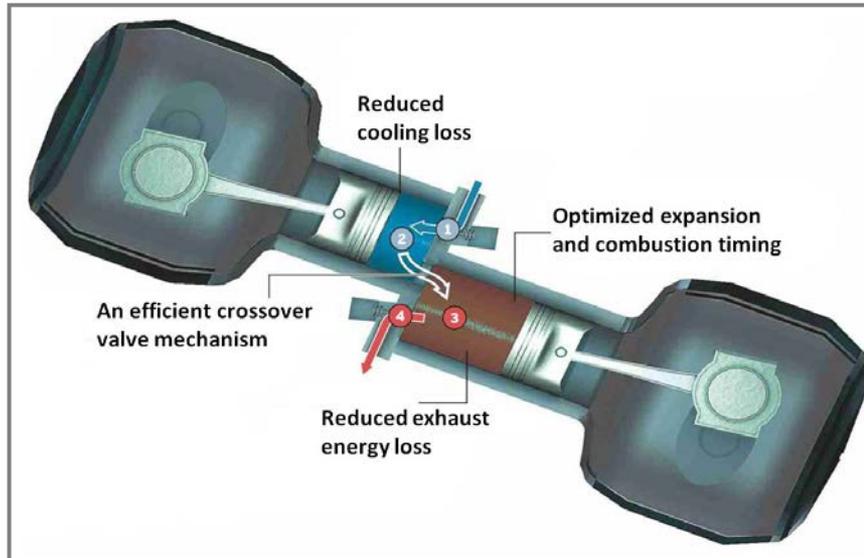


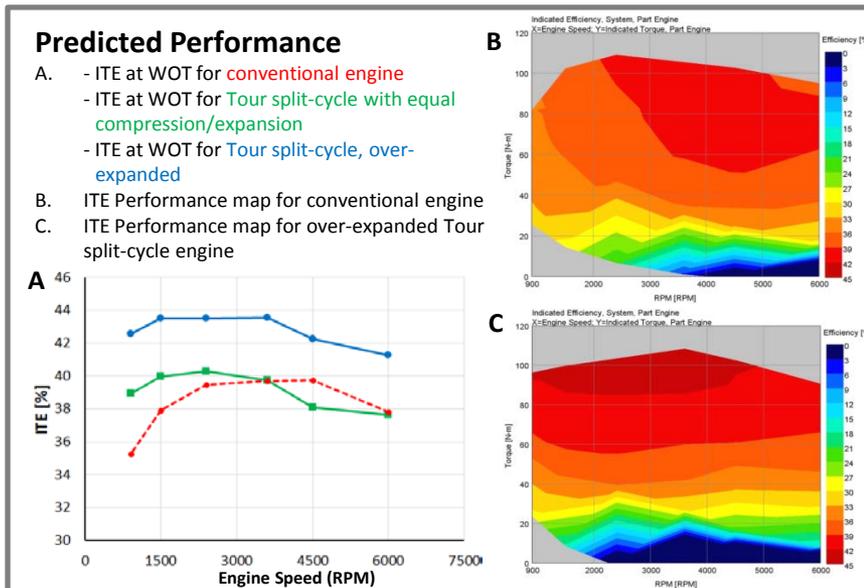
Split-Cycle Engine with Superior Efficiency



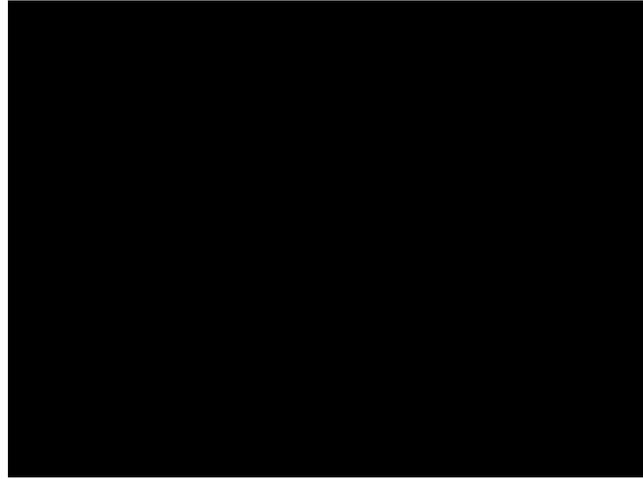
- Efficiency improvements
- Reduced regulated emissions
- Based on conventional parts and technology

