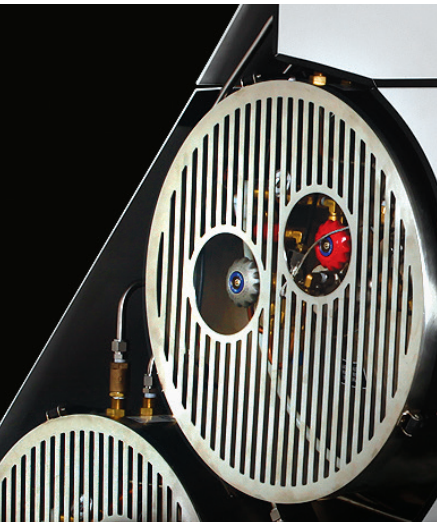
EVO MT System

EVO-MT 7770 LNG Conversion for Mine Haul Trucks

The EVO-MT™ System enables operators of mine haul trucks to substantially reduce operational costs and improve sustainability by substituting diesel fuel with lower cost, cleaner burning natural gas. The EVO-MT System is comprised of patented and proprietary technologies that allow haul trucks to safely operate on gas percentages ranging from 50% to 70% of their total fuel requirement. Trucks converted to LNG + diesel operation exhibit diesel-like performance in such critical areas as power, response and efficiency.



Engine Conversion

The EVO-MT System allows for the in-frame conversion of the haul truck engine to LNG+D operation. The conversion process utilizes components that are installed externally of the engine and no changes or modifications to the cylinders, pistons, fuel injectors or cylinder heads are required. Retaining the OEM diesel fuel system in its entirety, the engine maintains the capability to operate solely on diesel fuel when required. The System interfaces with the engine cooling circuit in order to supply high temperature coolant to a heat exchanger / vaporizer for efficient conversion of the LNG from a liquid to a vapor state. Once the LNG is converted to a vapor phase, it is supplied to the engine's air-intake system at a point upstream of the turbo-compressor inlets using low restriction air-gas mixing technology. Installation is performed using conventional shop tools and equipment and requires about 6 - 8 hours to complete.

Protection and Control

The EVO-MT System includes a powerful Electronic Control Unit (ECU) that monitors critical engine, chassis and system data and uses this information to dynamically control the operating fuel mode of the engine. The ECU also provides sophisticated engine protection and monitoring functionality with pre-alarm, alarm and shut-down logic that allows the engine to be switched from LNG+D mode to diesel-only operation seamlessly and automatically. These protective systems and control algorithms ensure continued engine reliability and uptime when operating on LNG. The ECU monitors critical engine parameters including exhaust gas temperature, manifold air temperature, vibration, engine coolant temperature, engine speed, compressor inlet pressure and manifold air pressure. Each ECU data channel is sampled 50 times per second (50 Hz) ensuring rapid detection and correction of anomalies.

Graphical User Interface

The GUI allows for quick and simple access to both real time and logged system data using a proprietary graphical user interface (GUI) program. The GUI program is PC compatible and technical personnel can access System data using a convenient USB interface located in the operator cab. In addition to accessing System data, the GUI program is utilized during setup and commissioning of the haul truck for creation or loading of fuel mapping algorithms as well as for programming various System control, pre-alarm and alarm setpoints.

On-Board LNG Storage

LNG is safely and securely stored onboard the mine haul truck using a fully-integrated chassis system. The LNG storage "pod" includes double walled, vacuum insulated cryogenic tanks, LNG vaporizer, cryogenic safety controls, high and low pressure gas regulators, gas flow meter and sensors. The pod is a fully-engineered, pre-fabricated assembly that significantly minimizes the required installation down-time of the truck. Pods are shipped to the mine site completely assembled and tested and can be installed using overhead shop cranes or mobile lifting systems. The LNG pod is designed for specific haul truck configurations and/or duty cycles and normally includes sufficient LNG storage capacity for a 12 hour refueling cycle.

LNG Refueling

The LNG storage pod is filled via a remote refueling receptacle that is located according to customer requirements. LNG refueling is performed using a pressurized, quick-disconnect coupling that allows for the safe and rapid refueling of the pod. LNG refueling can be done in parallel with diesel refueling using either permanent, semi-permanent or mobile cryogenic fuel transfer systems.

EVO MT System

EVO-MT 7770 | Specifications

Integrated LNG Storage System

Approximately 190 U.S. Gallon (719.2 liter) LNG Capacity
50 – 75 PSI Operating Pressure
275 PSI Vent Pressure
Engine Access Unobstructed
Vibration Isolation
Combustible Gas Detection
DOT Approved, Double-Walled and Vacuum-Insulated Cryogenic Tanks
15 Day Hold Time
CSA Approved Gas Train
Cryogenic Shut-Off Valves
Remote Fill LNG Port – 50 GPM
Remote Venting System
Single Stage LNG Vaporizer

Electronic Control Unit (ECU)

32-bit Microcontroller with USB and CAN Communications
J1939 Compatible
Programmable Fuel Mapping
Remote Graphic User Interface
Monitors >25 Sensors 50X per Second
Four Channel Throttle-Body Control Output
24V Input Power, Load Dump Overvoltage > 100V, Under-Voltage Lockout < 18V, Reverse and Double Battery Voltage Protected

ECU Environmental Ratings

Ambient Operating Temperature:
-40°C to +105°C
Storage Temperature:
-40°C to +125°C
EMC/EMI:
EN61000-6-2/-4
ISO 10605
ISO 11452-2,4
CISPR 25
Humidity:
MIL-STD-810D, 507.2
Chemical Resistance:
SAE J1455, 4.4.3
Shock:
40 Gs
Vibration:
Random: 0.3G²/Hz, 10-2000 Hz
Thermal Shock:
SAE J1455, 4.1.3.2
Ingress Protection:
IP56 Per IEC 60529
SAE J1455

Engine Safety

Flame Detection
Combustible Gas Detection
Air-Gas Mixture Inflammable Outside Combustion Chamber
High Exhaust / Turbo Temperature
High Boost Pressure / Temperature
Engine Over-Speed Protection
High Vibration (Knock Detection)
Excess Diesel & Gas Flow
Gas Throttle Position Feedback Loop
Tie-In to Truck Fire Control System

Operator Safety

In-Cab Combustible Gas Detection
In-Cab Emergency Stop
Remote Emergency Stop
Automatic Gas Shutdown in Rollover
Automatic Gas Shutdown in Collision
Automatic Gas Shutdown on Truck Over-Speed
Automatic Reversion to Diesel Operation
Driver Site-Line to RH Mirror Unobstructed
Secondary Egress Door Still Functional

3360 Enterprise Ave., Suite 180
Weston, Florida 33331

t: 954.693.9657 f: 954.472.1447
www.gfs-corp.com

GFS CORP