

# HUNTSMAN

Enriching lives through innovation

## Ferrari engine air box prototype produced using advanced RTM technology



### Case History

## Huntsman Advanced Materials Epoxy RTM System used on Ferrari engine air box

An advanced Resin Transfer Moulding system (Advanced RTM) developed by the ATR Group and Huntsman Advanced Materials has been used on an award winning prototype engine air box for the Ferrari F430.

The ATR Group is an Italian consortium comprising nine leading companies involved in the research and production of advanced structural composite parts and components. Using ATR's advanced RTM technology and a new epoxy resin system - XB 3583/Aradur® 3486/ LMB 6432 from Huntsman Advanced Materials - it was possible to build the highly complex prototype of the engine air box. The process was so revolutionary it won the highly prestigious 2006 China Composites Expo-JEC Innovation Award for the best application for FRP/Composites Production in September 2006.

RTM is an established moulding process in which a catalysed resin is transferred into an enclosed mould, lined with reinforced fibrous material. It then may or may not be heated to complete the moulding process. The main benefit of RTM is that it combines relatively low cost tooling and equipment costs with the ability to consolidate large structural parts

“With our significant advancement in RTM technology combined with the Huntsman Advanced Materials resin system, it is possible to produce highly complex, yet lightweight composite parts in a single shot.”

ATR's advanced RTM system, in combination with Huntsman's resin system XB 3585/ Aradur® 3486/ LMB 6432, is so innovative because it enables the production of detailed composite parts in a single shot.

With the Ferrari F430 engine air box, the weight of the finished prototype part was virtually halved from the aluminium original – down from 4.1kg to just 2.4kg. This was achieved by using a special, flexible silicone membrane rather than the usual metal RTM mould, which enabled the resin content to be reduced and the reinforced fibre content to be increased. Additional external pressure was also applied to the membrane to optimise this process.

Although highly complex, the prototype part produced using this advanced RTM system was extremely accurate – even the engine flange drill holes matched up with no further finishing required.

No additional bonding was needed either to add connecting parts such as inserts and internal auxiliary structures as they were formed in the mould during the RTM process

- **Application:**
  - advanced RTM system used to produce highly complex engine component
- **Special service conditions:**
  - strength and flexibility to meet required prototype tests
  - had to meet rigorous Ferrari production standards
- **Advantages for customer:**
  - relatively low cost tooling and equipment costs for prototype parts
  - rapid production of large structural parts
- **Advantages over the competition:**
  - highly complex and accurate parts produced in a single process
  - little or no additional finishing required
  - minimises resin content so reducing weight without compromising mechanical properties
- **Customer location:**
  - Maranello, Italy

## Case History

# Huntsman Advanced Materials Epoxy RTM System used on Ferrari engine air box

Abramo Levato, R&D Manager at ATR Group said: "With our significant advancement in RTM technology combined with the Huntsman Advanced Materials resin system, it is possible to produce highly complex, yet lightweight composite parts in a single shot. This versatile laminating system makes Advanced RTM an even more time and cost effective manufacturing option for our customers."

**"This versatile laminating system makes Advanced RTM an even more time and cost effective manufacturing option for our customers."**

Statements in this release that are not historical are forward-looking statements. These statements are based on management's current beliefs and expectations. The forward-looking statements in this release are subject to uncertainty and changes in circumstances and involve risks and uncertainties that may affect the company's operations, markets, products, services, prices and other factors as discussed in the Huntsman companies' filings with the Securities and Exchange Commission. Significant risks and uncertainties may relate to, but are not limited to, financial, economic, competitive, environmental, political, legal, regulatory and technological factors. Accordingly, there can be no assurance that the company's expectations will be realized. The company assumes no obligation to provide revisions to any forward-looking statements should circumstances change, except as otherwise required by securities and other applicable laws.

© Huntsman Advanced Materials (Switzerland) GmbH 2004. © Araldite is a registered trademark of Huntsman Corporation or an affiliate thereof in one or more, but not all, countries.