

WELCOME TO ANAGHA ENGINEERING



22, 13th Cross, Doddanna Industrial Estate,
Near Peenya II Stage, Bangalore – 560 091
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COMMERCIALY CONFIDENTIAL TO ANAGHA ENGINEERING





COMPANY OVERVIEW

- ▶ Established in 1999 as a partnership company
- ▶ Located in Peenya Industrial Area, Bangalore
- ▶ 55000 Sqft in one of the prime industrial areas
- ▶ Built up area of 50000 Sqft – housing :
 - a) Design/ Development Office
 - b) In-house Fabrication
 - c) Machining Facilities



COMPANY OVERVIEW

- ▶ Achieved rapid growth and Engineering Excellence
- ▶ Attained enhanced technical capability in precision components manufacture for Aerospace and other Engineering Companies
- ▶ Capabilities in Design, Manufacture, Fabrication, Installation, Calibration and Commissioning of Major Aero, Marine and Industrial Gas Turbine Test Facilities
- ▶ Executed state-of-the-art Multi-Disciplinary Turnkey Projects for Aviation and other Heavy Engineering Industries



INFRASTRUCTURE

▶ FACILITIES

- ▶ Precision Manufacturing Machinery
- ▶ Fabrication related machinery
- ▶ Tool room related machinery
- ▶ Measuring equipment and tools

▶ MANPOWER – MANUFACTURING

- ▶ 10 Engineers
- ▶ 4 Quality Engineers
- ▶ 80 Skilled technicians
- ▶ 50 Semiskilled
- ▶ 30 Support Staff



IN-HOUSE FACILITIES

- ▶ CNC Flame Cutting 100mm thick X 14m L X 2.5m W
- ▶ FIBER Laser Cutting 16mm thick x 1.5m x 3m x 3KW + 6KW
- ▶ Straightening Press – 100 Tones
- ▶ Tool Room with Conventional Machines
- ▶ Measuring Instruments
- ▶ TiG, MiG and Arc Welding Machines.
- ▶ Gouging Machine



IN-HOUSE FACILITIES

- ▶ 110 Ton Hydraulic Press Brake - 3 mtr Length
- ▶ 100 Ton Hydraulic Press Brake - 3 mtr Length
- ▶ 35 Ton Hydraulic Press Brake – 1.5 mtr Length
- ▶ 80 Ton Hydraulic Press Brake – 1.5 mtr Length
- ▶ 80 Ton Power Press
- ▶ Hydraulic Shearing Machine – 6mm x 3 mtrs



OUR DESIGN/DEVELOPMENT DEPARTMENT





OUR DESIGN/DEVELOPMENT DEPARTMENT





FIBER Laser Cutting 16mm thick x 1.5m x 3m x 3KW





100 Ton Hydraulic Press Brake - 3 mtr Length





110 Ton Hydraulic Press Brake - 3 mtr Length





OUR FABRICATION AREA





OUR FABRICATION AREA





OUR FABRICATION AREA





OUR FABRICATION AREA





OUR FABRICATION AREA





OUR ASSEMBLY AREA





OUR ASSEMBLY AREA





TWIN TORCH CNC FLAME CUTTING MACHINE - MESSERS – Germany





ONGOING EXPANSIONS

- ▶ Sand Blasting Facility – Capable of Blasting 50 Sqm/ Hour
- ▶ Curing Oven of Size 5.5m x 3m x 3m Up to 250 degrees
- ▶ Power Coating Booth of size 10 feet x 6 feet x 8 feet – 2 Nos
- ▶ Liquid Painting Booth



SUB-SYSTEMS FOR AERO ENGINE TEST BEDS

- ▶ Engine Thrust Stand including Flexure Plates for Thrust Measurement
- ▶ Air Intake Splitters
- ▶ Aero Acoustic Exhaust Silencing Detuners
- ▶ Soundproof Doors
- ▶ Aero Acoustic Wall Paneling
- ▶ Aviation Turbine Fuel Tanks
- ▶ Engine Transportation Trolleys



TEST FACILITIES FOR AERO ENGINE COMPONENT TESTING

- ▶ Aero Engine Bleed Air Extraction & Measurement System
- ▶ Secondary Power System for Measurement of Power off take from Engine for performance validation
- ▶ Cyclic Torsion Test Rig for Aero Gas Turbine Engine Shafts
- ▶ Cyclic Spin Test Rig for Aero Gas Turbine Engine Rotors



THRUST STAND & OTHER MACHINING





PORTAL FRAME FOR AERO-ENGINE THRUST STAND





AERO - ENGINE THRUST STAND





PRECISION MACHINED FLEXURE PLATES

- ▶ Forged Spring Steel MPI cleared
- ▶ Machined, Precision Ground & Buffed to 800 x 200 x 20
- ▶ Overall accuracy within 10 Microns
- ▶ Centerline and Thickness variation between the two thin machined walls within 7 Microns





