

# NATIONAL TRISONIC AERODYNAMIC FACILITIES

## SUMMARY

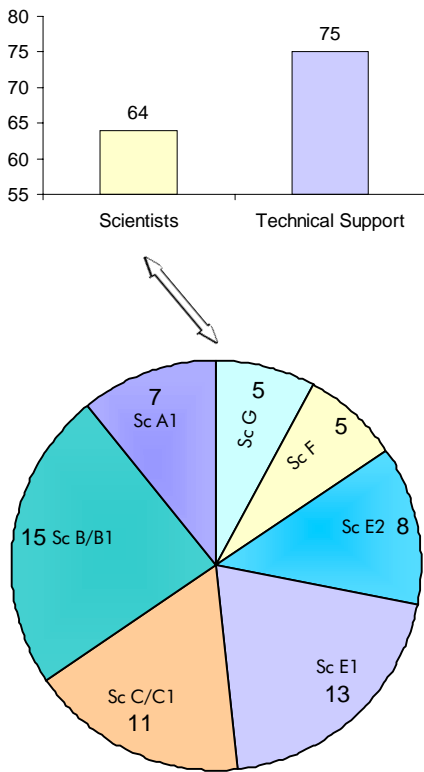
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During the reporting year, NTAFA activities centred mainly on aerodynamic tests in the 1.2m and 0.6m high speed wind tunnels and further work on facility augmentation. 1,589 blowdowns in the 1.2m tunnel (Fig. 1) and 195 blowdowns in the 0.6m tunnel (Fig. 2) were made during 2001-2002.

valuable insight on the probe locations on the forebody and their sensitivity to intake flow characteristics.

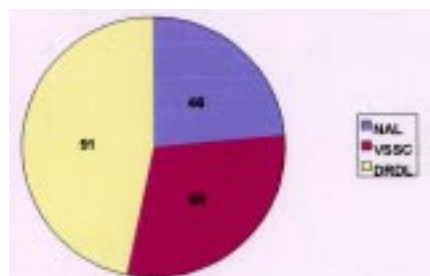
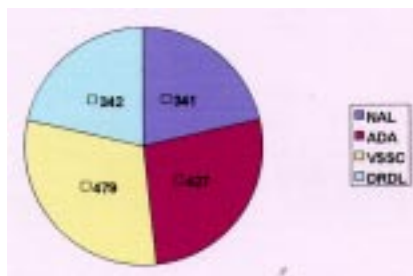
Wind tunnel tests for VSSC accounted for the highest number of runs. The pressure distributions around the heat shield region of a launch vehicle were measured on a specially instrumented model at different Mach numbers. Scale models of two geometries of the payload recovery module were tested over a wide range of Mach numbers to check the repeatability of results. Studies on the reduction of unsteady aerodynamic loads on canted and gymballed nozzles of a launch vehicle using passive devices continued and several configurations were tested, with encouraging results. Aerodynamic load measurements on a scaled model of a sounding rocket were carried out using booster fins of different geometry. A special test rig was designed, developed and successfully used in the 1.2m tunnel for roll damping measurements on two spin stabilised sounding rocket models. The rig enables the model to be rotated about its longitudinal axis

A majority of the wind tunnel tests for ADA were focused on the naval trainer version of LCA. Extensive tests were carried out in a phased manner to investigate the effects of nose droop, slat extension, rudder deflection and the use of high lift devices such as leading edge vortex control (LEVCON) and vortex plates with different deflections. A tuned vibration damper installed in a scaled model of the LCA reduced the model oscillations resulting from unsteady loads at high angles of attack and enabled tests to be conducted beyond 15° angle of attack. A number of tests were made on a scaled model of the LCA intake for Kaveri engine to investigate the effect of PSP air data probes on the buzz margin. These tests provided a



↓ Fig. 1 Utilisation of 1.2m tunnel. (Total: 1589 blowdowns)

↓ Fig. 2 Utilisation of 0.6m tunnel. (Total: 195 blowdowns)



at a series of steady speeds up to a maximum of 2500 rpm in a preprogrammed mode using a PC based feedback control system. This rig also features a custom-made single component strain gauge balance for measuring the small magnitudes of rolling moment on the model.

Wind tunnel tests for DRDL featured performance studies of air intakes on

a large-scale model of a missile. Load and moment measurements on the fin of a missile model for various fin deflections and model roll orientations at different Mach numbers were also made. Extensive tests were conducted in the 0.6m transonic tunnel on a scaled model of a hypersonic air-breathing vehicle configuration for DRDL. Modular tests were carried out on this model to generate aerodynamic data on body

alone and to study the effect of engine block, boosters, wings and control surfaces on the basic body.

Substantial progress has been achieved on the augmentation programme of NTAF facilities. Based on tenders received from suppliers, technical as well as commercial negotiations have been held and orders have been placed for some items.