

The Rover Group

Sector:	Automotive
Technology:	SLA® system

Stereolithography (SL) cuts lead time by 90% on new manifold for The Rover Group, giving Britain's largest car manufacturer a powerful advantage in the fiercely competitive world auto market.

The Challenge

To build a multi-faceted injection manifold for a new Rover power unit, based upon a concept design from Rover power train engineers. The manifold had to demonstrate an innovative plenum chamber designed for efficient movement of atmosphere into the cylinders to mix with the injected fuel. The extremely intricate chamber posed a considerable challenge due to trapped volumes and support requirements during manufacture of the SL model. At 450mm x 260mm x 250mm high, the large-scale components had to be produced as a single part to provide accurate flow characteristics. Furthermore, Rover faced time constraints and budget controls.

The Results

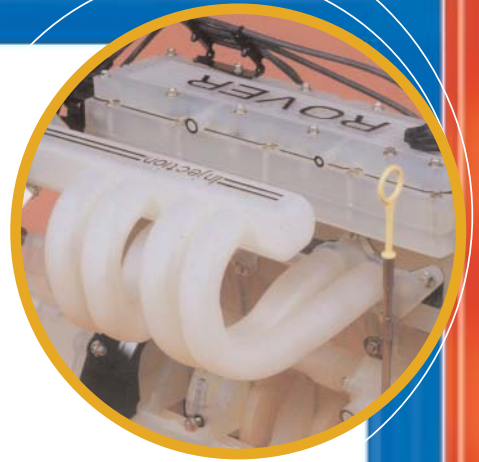
Using SL, Rover was able to create from the CAD design a major engine component -- the multi-tract injection manifold -- in only 39 hours, and at a cost of only £1,200. This produced a savings of more than 90% over traditional methods of prototype model manufacturing. More important, due to its strength in design and accuracy, the design team was able to place the completed model onto an engine test bed and measure its volumetric efficiency (i.e., its ability to allow the maximum volume of air to pass into the cylinder on one down stroke of the piston under various load conditions) prove out the design of the complex inlet tracts and plenum chamber. By using this method, any design iterations could be realized very early in the program, and well before committing to expensive tooling.

Before SL, Rover would have had to rely on traditional patternmaking techniques to produce master patterns, followed by complex core making and casting. The process would have taken 16 weeks at a cost of £22,000. Other benefits Rover realized were the ability to:

- Verify design assumptions and computations very early in the process
- Rapidly make design changes or remake parts
- Connect multifunctional teams working from a common database
- Devote more time to creative thinking and design

The Process

Rover design engineers created the actual manifold database using Computervision Solid Design and converted the original CAD model using the CV-to-STL translator. This data was then processed onto the SLA system. Once the design was accepted as intent, further manifolds were created and perfect reproductions were investment cast in aluminum using the lost wax process. These reproductions then went on to further test and evaluation. Rover claims to be ahead of other automotive companies within Europe by including investment casting within their process.



"[Solid imaging] offers the benefits of higher productivity with relatively few of the costs associated with conventional methods of prototype development."

*- Gordon Sked, Director of Design
The Rover Group*

Since acquiring its SLA system in June 1991, Rover has produced more than 250 different SL parts, including such items as full automotive heater systems, ducts, manifolds and casting patterns.

Company Profile

The Rover Group is Britain's largest motor car manufacturer, and a subsidiary of British Aerospace with annual sales of £3.7 billion and 35,000 employees internationally. The Group designs, manufactures and markets cars in the small, medium and executive sectors: car-derived vans and specialist four-wheel drive vehicles, producing 500,000 vehicles a year for domestic use and export to 150 markets worldwide. The Rover Group is world famous for its four-wheel drive vehicles and time-honored reputation for leading-edge design in motorcar performance.



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