Brief Write-Up about handing over of Composite Components / assemblies to HAL for TEJAS (LCA) – Limited Series Production (LSP) programme

Advanced Composites Division (ACD) has developed a number of composite airframe structural components / Assemblies for TEJAS (LCA). These include the following components that go on into each aircraft :

1) Rudder assembly - 1No.
2) Fin assembly - 1No.
3) CFC Wing Spars - 60 Nos.
4) Wing Fuselage Fairing Skins - 38 Nos.
5) Wing Fuselage Fairing Blocks - 20 Nos.
6) CFC Centre Fuselage Components - 41 Nos.
7) Under Carriage Doors (AFT) - 2Nos
8) Under Carriage Door (FWD) – 2 Nos.

While the initial emphasis was to develop the required technologies for fabricating designs made by HAL. Later ACD also ventured into design & development of flight critical primary structural components like the cocured Fin and Rudder. We are extremely proud & happy that NAL was able to significantly contribute to making LCA as one of the fighter aircraft with maximum amount of composites.

These components were developed with support & encouragement from ADA. The technologies developed are contemporary in nature and involve innovative manufacturing concepts. These are primarily of integral constructions employing cocuring, cobonding technologies. ACD pursued the co-curing co-bonded technology with a view to realise primary structural components having cost effective, reduced weight, improved performance.

Over the years this has been significantly implemented in realising large primary structural components for LCA. The technologies developed include a novel single shot fabrication technique to realise large structural assemblies through co-curing thereby

reducing the individual part count. The entire concept was conceived and realised by the division and took the challenging tasks towards the development of composite components within the stipulated time and delivered flight qualified hardware for LCA. Some of these technologies that have been developed are highly innovative and are attempted for the first time for manufacturing primary aircraft structures. Some of the primary components that was realised which employee the cocuring technology is the Composite Torque Shaft of LCA Rudder & Torsional box of LCA Fin.

Based on the progress of Fin & Rudder, ACD developed a new technique named as Derivative Tooling Technique to develop structural components which are doubly curved. Through this it was possible to develop the under carriage doors of LCA which are cured in a single operation. These concepts were further extended to develop doubly curved stiffened shells structures for the centrefuselage components of LCA. The centrefuselage section is a complex structure, housed with integral fuel tanks, airducts & wing fuselage attachments. The centrefuselage in the metal version has nearly 500 parts, which has been reduced to 41 Parts in the composite version by integrating many small parts into single assemblies. India is probably the first country to use advanced composites for fuselage structures.

Initially the component development activity at ACD began with the technology demonstrators TD1 & TD2. Further, the supply of components were made to all the PV series of LCA for ADA. Subsequently, the supply of components was further extended to the Limited Series Production (LSP) of LCA at HAL.

A function was organized on 7th May 2008 at ACD's premises at 11.00 a.m. to mark the occasion of completing the supply of all composite components / assemblies to HAL to meet the requirements of LSP aircraft programme developed by ACD, NAL for LCA. We have fulfilled the commitments made to HAL towards this.

HAL placed a Purchase Order for the supply of components developed by ACD for LCA during April 2003 for the supply of 8 aircraft sets of components for the LSP at a cost of Rs.2640 Lakhs (Rs.330 Lakhs per set). This was a challenging task for ACD to

meet the production requirements. Towards this end necessary process modification, drawings etc. had to be modified to production standards of HAL. ACD also learnt many things in the process with close interaction with the production team. Recently we have completed the supply of all the components / assemblies for the 8 aircraft sets of LSP. During this function, Director, NAL has handed over the documents to Managing Director (BC), HAL pertaining to the Fin and Wing Spars for the LSP 8 aircraft. We thank HAL for providing this opportunity to be associated with the LSP programme. We also thank ADA, DGAQA, CEMILAC for their support in this programme. Thanks for the timely help and technical support from many divisions within NAL.

NAL would continue to extend all the support, as and when required, to the LCA production activity. ACD, NAL has already initiated the process of transferring the technologies to HAL in respect of all components / assemblies developed for LCA programme & enormous efforts are being put to see that there is smooth transfer of technology to HAL to meet the Series production requirements of LCA.

This function was graced by Mr. Ashok Nayak, Managing Director, (BC), HAL as the Chief Guest and received the documents from Director, NAL in respect of Fin and Wing Spars for LSP 8 aircraft. Mr. P.S. Subramanyam, Proj. Director (CA) & Director – ADA was also present and addressed the gathering. Dr. A R Upadhya, Director, NAL gave a report on the various R & D programmes handled by ACD in the past and also about the current programmes for LCA. Dr. M R Madhava, Head, ACD in his welcome address gave an exhaustive account of all the research and development activities undertaken by the division since its formation and highlighted the technological achievements made in these programmes. Mr. H N Sudheendra, Dy. Head, ACD and Co-ordinator for LCA projects proposed the vote of thanks and thanked all the participants who have contributed in one way or the other for the success of this programme.