AERO ENGINE THRUST STAND ASSEMBLY





ADOUR ENGINE THRUST STAND





AERO – ACOUSTIC AIR INTAKE SPLITTERS





MiG AEROENGINE SPLITTERS IN ALUMINIUM





AIR INTAKE SPLITTERS ADOUR ENGINE TEST BED FOR HAWK

Noise Attenuated Streamlined Air Flow





DETUNERS AFTER FABRICATION





DETUNERS AFTER FABRICATION





EXHAUST DETUNERS BEING DISPATCHED





AERO ENGINE DE-TUNER INSTALLATION





AERO ACCOUSTIC DETUNER





ENGINE TRANSPORTATION TROLLEYS





JET PIPE TROLLEY FOR ADOUR 871



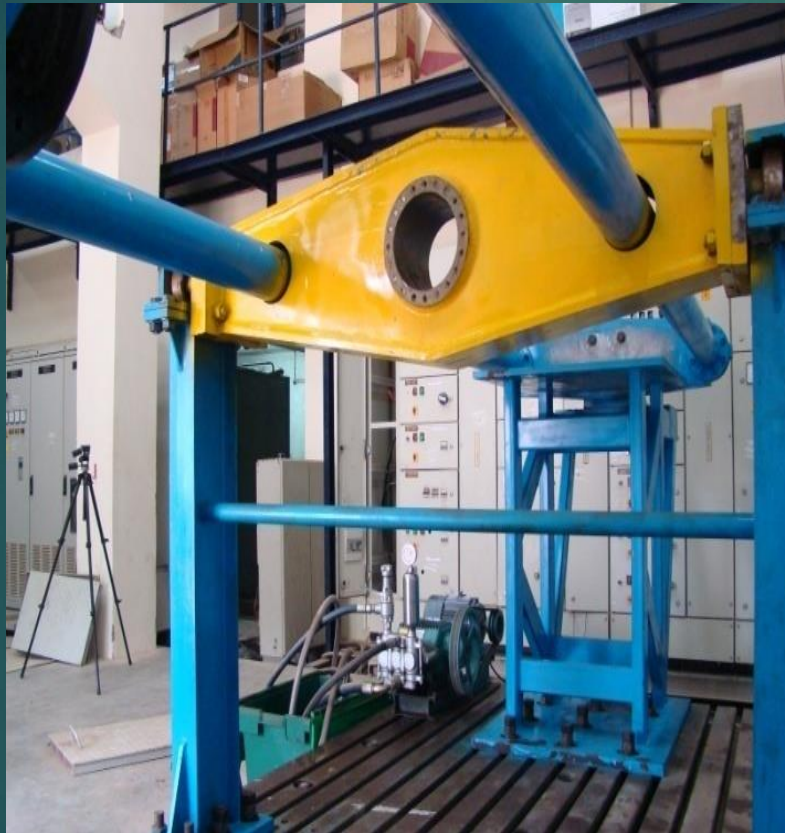


GASTURBINE SHAFT TORSION TEST RIG



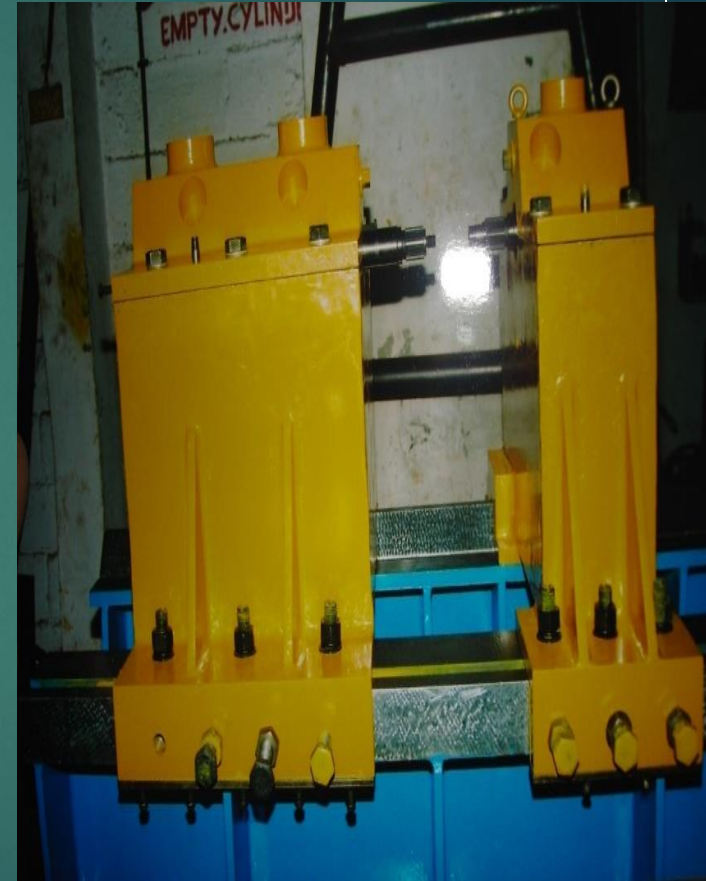


GAS TURBINE SHAFT TORSION TEST RIG





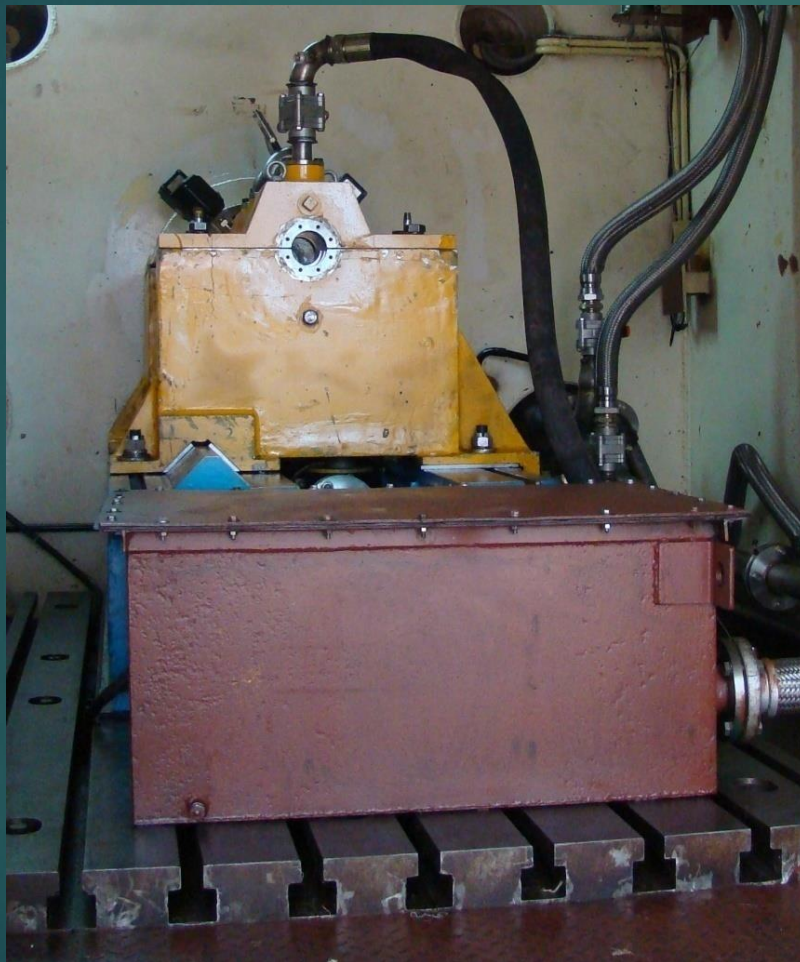
TURBINE ROTORS BALANCING RIG





AEROENGINE TURBINE ROTORS BALANCING RIG

Hi-speed Spin Test Rig – 40,000 rpm Max. for HAL





AVIATION TURBINE FUEL STORAGE & SUPPLY TANKS





AVIATION TURBINE FUEL STORAGE AND SUPPLYTANKS





AVIATION TURBINE FUEL STORAGE & SUPPLY TANK





ADOUR ENGINE TEST BED





ADOUR ENGINE TEST BED INSTALLATION AERO ACOUSTIC WALL PANELLING





ADOUR ENGINE TEST BED





AERO ENGINE TEST BED SYSTEMS





AERO ENGINE TEST BED





ADOUR AERO ENGINE TEST BED





SMALL GT TEST BED - PTAE





SMALL ENGINES TEST BED





AERO ENGINE BLEED AIR EXTRACTION AND MEASUREMENT TEST FACILITY



Back
Pressure
Valve

Orifice
Plates

Safety Shut off
Valves



TEST BED SYSTEMS FOR

- ▶ Adour Engine
 - * HAL –Bangalore
 - * Air Force Stations
 - Ambala
 - Gorakhpur
 - Bidar

