM is a radial type fluid actuated (as distinguished from internal combustion) reciprocating motor that extracts propellant energy exclusively from a low-pressure thermal waste gas fluid stream (LPTGS). EGM converts a LPTGS into torque/work through a unique combination of intake and piston motion that rapidly expands the LPTGS to power moving pistons. A central yoke assembly converts the radial motion of the power pistons into a rotational motion by means of a central yoke assembly. A drive shaft actuates the valve pistons to complete the expansion/torque cycle and release the expanded gas. The EGM/LPTGS conversion action produces significant torque/work potential and dramatically cools and reduces the pressure of the waste stream.

The conversion from LPTGS to EGM torque/work only occurs as the result of some other combustion or manufacturing process that produces the LPTGS emission or waste stream. The EGM/LPTGS conversion process does not require water, coolants or oxygen and is not affected by altitude, ambient heat or cold temperatures. The conversion potential of EGM torque/work is limited only by the quality and continuous flow of the LPTGS and engine/piston size. Currently two EGM sizes are available for commercialization, the EGM 3 (3 inch piston and bore with 6 power strokes) and the EGM Super 6 (6 inch piston and bore with 12 power strokes).

The Product:

The Zelini EGM 3 (3 inch pistons and bore) proposed for the (Optimum) Texas Sanitation and Refuse Truck technology is the first of kind. The unique new expansion gas motor produces low-cost and significant amounts of environmentally safe prime-mover torque to move a matched generator, PTO for compression or other duty cycle work. The EGM 3 is to be combined with a new LI generator set and the High Country Tek solid-state control system to generate up to 17 kilowatts of electricity for vehicle parasitic use with the Microtech electronic particulate trap and/or CNG engine optimization system, for heating or cooling the cab compartment, for operating the High Country Tek digital engine fan system or to serve as an emergency alternate energy or PTO resource. The EGM 3 mounts at the back of an exhaust manifold, is 5 ½" X 29 ½" in size and weighs 278 pounds.

Engineering:

The 29 working EGM components are sealed and constructed of aluminum or titanium alloy with stainless steel piston sleeves. The bearings are non-load and self-lubricating manufactured with space-age polymer. The crankshaft, yoke assemblies and other components are constructed of hardened steel and composites.

The EGM 3 is equipped with a solid-state microprocessor to monitor the LPTGS, heat, and pressure relief systems. The EGM Super 6 prime-mover is controlled by a solid-state microprocessor and Continuously Variable Hydraulic Transmission (CVHT) for grid quality potential. The EGM is relatively silent in operation.

Installation:

EGM 3 may be installed in OEM or retrofit applications pancake or up-right to assist with space considerations.

Service:

EGM is engineered for extended and continuous work service. The working components are simple to service with traditional tools in the field. The warranty for EGM is one-year for parts and service.

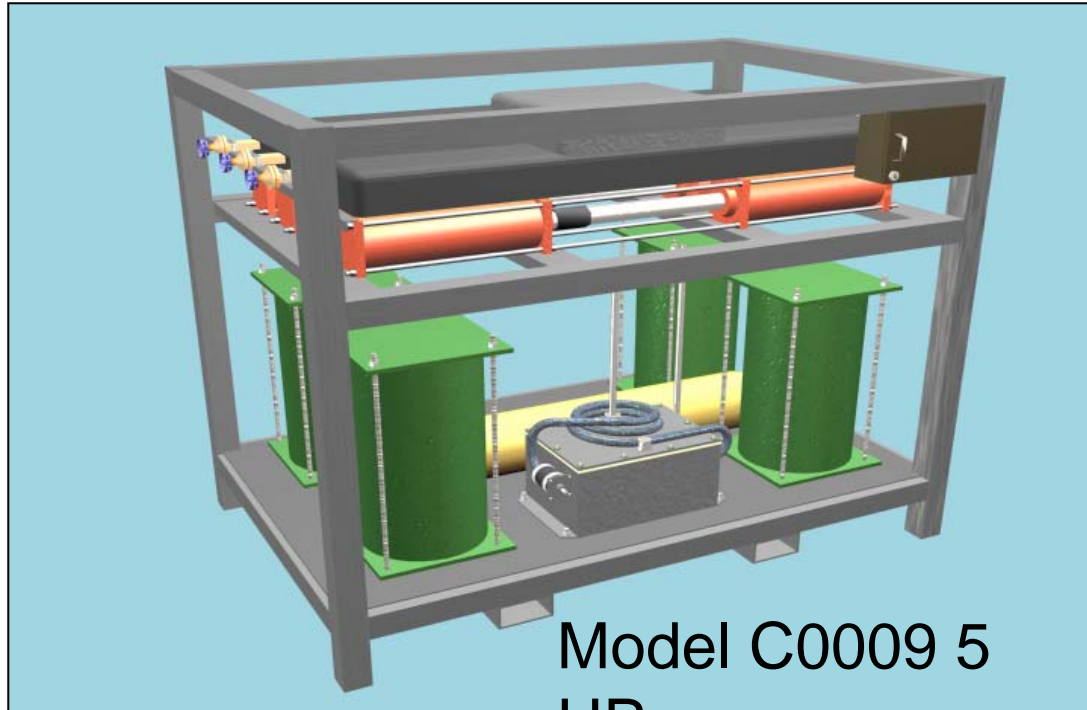
Environmental:

