



CORRIGENDUM

REFERENCE NO. : - P/NC/242/BM/SO(SB)/OTE/22-23/1373

DATE: 06/07/2023

NAME OF EQUIPMENT: "SUPPLY, INSTALLATION, COMMISSIONING, DEMONSTRATION & TRAINING OF SYSTEM OF LASER BASED IMPRINTING OF GRATING (LBIG) IN SILICA OPTICAL FIBERS".

NOTE: The Bids must be submitted in the Central Public Procurement Portal (URL:<https://etenders.gov.in/eprocure/app>) only. Manual/Offline bids shall not be accepted under any circumstances. Bidders should quote in INR only.

CONSEQUENT TO THE PRE-BID MEETING HELD ON 27/06/2023, THE REVISED SPECIFICATION IS GIVEN BELOW:-

SYSTEM OF LASER BASED IMPRINTING OF GRATING (LBIG) IN SILICA OPTICAL FIBERS

I. Item Name: System of Laser Based Imprinting of Gratings (LBIG) in silica optical fibers

Scope of the work: The proposed system (The details as given below) should have the capability of creating designed patterns in silica optical fibers using high pulse energy laser through controlled modification of the local refractive index of the silica glass fibers. Typically, patterns would be in the form of stacked lines, perpendicular to the fiber axis with a certain defined periodicity. The system should also have the capability to draw patterns with non-uniform periodicity and also with varying laser power for creating apodization. The linear patterns may also have inclination with respect to the axis of the fiber.

Detailed specification of the modules to be developed and supplied are as follows:

Specification:

1. Customized system Software:

- Software should be developed in-house in consultation of CGCRI Scientists.
- The software programming language is to be used C#/C++.
- Controlling XY motorized stage stack for moving the laser beam on the fiber
- Controlling motorized Z positioner for fiber positioning in vertical direction
- Establishing communication between motion controllers and the laser controller and also with the control PC
- Controlling input trigger signal and power control of the laser
- Facilitating camera control for image analysis
- Integration of machine vision module in the control software for fiber alignment
- Virtual and real joystick control
- Drawing tools to create patterns to be imprinted
- Controlling laser exposure through motion control of XY stages for incorporating apodization functions
- Option for importing design files as created by CGCRI (e.g. .TXT, DWG, CSV etc.)
- Integration and control of illumination devices for imaging in transmission and reflection mode
- Features to display input-output data and record processed data
- Possible to integrate other additional translation and rotation stages (compatible to the existing, XPS D8 controller) in future.
- Source code in C#/C++ is to be provided to CGCRI.
- Onsite support for any modification required in the software code need to be provided during the warranty period free of cost.

2. Optical Beam Delivery

2.1 Piezo Stage and Drivers to hold Microscope Objective

2.1.1 Stage

- Microscope Objective Stage, at least 10 nanometer resolution in focusing, 250 μ m travel range, Close loop operation with Strain-gauge position sensor, compatible with XPS-D8 motion controller
- **Use:** Nano-Focusing & Scanning Microscope Objective
- **Adjustment Type:** Piezo
- **Adjustment:** Z-axis
- **Cable Length:** At least 1.0 m

2.1.2 Controller/Driver

- XPS-D8 (Already available with CGCRI)

2.1.3 Driver Card

- Nano Positioning Drive Module, Piezo-Stack.
- **Drive Type:** Piezo-Stack
- **Maximum Current:** 60 mA
- **Maximum Voltage:** -10 V/+150 V
- **Maximum Power Consumption:** 9 W
- **Connector Type:** DB25