- ▶ Pegasus Engine
 - * Naval Base-Cochin





TEST BED SYSTEMS FOR

- ▶ R11F Engine
HAL – Koraput
- ▶ RD 33 Engine
HAL - Koraput





TEST BED SYSTEMS FOR

- ▶ LCA – GE-F404 E & Kaveri Engine-GTRE
- ▶ ALH - Shakti Engine HAL - Bangalore



LCA



ALH



TEST BED SYSTEMS FOR

- ▶ LAKSHYA – PTAE
Pilotless Target Aircraft
Engine - HAL Bangalore



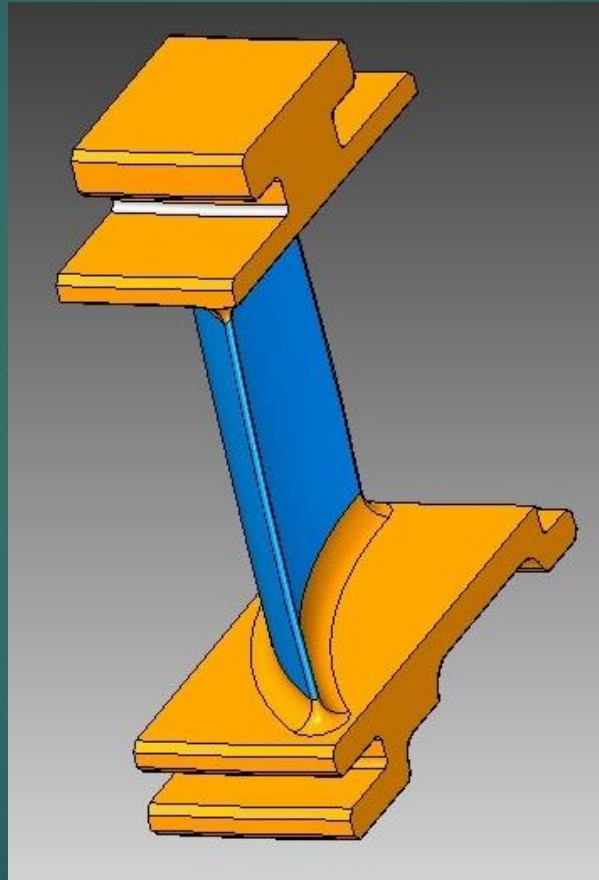


MACHINING CAPABILITIES AEROSPACE





CAD MODLE - 5th STAGE STATOR





THE MACHINED BLADE IN TITANIUM





CAD MODEL – 6th STAGE ROTOR



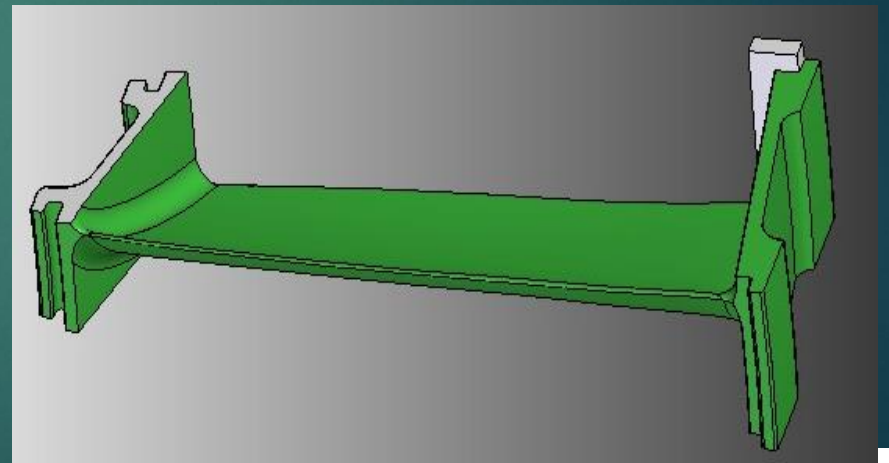
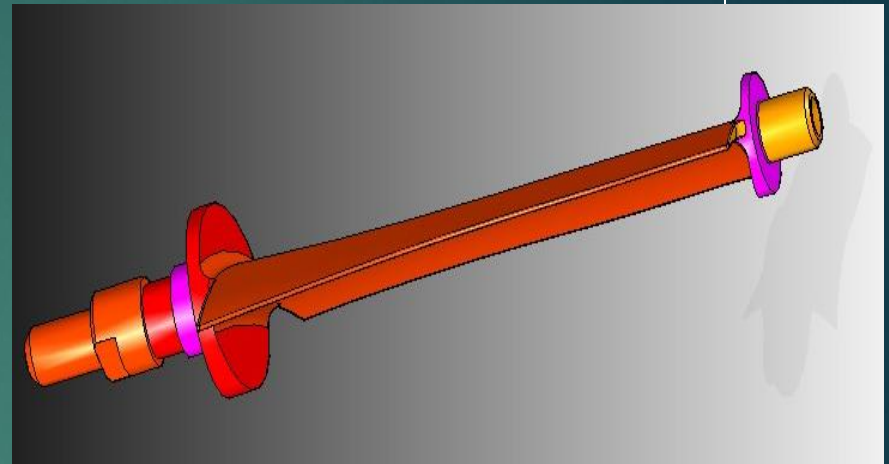
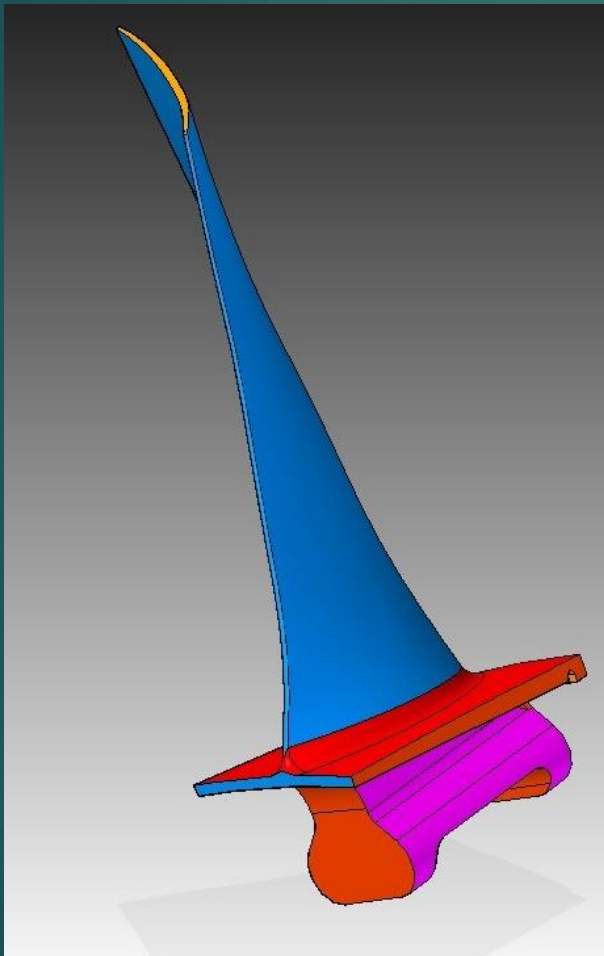


