Southern Methodist University, Dallas, TX
Research Center for Advanced Manufacturing (RCAM) and Center for Laser-aided Manufacturing (CLAM)

SMU | RCAM
Research Center for Advanced Manufacturing

Introduction

In September 1999, SMU's School of Engineering with its Mechanical Engineering Department established RCAM and in 2005 SMU became a university site in the National Science Foundation Industry/University Cooperative Research Center (I/UCRC) for Lasers and Plasmas for Advanced Manufacturing. Besides SMU, the University of Virginia, the University of Illinois at Urbana-Champaign, and the North Carolina State University are members of this consortium. Every university site has to have at least five industrial members.

Mission

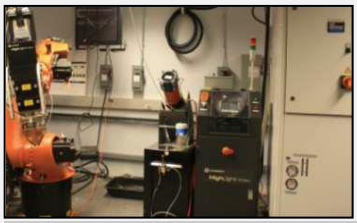
- ✓ To promote and apply university-led advanced manufacturing and development work for the benefit of industry.
- ✓ To educate and train a new generation of engineers and researchers in manufacturing engineering.

Expertise of RCAM/CLAM research teams

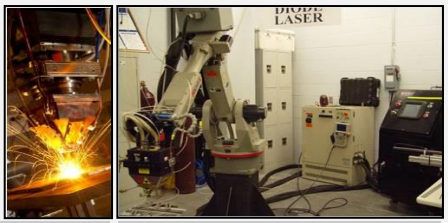
- Rapid manufacturing of functional components by laser-based direct metal deposition (3-D printing), powder or wire, by using principles of topological optimization and functionally graded porosity
- Repair of high-value parts by laser cladding (powder or wire)
- Heat treatment and surface modification by high-power direct diode laser (up to 8 kW)
- Laser-based welding technologies for joining similar and dissimilar materials:
- Hybrid laser/arc welding of thick and difficult-to-weld materials by a disk laser of 10 kW in power
- Laser micro machining and micro welding
- Laser paint stripping
- Friction Stir Welding assisted by a laser as a preheating source
- Sensing and control of different welding processes
- Synthesizing materials resistant to heat, abrasion, corrosion, and erosion
- Numerical simulation of different laser-based welding processes by ANSYS, COMSOL, FLUENT, SYSWELD
- System integration
- Materials properties characterization.

Equipment

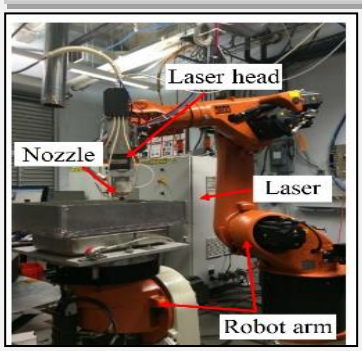
- ➢ TRUMPF laser of 10 kW
- ➢ IPG fiber laser of 4 kW
- ➢ NUVONYX direct diode laser of 2 kW
- ➢ NUVONYX fiber coupled diode laser of 1 kW
- ➢ LUMONIX Nd:YAG laser of 1 kW
- ➢ COHERENT direct diode laser of 8 kW
- ➢ Spectra Physics HIPPO Nd: YVO4 diode pumped Q-switched nanosecond pulse duration laser with four wavelengths (1064, 532, 355, and 266 nm)
- ➢ Lee Laser frequency-doubled diode-pumped Nd:YAG nanosecond pulse duration laser (1064 and 532 nm)
- ➢ Six-axis robots
- ➢ Computer controlled multiple axis high precision linear positioning systems.



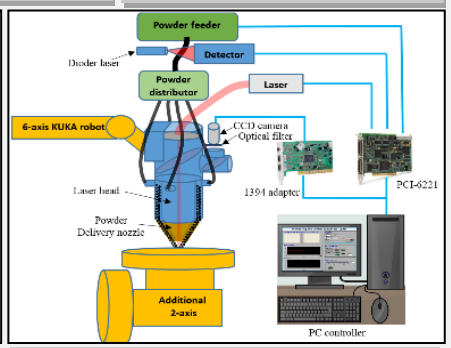
Robotized surface modification system based on Coherent direct diode laser of 8 kW.



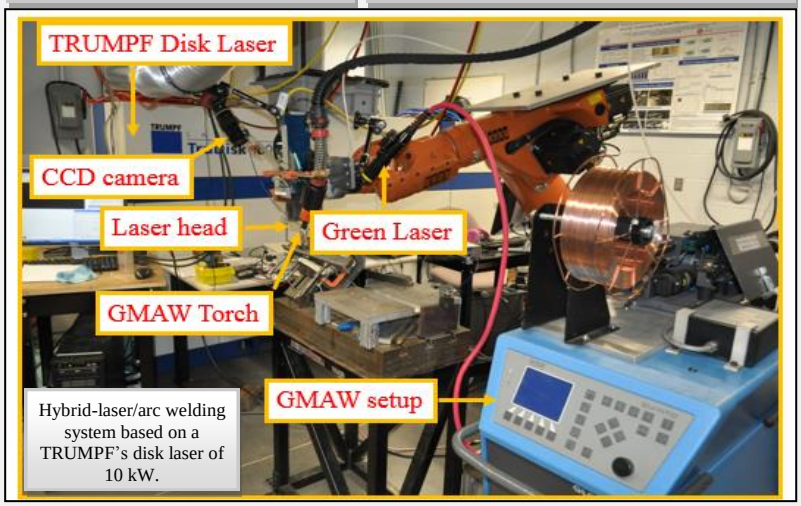
Robotized paint removal system based on direct diode laser of 2 kW.



Robotized direct metal printing system based on an IPG fiber laser of 4 kW.



Closed-loop control system to control the size of molten pool in laser-based additive manufacturing.



Hybrid-laser/arc welding system based on a TRUMPF's disk laser of 10 kW.

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