

**REFERENCE STANDARDS:**

- ISO 230 PART1-10
- ISO 13041 PART1-8
- ISO 10791 PART1-8
- ISO 3070--: Part 1-3
- ISO 3655
- ISO 3875
- ISO 2423
- JIS B 6192 PART1-8
- VDI/DGQ 3441
- VDI/DGQ 3442
- ANSI/ASME B5.57-2000
- ANSI/ASME B5.54-2005
- BS EN 50370-1 and 2

**EMI/EMC FOR "CE CERTIFICATION"**



**DYNAMIC TESTING OF VMC**



**PERFORMANCE TESTING CNC ROTARY TABLE (40 Ton)**



**5 - AXES MACHINING CENTER**



**6 - AXES CNC TOOL GRINDER**



**ABOUT ADVANCED MACHINE TOOL TESTING FACILITY (AMTTF)**

AMTTF is a joint project of the Indian Machine Tool Industry and the Dept of Industrial Policy and Promotion (DIPP) of the Govt of India to establish a state-of-the-art machine tool testing facility. This is a dedicated facility equipped with the latest equipment and facilities to test machine tools, accessories, parts and subsystems to establish their performance and reliability against international standards. The facility will help machine tool and related industries to test, trouble shoot and upgrade their products to higher level of performance.

AMTTF is located within the premises of CMTI as separate unit, equipped with the necessary facilities such as test beds, test equipment, specialized test rigs and instrumentation. The selection and design of this facility is done in close consultation with the machine tool industry and the experts of CMTI. AMTTF will also draw on the existing facilities and staff at CMTI to carry out its activities.

AMTTF is a 'single window' dedicated facility to provide testing and development support to Machine Tool / related industries and machine tool users / buyers. The activity of the centre is basically service oriented aiming at both routine & investigative work. AMTTF, while being a separate autonomous entity, works closely with CMTI, using its facilities and technical manpower wherever required.

Manufacturers of machine tools and suppliers of attachments, accessories and subsystems to machine tools can make use of AMTTF services. Users of machine tools can approach AMTTF for inspection of machine tools and related issues.



*Joint project by DIPP, Ministry of Commerce & Industry  
Govt. of India, IMTMA and CMTI*

**Founder Members**

- DIPP, MoCI, Govt. of India, Off. of PSA to Govt. of India
- Indian Machine Tool Manufacturers' Association
- Central Manufacturing Technology Institute
- Ace Designers Ltd.
- Ace Manufacturing Systems Ltd.
- Bharat Fritz Werner Ltd.
- Siemens Ltd.

**Industry users - AMTTF Services**



**AMTTF**

**ADVANCED MACHINE TOOL TESTING FACILITY**

**CMTI CAMPUS, TUMKUR ROAD, BANGALORE - 560 022**

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- Performance Evaluation of Machine Tools and Sub-systems
- Third Party Inspection for Machine Acceptance
- Testing and calibration of Machine Tools
- Calibration of Measuring Instruments
- Test protocols preparation for Machine Acceptance
- Consultancy for Test chart preparation for SPMs
- Testing beyond standards
- Static , Thermal and Dynamic Analysis
- Frequency Analysis and Mode Shapes
- Power Utilization and Chatter Analysis
- Machine Reliability Tests
- EMI/EMC testing for CE Compatibility
- Failure analysis by Residual Stress Measurement
- Issue of Performance Certification