THE MACHINED BLADE IN INCONEL





CAD MODEL OF BLADES



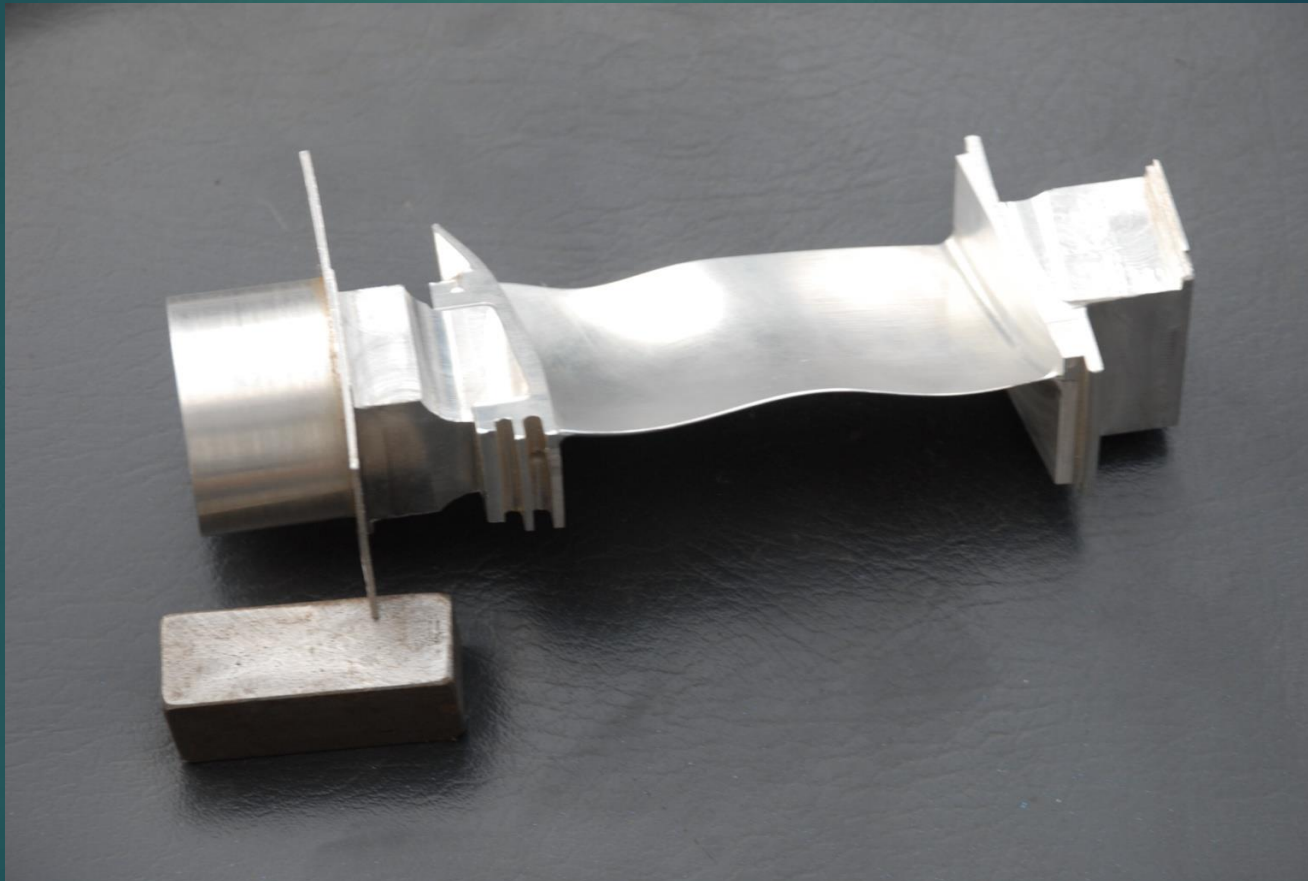


2nd STAGE FAN BLADE - TITANIUM





SHROUDED STATOR BLADE



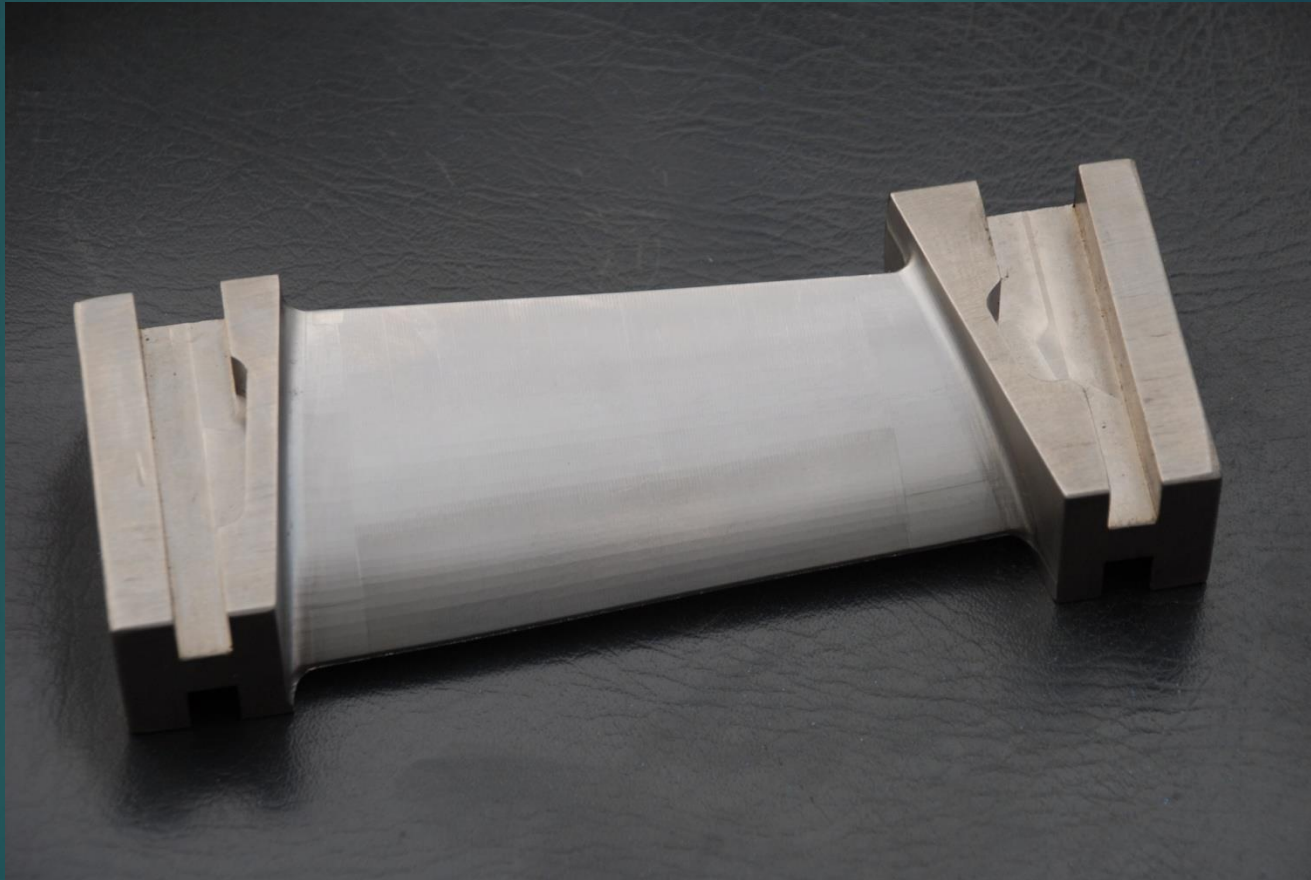


AEROFOIL MACHINED BLADE TITANIUM



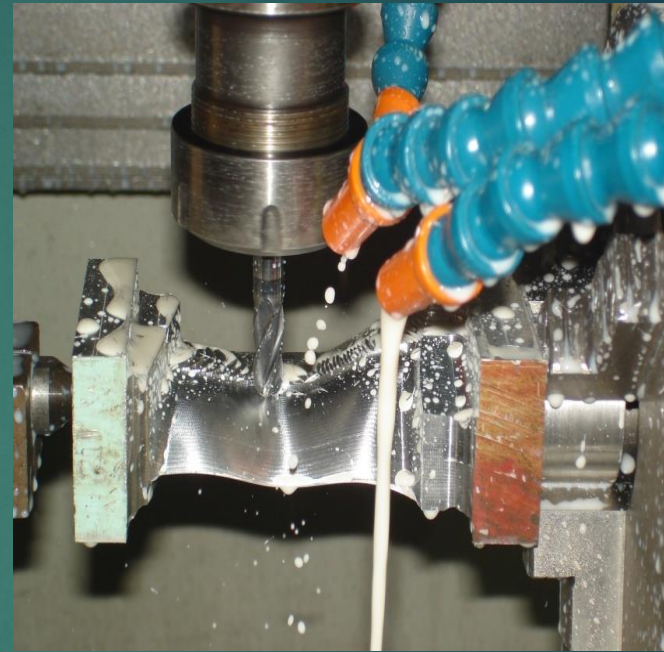
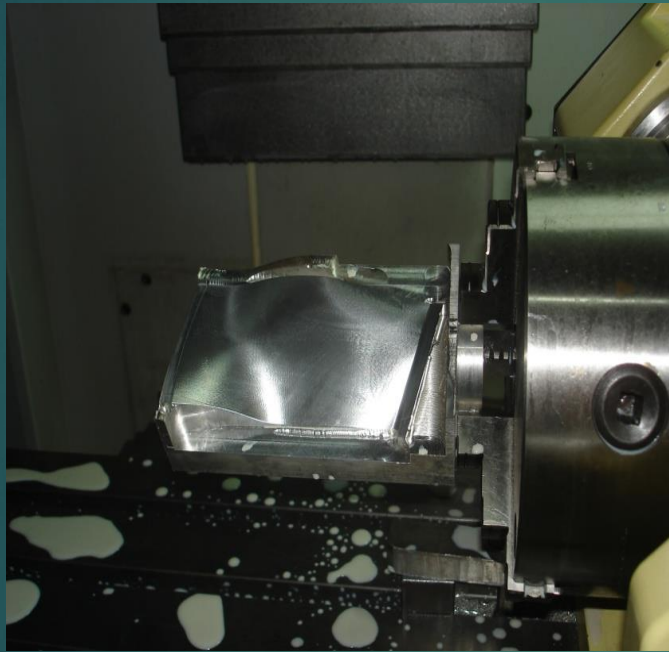


AEROFOIL MACHINED BLADE TITANIUM





PROTOTYPE MACHINING OF KAVERI ENGINE NEW DESIGN FAN BLADE





MACHINED COMPONENT FOR KMG T

Power Turbine Output Shaft for Kaveri Marine GT

- ▶ Material EN24 Forging
- ▶ OD 515mm X 234mm Length
- ▶ Concentricity < 10 microns
- ▶ Involute Spline
- ▶ Raw Forging Weight 750 kg
- ▶ Finished weight 65 kg
- ▶ Stringent Ultrasonic requirement





OUR OTHER MANUFACTURING CAPABILITIES





LARGE STEEL TANKS – 28000 LTRS BEML





LARGE STEEL TANKS – 28000 LTRS BEML





MACHINE FRAME & CONTROL PANELS





