N.13: RRCAT-NPCIL Interaction Meeting on laser based technologies developed / deployed in nuclear power reactors

RRCAT has developed laser systems, processes and technologies for laser material processing which proved to be very useful in applications for various maintenance and refurbishment tasks related to nuclear power reactors. During last few years many laser-assisted refurbishment activities have been successfully carried out at various nuclear power plants using indigenously developed high-power lasers. A need was felt to promulgate these significant tasks carried by RRCAT, among concerned officials at all the Atomic Power Stations under NPCIL. On advice from Shri S.K. Sharma, CMD, NPCIL, one-day meeting with one or two senior officials from each of the Atomic Power Station was held at RRCAT on June 13, 2019.

Participants visiting the labs during the interaction meeting.

Senior officials from different nuclear power plant stations of NPCIL were nominated by respective Station Directors, Site Directors, Director (O) and Director (T) to participate in the meeting. Twenty-three officials from NPCIL participated from eleven power stations, NPCIL Headquarter and NPCIL R&D Centre, Tarapur. There were five talks of half an hour each followed by a feedback and concluding session. Lab visits of the participants were arranged in the afternoon session with a view to give a practical exposure of the laser-based systems and technologies developed at RRCAT.

The first talk by Dr. K. S. Bindra on "High power lasers and their uses in NPCIL" covered basics of lasers, solid-state laser technology, flash lamp pumped lasers, fiber lasers and the laser technologies deployed at different sites of NPCIL for various applications including bellow-lip cutting during EMCCR, cutting of triangular blocks of yoke assembly at RAPS-3, laser marker for endplates of fuel bundles and optical viewing system for end-shield leak detection etc. Second talk by Dr. B. N. Upadhyaya on "Laser material processing: case studies in NPCIL" included specific case studies related with laser cutting of bellow-lips at NAPS-1&2 and KAPS-1&2, underwater gas assisted cutting of pressure tube (PT) stubs at KAPS-1&2, cutting of end-fitting of Q-15 at KAPS-1, cutting of stuck north end of S-07 coolant channel of KAPS-2, removal of single selected coolant channel of 220 MWe and 540 MWe reactors, cutting of double check valves and steam generator tubes as well as laser welding of fuel pins. Talk by Dr. Om Prakash on "Fiber based temperature monitoring in radioactive environment" covered basics of fiber Bragg grating (FBG) based temperature sensor and deployment of temperature sensors in high radiation storage vault of SSSF and fuel recycling chamber at FF, BARC, Tarapur as well as development of prototype sensor for coolant temperature monitoring of KAPS-1. Shri M.P. Kamath delivered a talk on "Sag measurement of coolant channels" covering laser-based in-situ noncontact techniques developed for sag measurement of calandria tubes (CTs) at KAPS-1, technique for sag profiling of CTs and also a technique for profiling PT replica. Shri P. P. Deshpande presented metrology systems for visual surface inspection and dimensional inspection of fuel-pin components including metrology systems developed for PFBR and FBTR fuel-pin components, end-plate of PHWR fuel bundle, end-caps of PHWR fuel element and dimensional inspection of irradiated components in his talk on "Metrology of nuclear fuel components". Lab visits were planned for laser cutting and welding activities as well as activities of fiber-based temperature monitoring, non-contact optical method for sag measurement of tubes and metrology of nuclear fuel components. An exposure to laser power supply and tool-controller systems developed/deployed for different cutting and welding applications at NPCIL sites and DAE units was also given to the participants during the lab visits. Soft copies of presentations were provided to NPCIL Headquarter for distribution to all NPCIL participants for their future reference and use. Participants from NPCIL appreciated the presentations from technology developers and took part enthusiastically in discussions on various topics related with laser-based technologies developed at RRCAT.

The event was organized by an organizing committee with Shri S. C. Joshi, Director, RRCAT, Shri S. K. Sharma, CMD, NPCIL and Shri S. V. Nakhe, Director, Laser Group as Patrons, Dr. K. S. Bindra as Chairman, Shri R. Arya as Convener and Dr. B. N. Upadhyaya as Secretary.

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