Central Manufacturing Technology Institute

An Autonomous R&D Institute under Ministry of Heavy Industries, Govt. of India

Manufacturing Technology Excellence through S&T driven solutions to 4P (Product-Process-People-Production) challenges of Industry
APRIL 2022

Technologies @ CMTI

Thread Measurement System
TMS-030

Special Features

➢ Non-contact and improved method of external thread form parameter measurement
➢ High speed thread parameter measurement system which can be used for automating the thread measurement process in the thread manufacturing lines
➢ User friendly thread measurement system requiring minimum human intervention

Specification:

✓ Measurement principle: Non-contact vision based measurement on back lit external thread image
✓ Measuring Range: ɸ 30 mm
✓ Measurement Features: Major diameter, minor diameter, pitch diameter, pitch, flank angle, root-to-crest height

Diamond Jubilee Calendar of Events

12th - Diamond Jubilee Inaugural Function
❖ Launching of DJ Helium Balloon as an iconic symbol of 60th anniversary

12th - Inauguration of Diamond Jubilee Research Centre for Sensor Technology Development

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MAY

Technologies @ CMTI

Ultra Precision Turning Machine

Special Features
➢ High Stiff Hydrostatic Oil Bearing Slides
➢ Ultra Precise Aerostatic Spindle
➢ Natural Granite Bed with Vibration Isolation System and active levelling
➢ Independent Slide configuration
➢ Open Architecture Motion Controller with Adaptive Control Technology
➢ Integrated chiller for Thermally stable slides and spindle.

Specification:
✓ Number of Axis : 3 Axis (X & Z, C-Axis)
✓ Maximum Workpiece Size: Ø 250 x 150 mm
✓ Spindle Running Accuracy : ≤ 25nm
✓ Spindle Max. Speed : 8,000 RPM
✓ Positional accuracy : ≤ 0.3μm
✓ Straightness of Slides : ≤ 0.3μm

Diamond Jubilee Calendar of Events

5th - Invited talk on DFMEA, Project management and 5S
18th - Technology Marketing & Entrepreneurship training program
20th - World Metrology Day Celebration
Lecture Series on Embedded Systems
Handing over of 2nd Line Test Rig

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JUNE

Technologies @ CMTI

High Precision Optical Calibration Masks

Special Features
➢ Calibration of Imaging, Optical and Microscopy equipment etc.
➢ Substitute for import items
➢ Coatings: Chrome (bright & anti-reflective), aluminum Iron oxide etc.

Specification:
✓ Size varies from 0.3”x0.3” to 8”x 8”
✓ Feature to feature accuracy down to 1 μm

Diamond Jubilee Calendar of Events

- 4th – Cycle Marathon
- 6th – 8th - Design Innovation Clinic 2022
- 10th - Invited talk on Stress Management
- 14th – Blood Donation Camp
- 16th - Expert Talks on Single Point Diamond Turning
- 21st – Yoga Day
- 22nd - Expert Talks on Modal Analysis
- 22nd – Simulation Technology day at CMTI
- IPR workshop for Scientific community

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### SUKSHM 3D Microfabrication

#### Special Features
- 3-D structures are created by the layer-by-layer forming method, under which 3-D ultra-fine solids are formed automatically by repeated light exposure and resin coating.
- Ultra-fine Features down to 10 μm level can be fabricated.
- Layer thickness can be optimized to 5μm level so that staircase effect can be eliminated with continuous exposure of UV projection.

#### Specification:
- Minimum feature size: <10μm
- Maximum print size: 14X8X25mm
- Layer thickness: 5μm to 100μm
- Z axis accuracy: 1μm
- Clean room class: 100000
- Ambient Temperature: 25 ± 2°C

### JULY

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#### CMTI Diamond Jubilee Calendar of Events
- 5th – 26th - Tuesday Webinar Series on Advance Material Characterization
- CMTI Diamond Jubilee Commemoration Pillar Unveiling
- Hands On training on Micro device/Sensor development
- Hands-on training on Polymeric Device fabrication

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AUGUST

Technologies @ CMTI

Ultra-Precision Air Bearing Spindle—Nanospin AIM 80

Special Features
➢ Motion Error in Nanometers
➢ High Bearing Stiffness
➢ High damping
➢ High Dimensional stability
➢ Near Zero Static Friction
➢ Near Zero Thermal Distortion
➢ No Harmonics
➢ No Air Hammer Effect
➢ Laminar Flow
➢ Higher Working Speed Range
➢ Integrated Motor
➢ Water Cooled

Specification:
✓ Bearing type: Aerostatic radial and thrust
✓ RPM: up to 3500 rpm
✓ Motion Error ≤ 100 nm
✓ Stiffness Radial: 80 N/μm
✓ Stiffness Axial: 150 N/μm

Diamond Jubilee Calendar of Events

10th – 12th – Khadi and Village Industries Commission Exhibition
12th – Master class Lecture on Realization of Fits & Tolerances in Mechanical Design
15th - Azadi Ka Amrit Mahotsav - 75th Independence Day Celebration
16th – 31st - Swachhata Pakhwada
17th – CMTI Open Day
17th – Aerospace Industry Meet
23rd – Vendor’s Conference
25th - Master Class Lecture on “Condition based Monitoring for Machine Tools”
Webinar on MEMS Fabrication
Expert talks on Hydraulic Power systems for SPMs