SHEET METAL FABRICATED HOUSING FOR SAINT GOBAIN





SAINT GOBAIN - SMALL TRANSITION DUCT





VACUUM CHAMBER FOR LARGE TURBINE ROTORS BALANCING FOR M/S. TRIVENI ENGINEERING INDUSTRIES

- ▶ Balance Rotors up to 30 tonnes
- ▶ Speeds up to 12000 rpm
- ▶ Vacuum level to 1 mbar
- ▶ 7m dia OD X 9m length
- ▶ Shell thickness 20mm
- ▶ All welds Helium leak Tested
- ▶ Rear Wall 200mm thick. Alone weighing over 28 Tons



VACUUM TUNNEL DOOR BEING FABRICATED AND MACHINED





VACUUM TUNNEL DOOR BEING FABRICATED





VACUUM TUNNEL SEALED END DOOR





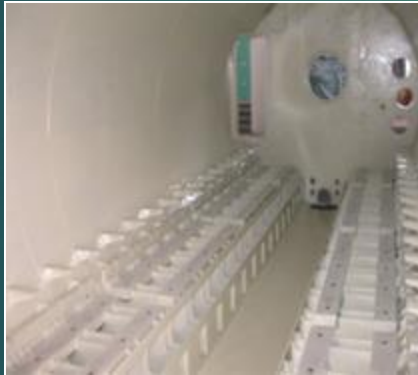
VACUUM TUNNEL SEALED END DOOR

- ▶ 8" / 200mm Thick Plate
- ▶ 3 Plates welded together
- ▶ Finished Weight of Door alone over 28 Tons
- ▶ Precision Machined after Fabrication
- ▶ Over 3 Tons of Welding Electrodes used
- ▶ All Welds – Helium Leak Tested



