

- Composite van functioning as a mobile speech and hearing clinic in the villages
- Prospects of buffalo-driven power generator

NAL also houses several sophisticated R&D facilities. Some of these are:

- National trisonic aerodynamic facilities (NTAF) with three (1.2m, 0.6m and 0.3m square) high speed wind tunnels and associated model making and data acquisition systems. Every Indian aerospace vehicle has graduated out of this remarkable national facility.
- The fullscale fatigue test facility has 24 actuators and controls to simulate service loading, 96 channels of data acquisition and other associated facilities. This facility is used to support the structural life extension programmes of IAF aircraft.
- The acoustic test facility, with a reverberation chamber of 1100 cu m, and an achievable overall sound pressure level of 157 dB, is used for acoustic qualification of all Indian satellites and launch vehicles.
- The composite structures laboratory, with all the necessary infrastructure (waterjet cutter, prepreg cutting machine, C-scan facility, clean room etc.) chiefly works on the Tejas airframe.



Acoustic Test Facility.



Fullscale fatigue test facility.



The NAL wind tunnel.

Budgetary status

NAL received Rs 88.76 crores in 2004-05: Rs 61.14 crores (69%) came from CSIR while Rs 27.62 crores (31%) came from external sources. NAL has always achieved the maximum external cash flow among all CSIR establishments.

Manpower

NAL currently has 1223 permanent employees consisting of 365 (including over 100 Ph.D.'s) R&D scientists, 164 technical officers, 574 technical support staff and 220 administrative staff.

Contact details

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Background note about National Aerospace Laboratories, Bangalore

Mandate

National Aerospace Laboratories (NAL), established in 1959, is a constituent of Council of Scientific and Industrial Research (CSIR). NAL's mandate is essentially three-fold:

- Design and development of small (HANSA) and medium (SARAS) sized civil aircraft, and work to promote a vibrant Indian civil aviation industry.
- Support all national R&D programmes in aerospace (such as the development of Tejas, India's light combat aircraft, satellite and launch vehicle development, DRDO's missile development programmes and Kaveri engine development).
- Undertake programmes in aerospace R&D leading to the creation of aerospace technologies.



NAL's main building.

Highlights in 2004-05

- The SARAS aircraft had its maiden flight on 29 May 2004 and its inaugural flight on 22 August 2004. The first SARAS prototype has flown 30 times so far. The second prototype will be ready in March 2006.
- Six HANSA aircraft currently flying in Indian skies (four in flying clubs).



SARAS flying at Aero India 2005.



HANSA flying over Jakkur airport in Bangalore.

Ongoing activities

NAL's core competence spans practically the whole aerospace spectrum. NAL is currently engaged in the following research and technology development programmes:

- Design, development, test flying and certification of SARAS, a pressurized multi-role transport aircraft.



Flight control law for the unstable Tejas aircraft.

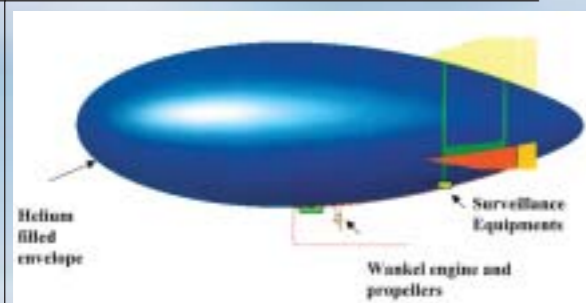
- Development and validation of the Tejas (LCA) flight control law
- Wind tunnel testing campaigns for all national aerospace programmes
- Establishment of integrated facility to manufacture carbon fibres and prepreps
- Development of a parallel supercomputer for numerical weather prediction
- Structural life extension of ageing fighter and helicopter airframes
- Smart materials and smart structural applications
- Failure analysis and accident investigation of aircraft and other engineering systems
- Development of advanced combustors for air breathing propulsion systems.
- Design and development of lighter-than-air vehicle (LTAV) systems for transporting food, traffic surveillance and even advertising.
- Use of computational fluid dynamics to design and optimize aerospace vehicles



Flosolver parallel supercomputer.



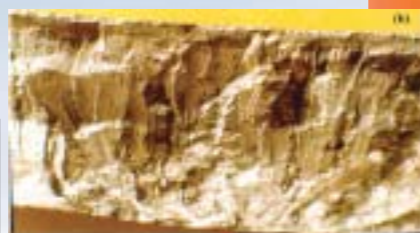
Development of advanced combustors.



Lighter-than-air vehicle systems.



Failure analysis.



Achievements

'Technology' has been explicitly identified as NAL's core engine for the future. The following are some of NAL's recent technological achievements:

- Design and development of HANSA, India's first all-composite aircraft ideal for ab initio training and hobby flying and SARAS, India's first civil transport aircraft.
- Flosolver, India's first parallel computer, now being configured for accurate weather prediction, especially in the tropics
- Design and development of autoclaves, to fabricate composite airworthy components. NAL delivered one of the world's largest (4m x 8m) autoclaves to HAL in 2002.
- NALSUN, an innovative solar selective coating especially useful for water heating applications.
- Design and fabrication of radomes for aerospace and meteorological applications.
- Development of comprehensive avionics system for aircraft such as the SARAS
- Co-cured co-bonded fabrication technologies for airworthy composite components.



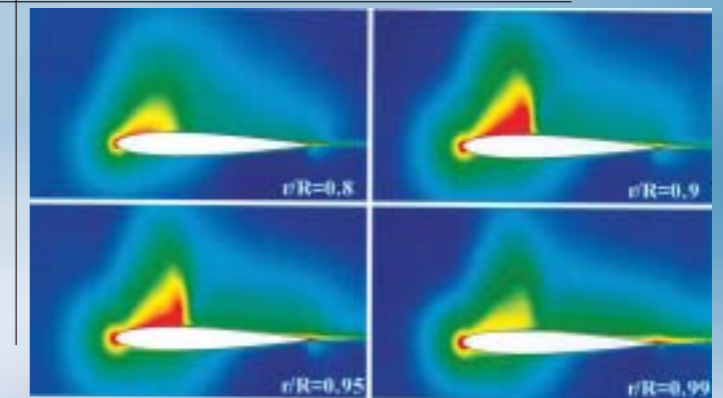
4m x 8m autoclave for NAL.



NALSUN solar selective coating.



SARAS engine test.



CFD analysis.

NAL's R&D projects also occasionally lead to happy and unexpected spin-offs for the society. Some examples:

- Streamlining and modifying state transport buses to reduce drag and effect fuel savings (up to Rs 50 crores saved for KSRTC)
- Power generation from salty ponds