

# Prototype Engineering Laboratories

Using the expertise at the Prototype Engineering Laboratories, engineers and researchers can transform conceptual ideas for novel instruments and components into fully functional instrument and system prototypes.

Staff at the Prototype Engineering Laboratories manufacture mechanical and electronic prototypes and provide design consultation to Department of Energy's Idaho National Engineering and Environmental Laboratory scientists and engineers and work for others for the development, assembly, and testing of one of a kind items.

The organization provides one-stop manpower support for material acquisition, fabrication and assembly of mechanical or electrical components. Support spans the spectrum from design, fabrication, modeling, assembly, installation, testing and troubleshooting, and maintenance of electronic equipment and systems, to procurement of quality significant material.

A significant volume of prototype engineering is precision machining, welding, instrumentation, electronic hardware, printed circuit boards, control panels, experimental component assembly, and functional testing. Technical support also involves module system or circuit design, implementation, field-testing and operation, and long-term maintenance of design.



*CNC Machining capabilities at the IRC Prototype Shop*

## **Mechanical Lab capabilities:**

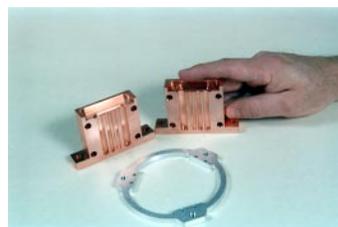
### **Computer Numerical Control (CNC) Machining –**

Conventional machining methods such as manually operated milling machines, lathes, and drill presses.

### **Computer Aided Design Drafting (CADD) –**

Staff can generate fabrication-ready designs and finished precision parts from electronic email files using AutoCad and Computer Aided Design Drafting software.

### **Metal alloy copper casting mold fabricated at North Holmes Lab for IRC researchers**



### **Electrical Discharge Machining (EDM) –**

Close tolerance geometric shapes can be cut into standard and exotic metals using electrodes custom made in prototype shops.

### **Wire Feed Electrical Discharge Machining –**

Using CNC controls, complex shapes can be cut into or out of all types of metal, graphite, and other conductive materials.

### **Welding –**

Certified welders support engineering and Research & Development projects.

### **Heat Treating –**

Instrument fabrication and machining requiring heat treatment, including hardening, aging, and metal annealing.

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**Research Electronics capabilities:**

**Material Procurement –**

Material takeoffs can be developed from project drawings for the acquisition of materials, including Quality Significant items.

**Prototype printed circuit board capabilities –**

Printed circuit board design  
Contract in place for commercial grade/quantities  
Installing/loading components

**Electronic Hardware, modules racks, chassis -**

Fabricated  
Assembled  
Wired

**Wiring/cabling/connector termination capabilities -**

Fiber Optic (ST, SMA, Military TFOCA), MS, DB, RJ  
Multi-conductor cable (shielded and unshielded)  
Single conductor  
Coaxial cable (RG-58, RG-59, RG-174)  
Wire wrap capabilities

**Custom engraved plastic and metal labels -**

Control and equipment function labels  
Warning and communication signs  
Component identification  
ANSI standard hazardous warning and IS (International Symbols)  
Aluminum, stainless steel and plastic materials  
Large assortment of letter and background color combinations and sizes



**Light Duty Utility Arm Robot gripper assembly fabricated and assembled in prototype shops for deployment at the high level liquid waste tanks at INTEC**

**Custom anodized aluminum panels (Metalphoto) -**

Front and rear panels for electronic modules and chassis

**Trouble shooting/repair –**

Trouble shooting and repair of electrical, electronic, pneumatic, mechanical systems and equipment

Prototype engineering labs are located at several INEEL buildings to support technology development research and general engineering projects. Site locations include Central Facilities-690, Test Reactor Area-604. Idaho Falls locations include the North Holmes Lab, North Yellowstone Complex Lab and the INEEL Research Center.



**Assembled 3-inch vacuum inlet for the INEEL's Laser-based Optical and Chemical Imager (LOCI) located at IRC**



**Compliance Joint Sampler End Effector limit switch blocks used in the Light Duty Utility Arm Robot**



**An example of circuit board design, fabrication and assembly capabilities available in the Electronics Prototype Shop.**

**Prototype Engineering Laboratory**

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