VACUUM TUNNEL FOR TURBINE ROTOR BALANCING

30 TONNE ROTORS AT 12000 RPM MAX







VACUUM TUNNEL BEING INSTALLED





VACUUM TUNNEL ASSEMBLED



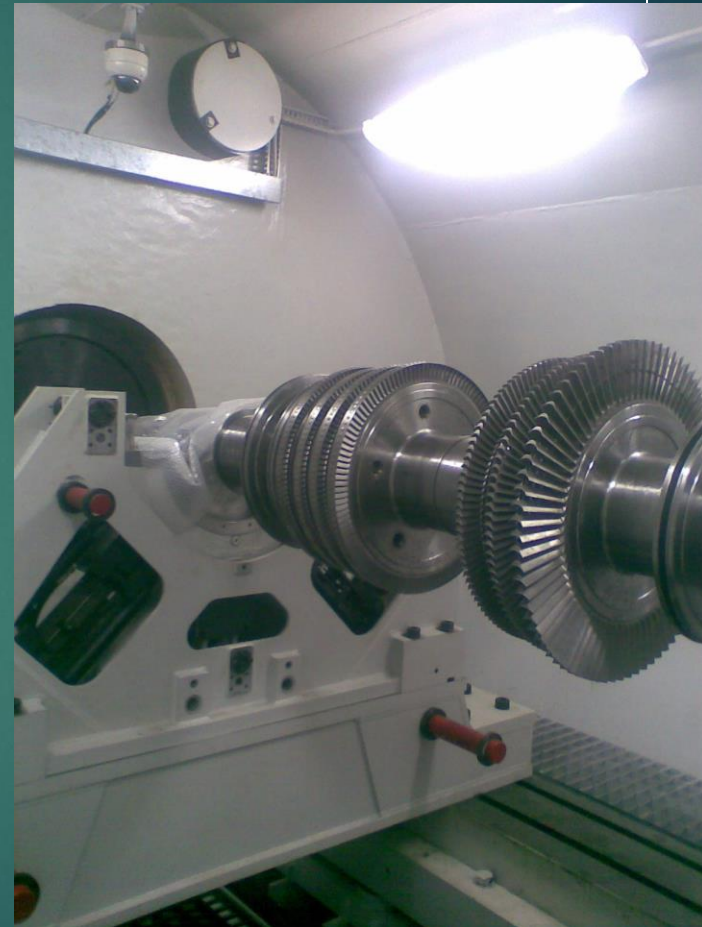


VACUUM TUNNEL ASSEMBLED





TURBINE ROTORS MOUNTED FOR BALANCING





VACUUM CHAMBER INSTALLED & COMMISSIONED





OUR FOOTPRINTS – A FEW

- ▶ ACE DESIGNERS LTD
- ▶ BIESSE MANUFACTURING COMPANY PVT LTD
- ▶ TRIVENI ENGINEERING & INDUSTRIES LTD
- ▶ HINDUSTAN AERONAUTICS LTD., (HAL)
- ▶ MOTOR INDUSTRIES CO., (MICO) BOSCH
- ▶ BEML
- ▶ KENNAMETAL WIDIA
- ▶ SAINT GOBAIN
- ▶ GAS TURBINE RESEARCH ESTABLISHMENT (GTRE)



BEML WATER TANK





BEML WATER TANK





EXHAUST CASING - TRIVENI





EXHAUST CASING - TRIVENI





HAL – BELL MOUTH





HAL – BELL MOUTH





BHULER INDIA





BHULER INDIA





BHULER INDIA - Fixture





NCBS





NCBS





BIESSE - GUARD





BIESSE - GUARD





BIESSE – ELECTRICAL CABINET





BIESSE – ELECTRICAL CABINET





BIESSE – ELECTRICAL CABINET





BIESSE





BIESSE





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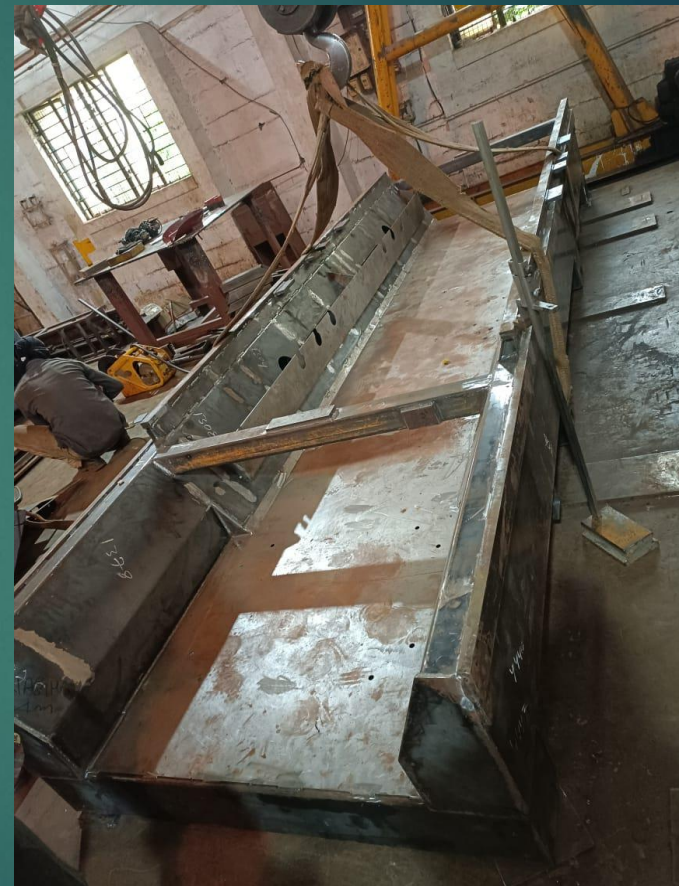