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### September 2022

#### Technologies @ CMTI

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**High Speed Shuttleless Loom LR-450**

**Special Features**
- High performance main drive
- Conjugate Cam beat-up system
- High speed Rapier Insertion system
- Electronic Warp Tension Regulation
- Servo-motor driven & electronically synchronized let-off & take-up motion
- Control system for M/c with State-of-the-art Monitoring & safety features
- High Stiffness Machine Structure

**Specification:**
- Picks per minute: 450 ppm
- Reed length: 220 cm
- 20 shaft Electronic Rotary Dobby
- Warp beam diameter: 1000 mm
- 8 colour weft selector

**Diamond Jubilee Calendar of Events**

- **13th** - Inauguration of Smart Manufacturing labs for experimental learning
- **14th** - Hindi Diwas Celebration
- **14th** - Master Class Lecture on “Data Acquisition and Control Strategies for Smart Manufacturing”
- **15th** - Engineers Day Celebration
- Webinar on MEMS Characterisation
- Exclusive CAD & CAE training sessions
- Invited talk on Bearings

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### OCTOBER 2022

#### Technologies @ CMTI

**Additive Manufacturing of Steel on Aluminum Bronze Bimetallic Parts**

<table>
<thead>
<tr>
<th>Steel deposition</th>
<th>Al-Bronze substrate</th>
<th>Steel on Aluminium Bronze Bimetallic Part</th>
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</thead>
</table>

#### Special Features
- Good metallurgical bonding
- Controlled heat affected zone
- Controlled dilution
- Good interfacial bonding
- No cracks
- No porosity
- No thermal distortion

#### Specification:
- Max. build volume: 300X 300 X 300 mm
- Deposition material: Tool Steel
- Substrate material: Aluminum Bronze

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#### Diamond Jubilee Calendar of Events

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
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<tr>
<td>12th</td>
<td>Smart Factory Demonstration to MSME Industries @ CMTI</td>
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<td>22nd</td>
<td>Diamond Jubilee Sports Program</td>
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<td>28th</td>
<td>Vigilance Awareness Week</td>
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- Invited Talk on Product Conceptualization to Development - Materials Engineering Perspective
- Webinar on Micro System Packaging
- Invited talk on Control System for SPMs

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Steel-Carbon Nano Tube Metal Matrix Composites through Additive Manufacturing

Special Features
➢ High strength
➢ Light weight
➢ Complex-geometry parts
➢ Less lead-time

Specification:
✓ Maximum build volume: 250X 250 X 150 mm
✓ Matrix material: Stainless Steel
✓ Reinforcement material: Carbon Nanotubes

Diamond Jubilee Calendar of Events

23rd - Workshop on Advance Material characterization
25th - CMTI Kannada Rajyotsava Celebration
Webinar on Welding and Sealing in MEMS Packaging
Master Class Lecture on “Machine Vision”
Social Get Together Function
Invited talk on Sensors & Instrumentation

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**Special Features**

- Endurance Test is vital for qualification of LRUs for its airworthiness by ensuring that actuator is functioning normally till the end of the life and obtain data for overhauling of the actuator.
- Qualification requirement is 50,00,000 cycles for each actuators 30% will be applied with hydraulic fluid at standard temperature, 60% with hydraulic fluid temperature at 75°C and 10% with hydraulic fluid temperature at 135±2°C.
- These tests are performed by repeating a single loop schedule (SLS), a combination of different loads and strokes at different temperature ranging up to 135°C.
Technologies @ CMTI

Thin film based Temperature Sensor for Industrial and Defense applications

Sensor Specification:

✓ Type: Thin film RTD based
✓ Temperature Range: -25 to 200°C
✓ Accuracy: + 0.5°C
✓ Sensitivity: 2.35 Ω/°C
✓ Die Size: 2.5 mm x 2.5 mm
✓ Type of Packaging:
  ❖ Epoxy packaging
  ❖ SS probe packaging

4th – 25th - Wednesday Webinar Series 2.0 – “Micro Nano Manufacturing & Metrology”

19th - Awareness program on Smart Manufacturing & Industry 4.0 to Undergraduates

Textile Machinery - Technology Demonstration on High Speed Weaving loom

Awareness programme on “Prevention of Sexual Harassment of Women at Workplace”

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Battery operated Power Pack

Special Features

➢ Used for charging the Parking Brake Accumulator of LCA Tejas aircraft
➢ Miniature sized pump coupled with a powerful DC motor to charge the aircraft accumulator to 207 bar in less than a minute
➢ The DC motor is run with the help of a compact green (environmental friendly) battery
➢ One switch operation of the rig makes a highlight in its ease of operability, arrived by a smart logic and selection of an optimum timing sequence
MARCH

Technologies @ CMTI

Manufacture of Internal deflector
Recirculating Ball screws

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Diamond Jubilee Calendar of Events

8th – CMTI Women’s Day Celebration, Prolific role of Women in Science & Technology
Handing over of 10T vertical mixer

27th - Diamond Jubilee Finale Event

Specification:

✓ Starting Torque - <0.015kgf-cm
✓ Pitch error requirements – C1 class
✓ Cylindricity Requirement ~2microns
✓ Symmetry and concentricity requirements – 5 μm
✓ Assembly run-out –Both shaft on nut and Nut on shaft – 10 μm

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