- 2.1.4 **Extension cable**
 - Cable, 3 m, DB25 Male to DB25 Female
- 2.1.5 **Inline Regulator, 5 VDC, for long cables**
 - The MMCABLE-REG 5 VDC regulator is required to ensure a high quality, regulated 5 V supply to the stage, when used with long MMCABLE / MCAB. For best efficiency, this regulator should be connected at the stage connector to re-adjust the 5 volts coming from the controller through the long cable (at least 5m)
- 2.2 **Software driven and provision of Joystick integration(later) for Coarse Stage Movement**
 - 2.2.1 **Software driven or Joystick**
 - provision of USB Interface for Joystick integration later
 - In assistance with virtual joystick or software driven
- 2.3 **Camera and Lens System**
 - 2.3.1 **Machine Vision Camera**
 - Ultra-Compact USB2.0 Monochrome 1.3MP CMOS Cameras, Enclosed
 - Resolution: 1,280 x 1,024 Monochrome
 - CMOS Chip: ½" (5:4) Micron MT9M001, Rolling Shutter
 - Pixel Size: 5.2 x 5.2 μm
 - Active Imager Size: 6.66 x 5.32 mm
 - 2.3.2 **Lens**
 - Focal Length 75 mm
 - Design Format f/2.5
 - C Mount
 - Design Format:to flood image on 2/3"
- 2.4 **LED and Driver**
 - 2.4.1 **LED**
 - Wavelength: Any wavelength between 610-670 nm
 - Typical Output Power: in the range of 100-150 mW
 - Interchangeable aspherical collimating lens
 - Integrated heat sink
 - Clear aperture: ~20-22 mm
 - 2.4.2 **LED Controller**
 - Power Supply Input Voltage: Vdc 9 -24 V
 - Power Supply Input Current < 4,000 mA
 - Output Current Resolution: at least 12 bit
 - Output Current Linearity +/-4 (or +/-0.5%) mA
 - Output Current Repeatability +/-1 (or +/-0.2%) mA
 - Computer controllable with SDK
 - Controlling 4 LEDs at once
- 2.5 **Microscope Objectives**
 - 2.5.1 **10X Objective**
 - Magnification 10x
 - Numerical Aperture 0.3
 - Free Working Distance [mm] 5.2
 - Thread Type M27x0.75
 - Coverglass Thickness [mm] 0.17
 - Immersion Without Immersion
 - Field of View [mm] 25
 - 2.5.2 **20X Objective**
 - Magnification 20x
 - Numerical Aperture 0.5
 - Free Working Distance [mm] 2.0
 - Thread Type W0.8x1/36
 - Coverglass Thickness [mm] 0.17

- Immersion : Without Immersion
- Field of View [mm] 25

2.5.3 40X Objective

- Magnification 40x
- Numerical Aperture 0.75
- Free Working Distance [mm] 0.71
- Thread Type W0.8x1/36
- Coverglass Thickness [mm] 0.17
- Without Immersion
- Field of View [mm] 25

2.6 Beam Folding Mirrors

2.6.1 Beam Routing and Beam Folding Mirrors

- Angle of Incidence (AOI): 45 degree
- Wavelength range of operation: 500-530 and also for the range 1000-1060 nm
- R%: >99%
- Surface flatness: $\lambda/10$ @632.8 nm
- Surface quality: 20-10 scratch dig
- Wedge <3 minutes
- Mirrors have low GDD and high damage threshold to sustain ~200 uJ energy at 100 fs

2.7 Dichroics for routing laser for grating inscription and also for imaging

- Preferably, a single or Two separate dichroic mirror to reflect 515 ± 2 and 1030 ± 2 nm laser and to transmit 613 ± 2 nm light

2.8 External variable attenuator for laser beam power control

2.8.1 For 515 nm

- Range: 400 - 700 nm
- Type: Motorized Variable Attenuator
- Attenuation Range: $T_p > 92\%$, polarized input, with broadband AR coating
- Wavelength Range 400 - 700 nm
- Extinction Ratio $T_p/T_s > 500:1$ and $1000:1$ average

2.8.2 For 1030 nm

- Motorized Variable Attenuator, Ultrafast, 650-1350 nm
- Type: Motorized Variable Attenuator
- Attenuation Range $T_p > 85\%$, polarized input, with uncoated polarizer
- Wavelength Range 650 - 1350 nm
- Extinction Ratio $T_p/T_s > 500:1$ and $1000:1$, average

2.9 Telescope Assembly for laser beam expansion and collimation

2.9.1 For 515 nm

- Expansion: 0.5 to 2.5X
- Max Input Beam Diameter: ~10 mm @ 0.5X, 8.0 mm @ 2.5X
- Typical Transmission: $\geq 90\%$

2.9.2 For 1030 nm

- Expansion: 0.5 to 2.5X
- Max Input Beam Diameter: ~10 mm @ 0.5X, 8.0 mm @ 2.5X
- Typical Transmission: $\geq 90\%$

2.10 Manual Stage

2.10.1 Course manual linear stage for microscope objective mount

- "Travel: 25 mm (Z-axis)"
- Angular Deviation $\leq 150 \mu\text{rad}$
- Micrometer to be included

2.11 Various Optics and Opto-Mechanics

2.11.1 Precision Spacer Kit

- \varnothing 25 mm Post Spacer and M6 Setscrew Kit

2.11.2 \varnothing 25.0 mm Pedestal Pillar Post, M6 Taps, L = 38 mm

2.11.3 Optical breadboard for vertical mounting

3. Mechanical Structure

3.1 Granite Base

- ##### 3.1.1 Granite base for the optical assembly (Size: 45X45 cm (approx.); would be finalized at the time of system integration.