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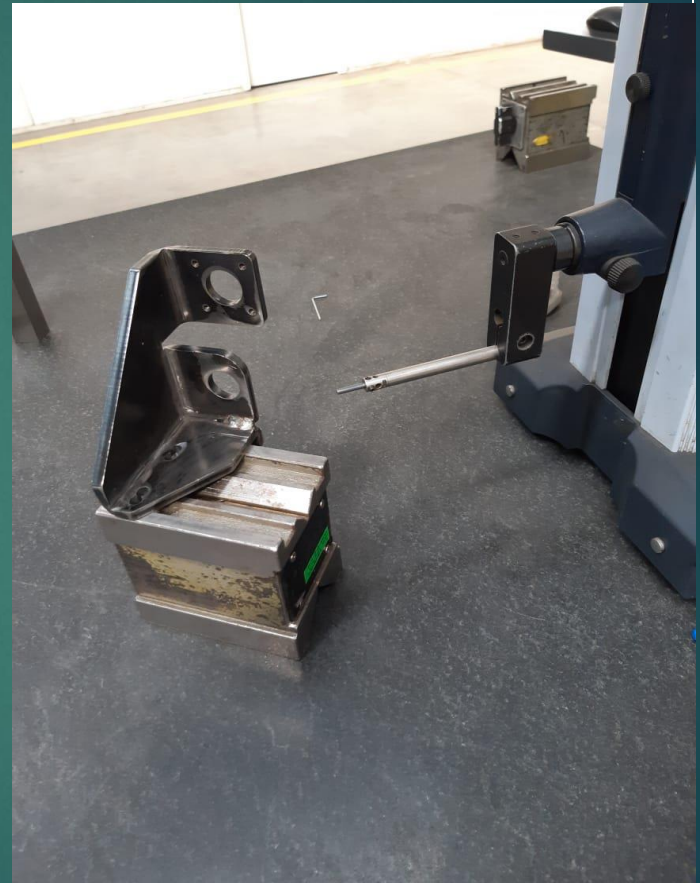


BIESSE





BIESSE





BIESSE





BIESSE





CERTIFICATES





CERTIFICATES

इंजन और टेस्ट बेड रिसर्च और डिजाइन सेंटर
हिन्दुस्तान एरोनाटिक्स लिमिटेड
पोस्ट बैग नं. 9310, सि.वि. रामन नगर पोस्ट, बंगलूर - 560 093.
Engine and Test Bed Research and Design Centre
(Formerly known as Engine Design Bureau)
HINDUSTAN AERONAUTICS LIMITED
Post Bag No. 9310, C.V. Raman Nagar Post, Bangalore - 560 093.

Tel: 91 (0) 80 25240143
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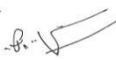
Fax: 91 (0) 80 25241397
91 (0) 80 25240180
E-mail : haleti@glabg01.vsnl.net.in
etbrc@mail@rediffmail.com
etbrc@hal-india.com

June 28, 2006

TO WHOMSOEVER IT MAY CONCERN

This is to certify that M/s.Anagha Engineering had manufactured and supplied the mechanical assembly of the Cyclic Spin Test Rig as per our Purchase Order No. 3251018 dated 25th May 2005. The run out requirement of the components in between Housing is 15 microns.

The work was carried out satisfactorily meeting the stringent requirements.


(P.V. MUSTAFA)
General Manager
ETBRDC

पुंजीकृत कार्यालय : 15/1, कब्बन रोड, बंगलूर - 560 001.
Registered Office : 15/1, Cubbon Road, Bangalore - 560 001.

ISO 9001-2000
COMPANY

इंजन और टेस्ट बेड रिसर्च और डिजाइन सेंटर
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etbrc@mail@rediffmail.com
etbrc@hal-india.com

20 May 2005

TO WHOM SOEVER IT MAY CONCERN

This is to certify that M/s Anagha Engineering has manufactured, supplied and erected the TM 333 detuner assembly for Aero engine test bed at HAL Bangalore. This was supplied against our Purchase order No. 3281015 dated 24.09.03.

The unit is working satisfactorily.


(P.V. MUSTAFA)
Addl.General Manager(D)
Engine Division

पुंजीकृत कार्यालय : 15/1, कब्बन रोड, बंगलूर - 560 001.
Registered Office : 15/1, Cubbon Road, Bangalore - 560 001.

ISO 9001-2000
COMPANY



CERTIFICATES

Triveni ENGINEERING & INDUSTRIES LTD.
TURBINE BUSINESS GROUP

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Fax : +91-86-2837 8211
Website : www.trivenigroup.com

*M/s. Anagha Engineering
No.22, 17th Cross
Doddanna Industrial Estate
Near Peenya, 2nd Stage
BANGALORE - 560 091*

Dear Sirs,

We are pleased to share our satisfaction in the services rendered by your company in partnering us for all fabrication and erection activities of our high speed vacuum tunnel facility.

The project was professionally managed from enquiry to commissioning stage and meeting our delivery schedule.

Our best wishes for the good job to continue in all future endeavors to come.

Best wishes,

*J. Madhan Kumar.
HCD Refurbishing services.*

REGD. OFF. "DEOSANDE" DISTRICT SAHAYANPUR, UTTAR PRADESH 221504.



CERTIFICATES





CERTIFICATES





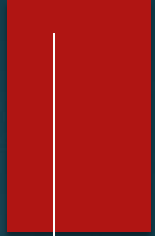
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THANK YOU