



(An Autonomous R&D Institute under Dept. of Heavy Industry,  
Ministry of Heavy Industries & Public Enterprises, Govt. of India)

**Advt No:08/2020**

## **Notice**

### **“Request For Qualification (Revised)” for Technology Transfer of “Ultra Precision Turning Machine, Nanoshape T250”.**

Central Manufacturing Technology Institute, (CMTI) intends to qualify and offer suitable Industries in India/Start-ups based on eligibility in accordance with the procedures set out in the “Request for Qualification (Revised)” document. The interested parties may contact CMTI.

**Director  
CMTI, Bengaluru**

**“Request for Qualification (Revised)” for Technology Transfer of “ Ultra Precision Turning Machine, Nanoshape T250” by CMTI to Indian Industries.**

The Request for Qualification document for Technology Transfer of **“Ultra Precision Turning Machine, Nanoshape T250”** intends to qualify and offer Industries in India/Start-ups based on eligibility criteria through an open evaluation process in accordance with the procedures set out in the document.

**“Ultra Precision Turning Machine, Nanoshape, T250”** developed by CMTI is a high precision turning machine capable of Single Point Diamond Turning (SPDT) & Ultra Precision Hard turning for producing optical quality surface finish of the order of few nanometres and submicron range of form accuracy on ferrous and non-ferrous components. The machine is equipped with state of the art technologies and has excellent static, dynamic and thermal behaviour.

CMTI, Bengaluru is now offering to transfer this technology to competent Indian Industries/Start-ups on **non-exclusive basis** to establish Ultra Precision Turning Machine production facilities that can produce and market the machine catering to the requirement of local and global industries.

The interested parties/consortia should obtain “Request for Qualification (Revised)” document from CMTI from the date of Notification and make an application in accordance with the provisions of “Request for Qualification (Revised)”. This “Request for Qualification (Revised)” for Technology Transfer of **“Ultra Precision Turning Machine-T250”**intends to qualify and offer Industries / Start-ups in India based on eligibility criteria in accordance with the procedures set out in the document.

*The “Request for Qualification” contains a brief description of qualification process, technology transfer process, instructions to applicants, eligibility criteria, timelines and related information for fulfilling the criteria and submitting the application.*

**The various activities related to qualification process are as follows:**

1. Release of Notice : **Monday, 4<sup>th</sup> January 2021**
2. Issue of Request for Qualification documents(revised): **4<sup>th</sup> January 2021**, on payment of **Rs. 25000\*/- (Rupees Twenty Five Thousand Only)(non-refundable and interest free) in the form of Demand Draft, drawn in favour of Central Manufacturing Technology Institute or CMTI, Bengaluru.**
3. **Submission** of filled-in Request for Qualification (Revised) documents along with Rs. 5 lakhs (Rupees Five Lakhs only) in the form Demand Draft as Security deposit.
4. Opening of RFQ Documents as and when filled in Institute receives the documents
5. Evaluation of proposals & short-listing/Selection of firms for Technology Transfer
6. Issue of notice of Award/Sign contract
7. Last date of issue of Request for Qualification documents(revised):**3<sup>RD</sup> January 2022**

- **The Request for Qualification documents Published as per notification dated 15.10.2018 has been revised.**
- The “Request for Qualification (revised) document” can be obtained against a non-refundable and interest-free payment of Rs.25,000/- (Rupees Twenty Five Thousand only) should be drawn in favour of “**Central Manufacturing Technology Institute or CMTI**”.  
(\*Those firms who have obtained the Request for Qualification (revised) documents earlier by paying Rs.25,000/- with respect to CMTI’s earlier notification dated 15-10-2018, may request for revised “**Request for Qualification (Revised)**” documents once again without making any payment.)They can contact CMTI to take the revised Request for Qualification (Revised) Documents. (The “Request for Qualification (Revised)” documents will be mailed to the interested firm’s e-mail ID from CMTI on receipt of the payment of Rs. 25,000/-).
- Security Deposit of Rs.5.00 lakhs (Rupees Five Lakhs only) in the form of Demand Draft has to be submitted by each applicant along with the final submission of Request for Qualification (Revised).
- Security Deposit of unsuccessful applicants will be returned, without any interest. Offer letter issued and security deposit shall not be returned back.
- **No withdrawal of application is permitted once selected and offered. Any withdrawal after the announcing the selected list would attract forfeit of security deposit.**
- Competent Firm's Security Deposit will be adjusted against the technology transfer fee.
- Competent firm/s shall pay the technology transfer fees as per payment terms and schedule within the stipulated time.
- Technology shall be transferred to **all/any** of the competent firms who qualify the eligibility criteria as specified in the Request for Qualification (Revised) Document. The required process documents shall be provided by CMTI at the time of signing of technology transfer agreement and payment of technology transfer fees as per payment terms.