3.2 Mechanical Enclosures: (The supplier would provide concept drawing of the assembly and also of individual enclosures for approval)

3.2.1 Enclosure for optical beam delivery

3.2.2 Enclosure for camera, bright light illuminators and microscope objective

3.2.3 Fiber Holder

- Quick-Release Cylindrical Device Mount for Multi-Axis Stages
- Accommodates Fibers or Cylindrical Optical Elements with Diameters from 125 μ m to 2.66 mm
- Fiber Clamping Arm with Adjustable Knob Provides 0.25 - 2.0 N (0.06 - 0.45 lb) of Holding Force

3.2.4 Fiber Illumination Mount

- To be fixed on XY stage stack

3.3 Granite Base for stages

3.3.1 Granite Base, 150 x 250 x 50 mm for XMS100 Linear Motor Stages (stages to be provided by CGCRI)

- Base size 150 x 250 x 50 mm
- Thread Type M6
- Material Granite
- Compliance RoHS 3, CE

3.4 Electrical Work for system integration

- ##### 3.4.1 Suppliers should supply all necessary electrical cables, switches, power supply, laptop, UPS, USB Hub, etc. for system integration

4 Other Essential Items

4.1 Index Matching Gel

- Optical Gel nD 1.52

4.2 Resolution Test Target

- Positive NBS 1952 standard Resolution Target, 3" x 1", 2.4 to 80 lp/mm

4.3 Reticle

- Negative Crosshair Reticle, \varnothing 1", UVFS

4.4 Optical Shutter with Controller

4.4.1 Optical Beam Shutter with 10' Long Cable, \varnothing 1" Aperture, Metric

4.4.2 Controller for item 4.4.1

4.4.3 Power supply, if required for item 4.4.2

4.5 VIS/NIR Detector Card

- VIS/IR Detector Card, 400 - 640 nm, 800 - 1700 nm

4.6 Alignment Disk

- SM1-Threaded Visible and IR Alignment Disk (400 - 640 nm, 800 - 1700 nm)

Terms and Conditions:

- The developer would supply all the necessary mechanical, optical and electronic components, modules etc. needed for the development and to meet the required specification.
2. The developer would also supply a custom made complete control and processing software as per the specification.
 3. It is important to note that the developer has to integrate few standard and major equipment like a pulse laser, high precision translation stages and controller, drivers already available with CGCRI, in the system. The final integration, installation and commissioning of the system has to be carried out at CGCRI. Following major equipment would be provided by CGCRI
 - a. Vibration isolated Optical Table (25 mm metric grid)
 - b. Femto-second pulsed laser: PHAROS-UP 10 W 200 μJ 1000 K
 - c. Newport linear stages: XMS-100S (2 Nos.)
 - d. Newport controller: XPS-D8
 - e. Driver cards: XPS-DRV-11 for all stages
 4. Warranty: 2 years
 5. AMC: Not required
 6. System assembly, Software development, Installation, commissioning and demonstration: within 180 days of PO issue date
 7. PBG: 2-months beyond warranty period.
 8. Experience: Supplier cum developer should have experiences of assembling and software development of motion controllers and also integration of similar type of laser based system.

Deadline for Submission of Bid and Opening of Bid is remain unchanged as given in CGCRI Tender No. P/NC/242/BM/SO(SB)/OTE/22-23/1373 dated 19/06/2023 which is as follows:-

| | |
|--------------------------------|-------------------------------|
| Bid Submission End Date & Time | 25/07/2023 upto 03.30 PM(IST) |
| Bid Opening Date & Time | 26/07/2023 upto 03.30 PM(IST) |

The above amendments shall amount to amendments of the relevant terms of our Bid Document for CGCRI Tender No. P/NC/242/BM/SO(SB)/OTE/22-23/1373 dated 19/06/2023.

All other Tender terms and conditions remain unchanged.

Bidders should quote only in **INR**. Bidding is open to only Class I /Class II Local Bidders.

(Handwritten signature)
06.07.2023.

(A.K.Pandey)
Stores & Purchase Officer
FOR & ON BEHALF OF CSIR

#*****
Stores & Purchase Officer
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