

NAL team (Mr Srinivasa V and Mr S Venkatesh) and ADA (Mr T C S Subba Reddy) receiving the JEC 2018 innovation award at Seoul.

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JEC INNOVATION AWARDS SEOUL 2018

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CSIR NATIONAL AEROSPACE LABORATORIES
Category: AEROSPACE – STRUCTURAL



JEC ASIA 2018

Seoul, Wednesday, November 14, 2018



JEC Asia-2018 Innovation Award

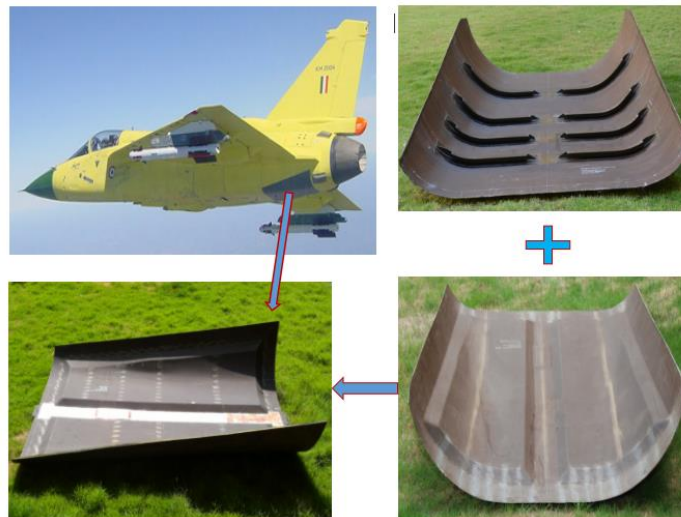
Under Aerospace-Structure Category

For the work:

Innovative Skin-Ribs Cocured Engine Bay Door

Awarded jointly to:

<i>Advanced Composites Division (ACD) CSIR- National Aerospace Laboratories (NAL)</i>	<i>Aeronautical Development Agency (ADA)</i>
<i>Shri. Karuppannan D, Scientist</i>	<i>Shri. Subba Reddy. TC, Scientist/Engineer G</i>
<i>Shri. Athimoolaganesh.S, Technical Officer</i>	<i>Shri. Girish.B, Scientist/Engineer G</i>
<i>Shri. Dharmappa.BL, Senior Technician</i>	<i>Shri. Ravindra Singh, Scientist/Engineer D</i>
<i>Shri. Margan.A, Lab Assistant</i>	<i>Shri. Sabarish. G, Scientist/Engineer D</i>
<i>Shri. Venkatesh.S, Senior Scientist</i>	
<i>Shri. Srinivasa.V, Senior Technical Officer</i>	



Photograph of Carbon-BMI Engine Bay Door parts and assembly

The primary requirement was to design a lightweight structure with a continuous service temperature of 180°C. This requirement precludes the usage of carbon-epoxy composites, as their service temperature is limited to 120-130°C. This requirement was met by employing BMI (Bismaleimide) composites whose service temperature is about 200°C. The processing of BMI based composites is a challenging task as the viscosity at processing temperature becomes too low and retaining the required amount of resin in the composite becomes tricky.

The design and development of Engine Bay Door was done through concurrent engineering approach. The structural design of door was carried out by ADA and aspects like process optimization, raw material certification, development of prototype door, static structural testing and airworthiness certification were carried out by CSIR-NAL. The development of co-cured/integrated structure using carbon-BMI material has not been reported in open literature so far. The structural qualification testing was carried out at 180°C by applying pressure loads using a specially designed vacuum fixture.

The qualified engine bay doors are assembled on LCA-Tejas aircraft and flight trials are in progress. 250 hours of flights have been completed without any issue and the engine bay door is set to enter series production soon.

Key Benefits of the Technology Developed

- ❖ 28% weight reduction over carbon-epoxy door
- ❖ Reduced manufacturing & assembly time
- ❖ Innovative venting process employed
- ❖ Flexible and self-aligning caul plate technology used to achieve defect free co-cured part
- ❖ Maintenance-free structure (need for insulation to manage temperature is eliminated)

The technology for realising high temperature composites for primary structures is demonstrated with the development of Engine bay door for LCA-Tejas program from concept to certification. The project involved structural design, process optimisation, extensive test program at various levels of test pyramid, tool design & development, part manufacturing & assembly and structural qualification at 180⁰C.

About JEC Innovation Awards:

JEC is the largest composites industry organization in the world with a network of 250,000 professionals. JEC supports the development of composite materials by fostering knowledge transfer & exchanges between suppliers & users. JEC conducts annual worldwide competition **JEC Innovation Program** at JEC exhibitions at Paris, America, China & Asia involving around 1800 companies worldwide. 177 companies & 433 partners have been rewarded for their composite innovations. ***It may be recalled here that ACD had won JEC Asia Innovation award for the years 2013, 2014 and 2016 in various categories for the Innovative developments. This is the first co-cured product using carbon-BMI material getting JEC ASIA 2018 Innovation award.***