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## Technology Brochure

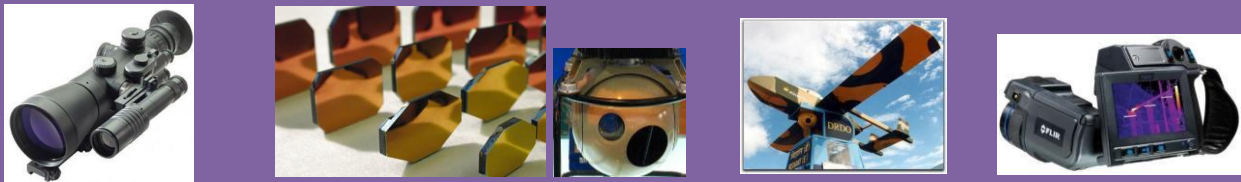
### **Brief about SPDT technology, Application areas and market Demand:**

SPDT Technology has been around for more than fifty years and diamond turning/machining is a well-established process abroad, for the fabrication of highly accurate optical components as well as mechanical component requiring micro/nano dimensional tolerances. Multi-axis machining and metrology systems are required to manufacture these optical components in various materials. Diamond Turning Machine produces a wide variety of electro/optical components including thermal imaging and night-vision systems, reflective mirrors for CO2 and YAG laser applications, crystalline materials for UV and microlithography, electro less nickel lens mold inserts, plastic lenses, telecommunication components and alignment devices.

In India, these technologies are finds its application in capital goods sector: ophthalmic, mobile phone cameras lens, etc. and strategic sectors like defence, space, atomic energy. At present no machine tool builder in India is building these machines and all the SPDT machines are being imported. There are a few industries fabricating the diamond turn components in the country and high value machined components are being outsourced from abroad currently.

Defence forces require specialized instruments that use the Infrared (IR) part of the EM Spectrum for night-vision and surveillance and tracking equipments. Other defence products include helmet-mounted display systems, head-up systems, virtual reality systems, avionics and imaging systems used in air and land defence systems.

The Indian electro-optics market is not only huge but also growing at a very fast pace; ironically, most of the demand is being fulfilled by imports as there are not enough public or private firms in this segment to cater to the current and augmenting demand. The global electro-optical market alone is estimated to be around \$12 billion for the fiscal 2014-15 and is expected to reach over \$16 billion by 2024-25 registering a CAGR of more than 3.00 %.

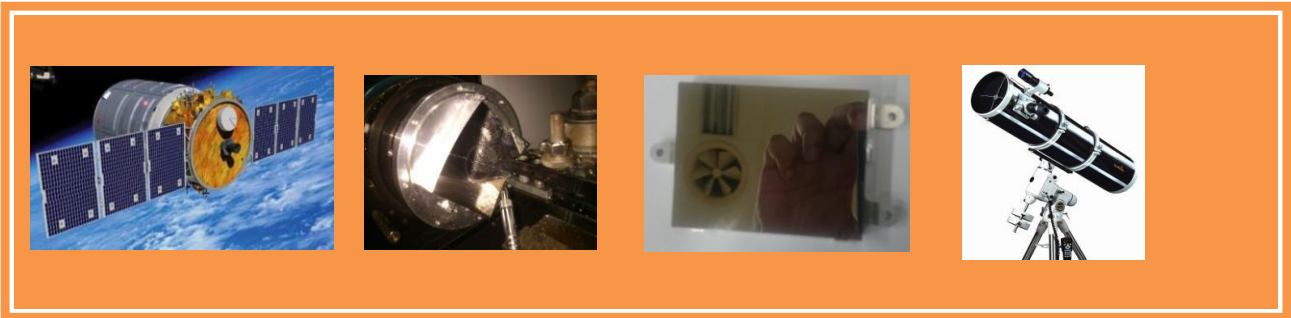


**Fig: Night vision and IR thermography systems**

Diamond turning technology is also needed to meet the requirements of the common human: medical products are needed to aid vision-both outside the body and implants for use inside the body. Such optical elements are typically made of polymers and are either directly processed using diamond turning or indirectly in the form of diamond turned inserts used in injection molds for mass replication. Many companies make such products commercially - ophthalmic implants, mobile camera lens and progressive lenses.