Residual Stress Analyser

## MACHINE TOOL TESTING & PERFORMANCE EVALUATION



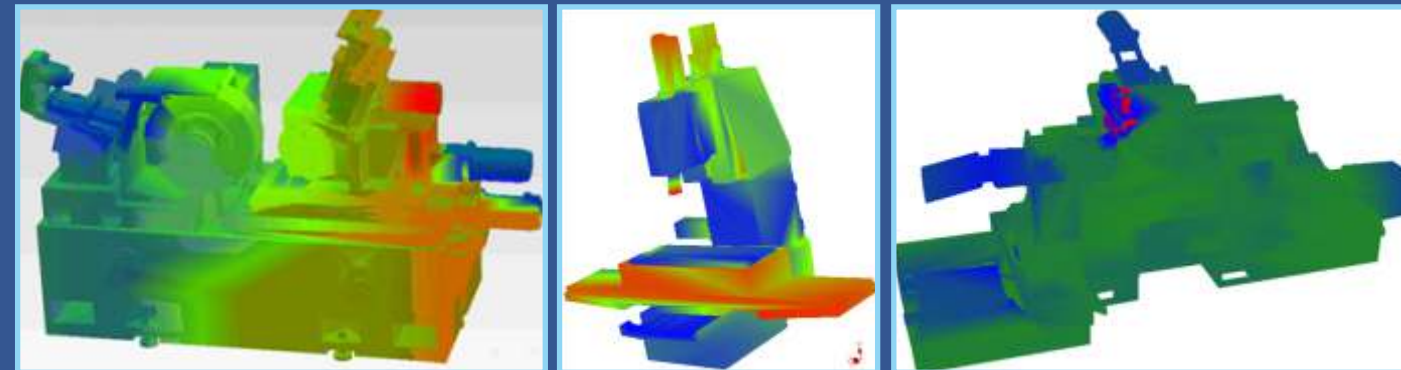
Full Power and Chatter



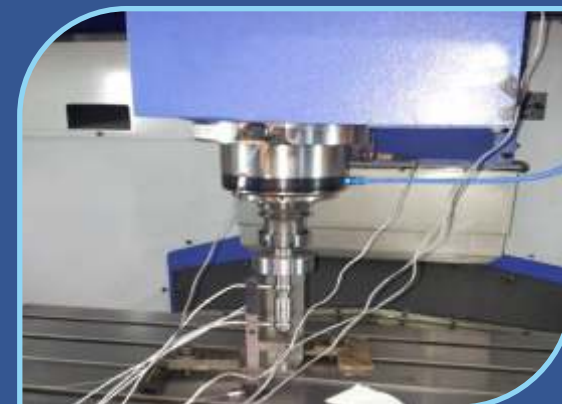
Static Compliance of CNC Machine

- Testing as per International Standards
- Performance and Accuracy Certification
- EMI/EMC Measurements for CE Certification
- Acceptance Tests as Third party Inspection
- Investigative Testing
- Testing beyond standards
- Static, Dynamic and Thermal Behaviour
- Natural Frequency and Mode Shapes analysis
- Testing of Sub-systems
- Consultancy on Specific Testing
- Test standards/Protocols and acceptance Criteria
- Test Equipment and Instrumentation
- Special Test Rig Development

## DYNAMIC ANALYSIS & MODE SHAPES



## MACHINE TOOL TESTING & PERFORMANCE EVALUATION



spindle Thermal Behaviour

- Test bed for Machine Testing
- Calibration Facility for Measuring Instruments
- Machine Calibration using LASER Measuring System- Linear and Rotary axes
- Instrumentation for Thermal, Static and Dynamic Measurements
- Thermal Chamber for variable Environment
- Contact and Non-Contact sensors for linear measurements
- Machine Power Analyser
- Dynamic Balancing Equipment
- Vibration and Noise Analysis
- Modal Analysis Equipment
- Electro-hydraulic Dynamic Exciter
- Residual Stress measurement
- Contour and Roughness Measurement
- EMI/EMC Analyser for CE certification



Indexing Accuracy-turn & Tilt Table

## Objectives of Machine Calibration, Inspection and Testing:

- To Improve the Machine Performance
- To Qualify the Machine Accuracy as per Standards
- To Accept the Machine to meet procurement as per Supply Order
- To Secure the right of Purchaser and minimise the arguments for Machine Acceptance
- To Identify the hidden problems and improving the Manufacturing and Assembly aspects
- To Track the Machine Accuracy and to Reduce the rejection of output of defective products

## Machine Tool Inspection and Calibration Services

- Full machine testing ( Geometrical alignments) as per Company, National (BIS), International standards (ISO, IIS, DIN, VDI/DGQ)
- LASER Calibration of the CNC Machine as per International standards (ISO, IIS, VDI/DGQ)
  - Accuracy and Repeatability of Linear axis (X, Y and Z axes)
  - Indexing accuracy of Rotary axis (A, B and C axes)
  - Linear geometric errors (Straightness, Parallelism, Squareness, and Flatness)
  - Angular geometric errors (Pitch, Yaw).
  - Angular geometric error (Roll) using precision electronic level
- Performance characteristics as per International standards (ISO,IIS)
  - Geometric accuracy tests of linear, rotary and angular alignments
  - Finish machining accuracies
  - Speeds , Feeds and Interpolation/Contouring accuracies
  - Thermal aspects of Spindle and Linear axis
  - Spindle error analysis
  - Circular test/Interpolation accuracy using Telescopic Ball bar
  - Operating times for tool and pallet change
- Testing beyond Standards
  - Static rigidity measurement and analysis of spindle and feed axis
  - Dynamic rigidity, Natural frequency and Damping coefficient of full machine
  - Vibration and Frequency analysis of complete machine
  - Mode shapes and Operational Displacement shapes (ODS) of full machine
  - Reliability aspects- Multifunction operations
  - Dynamic balancing (in-situ) of machine tool spindles and drive motors
- Contour and roughness measurement on finished component
- EMI/EMC capability testing for CE certification as per European Standards
- Residual stress and Retained Austenite on ferrous components
- Third party Inspection and Verification for Machine Acceptance as per procurement contract
- Issue of Performance Certificate for Indian and Imported machines