Zelini, LLC certifies that the electricity generated by an EGM system qualifies as clean and renewable "sink" energy. An EGM does not produce NOx, SOx, CO, CO₂, H₂O, mercury or Particulate Matter or any other airborne or water toxins traditionally associated with electricity generation.

DELUGE, INC.

PHOENIX, ARIZONA

USDA Water Conservation Laboratory, ARS Maricopa, RMOTC



Model C0009 5

HP

THERMAL HYDRAULIC ENGINE

No emissions

Multiple fuel options

No fuel cost

No electricity required

Economical to operate

No safety hazards

Quiet operation

Long life design

Value added for waste heat

Operates off-grid

Water or oil pump

Operates un-attended

VERDAE ELECTRONICS, INC.

SAN DIEGO, CALIFORNIA

**VERDAE HAS IN DEVELOPMENT AND
HAS PATENTS PENDING FOR
A NEW COMPUTER HARD DRIVE
THAT PROJECTS TO OPERATE
10 TO 20 TIMES FASTER
THAN ANY OTHER HARD-DRIVE IN
THE MARKET.**

**LOOKING FOR DEVELOPMENT AND
CRADA PARTNERS.**

**HAF PYRONAUTICS, LLC
PRESCOTT, ARIZONA**

NAVY MULTI-MISSION UN-MANNED FIREBIRD



WIND TUNNEL MODEL OF THE UN-MANNED NAVY HYBRID FIREBIRD MULTI-TASK, 2,000 POUND PAYLOAD AIR TANKER SEAPLANE DESIGN. CONFIGURED FOR FIRST STRIKE, SUPPLY TRANSPORT OR SURVEILLANCE MISSIONS. A PERMANENTLY DISTRIBUTED ASSET FOR SHORT RUNWAY, SEA, OR HIGH ALTITUDE NAVY DEFENSE STATIONS THROUGHOUT THE WORLD. QUICK CONNECT INTERCHANGABLE BELLY TANKS SERVE FIRST STRIKE TARGETS, SUPPORT WATER BOURNE MISSIONS, WILDFIRE AND HOMELAND DEFENSE INITIATIVES, LOW SPEED INFRASTRUCTURE FLY-OVER, BORDER AND PORT PATROL SURVEILLANCE DUTIES. THE PROPOSED NAVY FIREBIRD O1 WILL PROVIDE LOW-COST AND LONG RANGE FEATURES.

**FOR ADDITIONAL INFORMATION CONCERNING THE
INITIATIVES OF THE FLC, INCLUDING:**

**E. COM AND MAIL LIST OF PUBLICATIONS
THE LABORATORY – TECHNOLOGY FINDER
LIST OF TECHNOLOGY TRANSFER CONTACTS
REGIONAL AND NATIONAL MEETINGS
CRADA OPPORTUNITIES
FLC CROSS-CUTTING INITIATIVES
WWW.FEDERALLABS.ORG**

**FOR INFORMATION CONCERNING THE SMALL BUSINESS
OPPORTUNITIES OUTLINED IN THIS PRESENTATION CONTACT:**

BOB HENNKENS, ADVISORY COUNCIL, FLC

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