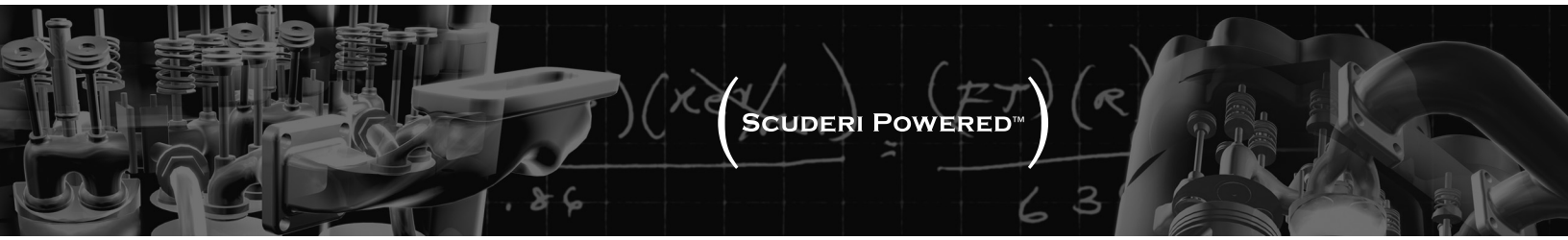
SCUDERI ENGINE

Revolutionary Technology
Evolutionary Design



Scuderi Engine Prototype I

What It Is:

The first proof-of-concept prototype for the Scuderi Split-Cycle Engine. This engine is a one-liter, naturally aspirated two-cylinder gasoline engine. It is designed and built to prove the combustion process of Firing After Top Dead Center. This unique combustion process is the key to the Scuderi Split-Cycle Technology that enables the Scuderi Turbocharged and Air-Hybrid versions to reach their expected efficiency and emissions levels.

This is the first of several Scuderi Engine prototypes under development. The turbocharged and air-hybrid gasoline engine prototypes are forthcoming and will be followed by the diesel versions.

How It's Done:

The Scuderi Engine is a split-cycle design that divides the four strokes of a standard engine over a paired combination of one (intake/compression) cylinder and one (power/exhaust) cylinder. These two cylinders perform their respective functions once per crankshaft revolution.

It utilizes a unique combustion process referred to as "Firing After Top Dead Center." This produces a highly efficient and clean-burning combustion process.

When firing after top dead center, combustion starts between 11 and 15 degrees after top dead center and ends 23 degrees after ignition. This results in a higher average combustion cylinder temperature but a lower peak temperature than conventional engines.

Knock Prevented:
Because of the continuous high-pressure air flowing through the crossover passage and the injection of fuel late in the combustion process, the engine exhibits a high resistance to knock.

Pioneering Fuel Injection:
Custom-designed fuel injection system by Bosch.

Crossover Passage:
By using a high-pressure, direct-injection type fuel injector and a uniquely designed crossover passage, the possibility that fuel can become trapped in the crossover passage is prevented.

Unique Valve Train Design:
The Scuderi Engine's unique valve train design utilizes pneumatic, fully variable valves to control engine load, enabling higher efficiency operation at part-load demand.

Valve Lift and Landing Control:
Patented valve and seat designs enable extremely high-speed opening and smooth closing of the high-speed crossover valves.

Unique Lash Device:
Provides automatic adjustment to prevent wear and damage to the outwardly opening crossover valves.

Air-Powered Valves:
The Scuderi Engine utilizes internally generated air to run the intake and exhaust valves, and pneumatic springs for the high-speed crossover valves.

What We See:

The Scuderi Engine represents a new thermodynamic cycle that creates an unprecedented opportunity for engine manufacturers to take fuel efficiency to new levels.

Studying the first two Scuderi Engine prototypes in development, initial reviews tell us:

SCUDERI ENGINE	NATURALLY ASPIRATED SCUDERI ENGINE	TURBOCHARGED SCUDERI ENGINE
ENGINE SPEED	Up to 6,000 rpm	Up to 6,000 rpm
HORSEPOWER	Similar to conventional engine	Up to 135 hp per liter
EFFICIENCY (FULL LOAD)	Similar to conventional engine	10-15% higher than conventional engine
EFFICIENCY (PART LOAD)	5-10% higher than conventional engine	15-20% higher than conventional engine
EMISSIONS	Up to 80% less NOx than conventional engine	Up to 80% less NOx than conventional engine
ENGINE OPERATING PRESSURE	50-65 bar	110-130 bar
FUEL INJECTION PRESSURE	Up to 200 bar	Up to 200 bar
BRAKE MEAN EFFECTIVE PRESSURE	Up to 10 bar	Up to 22 bar
COMPRESSION RATIO	75:1 — Compression side 50:1 — Power side	75:1 — Compression side 50:1 — Power side
DISPLACEMENT (APPROX. 1 LITER)	.59 — Compression side .52 — Power side	.48 — Compression side .52 — Power side