Technical Details:

- Platform technology
- 5 kW - 10 MW
- Comparable weight to today's engines
- Comparable size to today's engines
- Efficiency - Above 45% Indicated Thermal Efficiency (ITE)
- Emissions - Reduce CO₂ and corresponding NO_x, CO and PM
- Exhaust temperature - Lower
- Inlet temperature - Standard
- Durability - Standard
- Cost - Standard
- Noise - Potentially lower



Split-Cycle Engine with Superior Efficiency

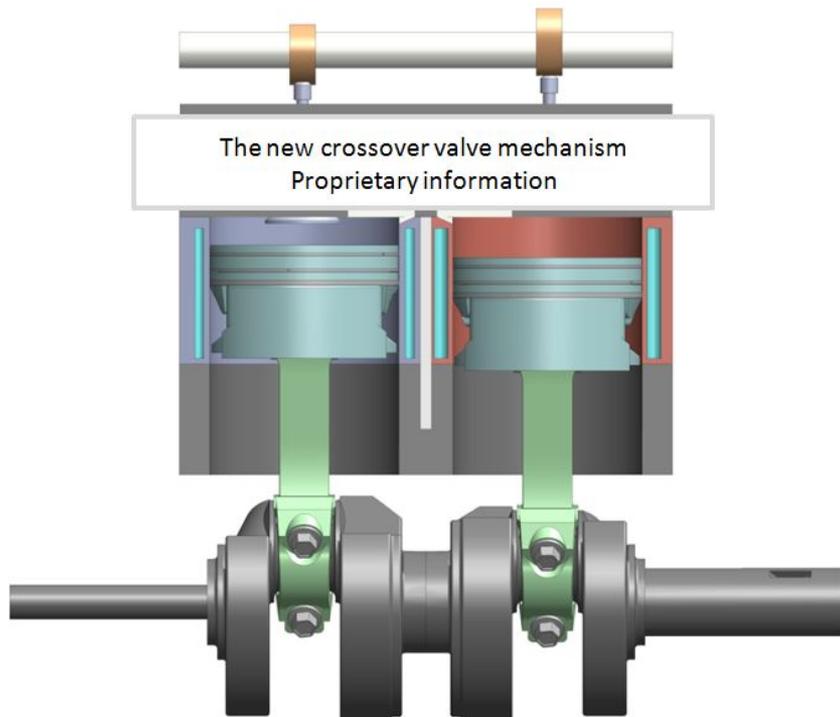


Development Needs:

- Build a third prototype to implement a new crossover valve mechanism, which is a key technology enabler (see next slide).
- Achieve higher efficiency by reducing both heat loss to the coolant/oil and exhaust energy loss, and optimizing expansion and combustion timing.
- Achieve high durability and reduce the cost of the system by utilizing existing state-of-the-art engine hardware and components.
- The Tour engine is feasible across a wide range of engine displacements. The first prototype was a 2.5 kW engine while the second prototype was a 5 kW engine.
- The Tour engine has an advantage of being part of a CHP system as the expansion side could be designed to generate high grade waste energy.
- Combustion phasing and over-expansion (Atkinson/Miller cycling) could be optimized to a higher degree compared to conventional engines.

Key requirements for the crossover valve mechanism - the key enabling technology

Minimal gas flow resistance (Demonstrated)	During the transfer of the charge from the compression to the expansion cylinders.
Durable (New IP)	New crossover valve mechanism - inertia reduced to one-tenth relative to previous Tour crossover valve mechanism. Less inertia than common poppet valve at time of gating. Also, sealing components are conventional.
Minimal dead volume (New IP)	In the compression cylinder, within the spool shuttle and in the expansion cylinder is achieved with the new crossover valve mechanism.



Commercialization Plan (bottom up)

Establish business relationships with OEMs in the following 3 stages:

1. **Fundamental development** of the technology with Tour Engine core team
2. **Initial product development** of the technology to an OEM specific applications
3. **Product development** with a specific OEM