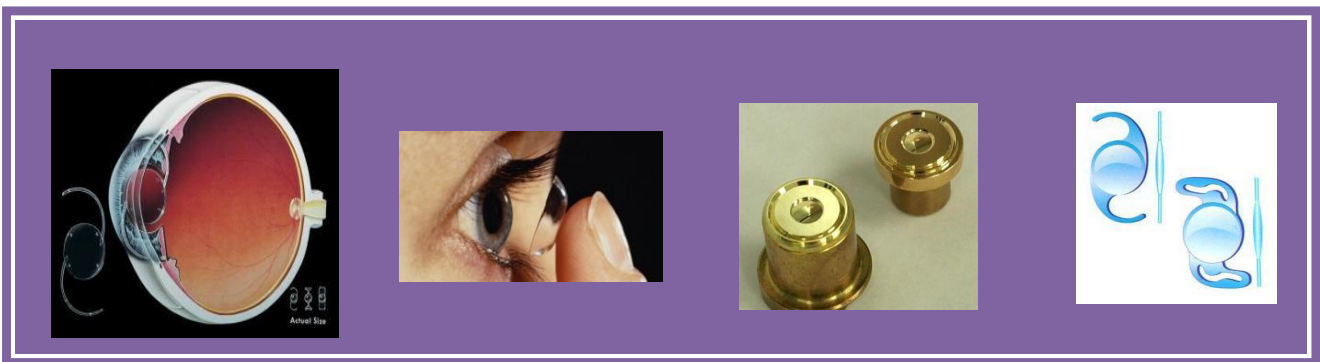
An important application of diamond turning machine is in large metal mirrors needed for telescope applications. Such telescopes are often made by a series of international collaborative agreements by several interested countries.

Space technology also requires diamond turning technology for making several specialized rocket components that require high precision smooth surfaces. Recent avionic requirements are exploring precision surfaces from titanium substrates.



**Fig: Space and Telescope mirrors**

Medical products such as many structural implants require very smooth surfaces for optical, tribological reasons and also for better integration with the body.



**Fig: Ophthalmic molds and lenses for medical implants**

# Nanoshape T250

Ultra Precision Turning Machine



*Nanoshape T250 is a highly stiff & Precision Turning machine, developed by CMTI, equipped with state of the art technologies for producing non-ferrous, ferrous and IR material components with optical quality surface finish. The machine accuracies are in the order of nanometers.*

### *Salient Features*

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

A product of  Central Manufacturing  
Technology Institute

# Nanoshape T250

## Major Technical Specifications

General	Description
Type	Ultra-Precision three axes (X,Z,C) CNC Turning machine
Machine configuration	"T" axes configuration
Machine Base	Natural Black Granite base provided with the mounting arrangements for slides
Vibration Isolation	Isolated-dual frames for the Granite base and optimally located pneumatic isolation system with active levelling
Control system	Open Architecture Motion Controller with Adaptive Control Technology
Computer specification	Intel core i3 3.5 GHz with 8 GB DDR3 RAM and 500 GB hard disk runs on windows - 7 Professional 64-BIT operating software.
Programming resolution	0.1 nm
Functional performance	Surface Roughness (Ra) < 2 nm, Form Accuracy (P-V) < 0.3 micron for 75mm diameter of convex sphere (ROC-250mm)

Linear Hydrostatic slide	Description
Type	Fully constrained oil hydrostatic, box way slide
Travel	X and Z axis: 200mm
Drive	Ironless Linear motor
Maximum feed rate	1000mm/min
Feedback type	Linear glass scale
Feedback resolution	32pico meters (0.032 nanometres)
Straightness	X axis: 0.3µm over full travel (200mm) Z axis: 0.3µm over full travel (200mm)
Stiffness	Horizontal: ≥500 N/µm Vertical: ≥1000 N/µm
Hydraulic oil Power pack	A separate hydraulic power pack with low flow rate, low pressure pulsation.
Thermal Control Option	Oil cooling provision with heat exchanger connected to water chiller which maintains temperature control to ± 0.1 °C accuracy

Work holding spindle	Description
Type	Air bearing
Drive	Integral Frameless, Brushless DC motor
Maximum speed	50-10000 rpm Bidirectional
Swing capacity	200mm
Motion Accuracy	Axial: ≤25 nanometres Radial: ≤ 25 nanometres
Working Load Capacity	Axial: 110 Kg @ 7bar @ spindle nose Radial: 95 Kg @ 7bar @ spindle nose
Stiffness	Axial: ≥ 225 N/µm @ 7bar Radial: ≥ 100 N/µm @ 7bar
Thermal Control Option	A chiller which maintains temperature control to ± 0.1 °C accuracy. The water is supplied to cooling channels located around the motor and bearing journals.

Facility Requirements	Air	Electrical	Machine Footprint
For optimal cutting results, facility thermal stability should be held within ±0.5°C	8 to 10 bar 25 scfm Dry to 10°C pressure dew point and pre-filtered to 10µm	3 Phase, 415 V AC; 50hz; (65 amp)	2.3m L X 1.7m H x 1.1m W

### For further details contact

Dr. N. Balashanmugam  
Joint Director  
[balashanmugam.cmti@nic.in](mailto:balashanmugam.cmti@nic.in)  
+91-80-22188302  
+91 (0) 9449842676

Mrs. Sharmila. M.R  
SAO & Nodal Officer (C-BD&SS)  
[sharmila.cmti@nic.in](mailto:sharmila.cmti@nic.in)  
+91-80-22188341/351  
+91 (0) 9449842681