



01. RPL In-Person

This guide is for reference during the in-person section of the RPL introduction.

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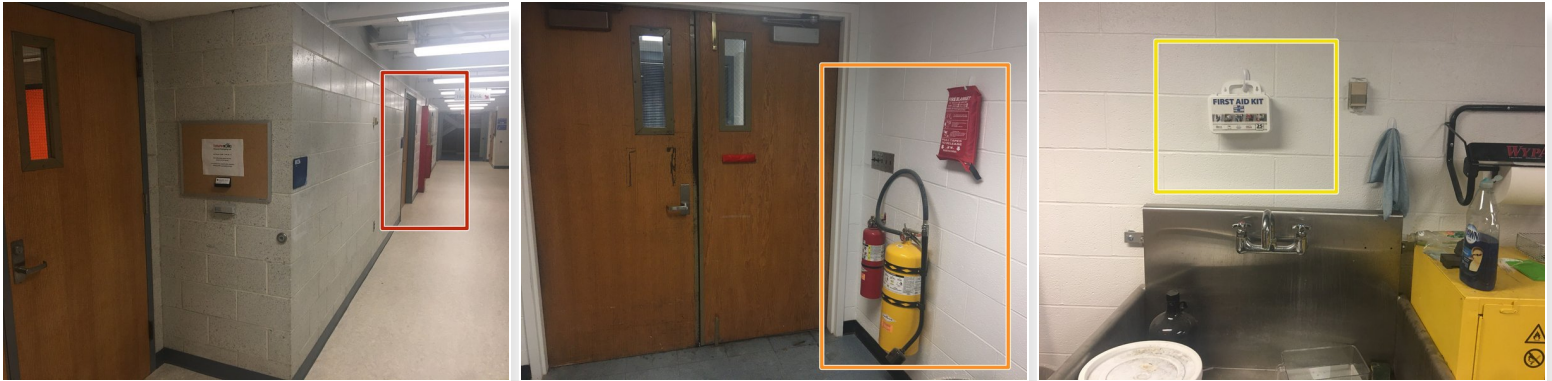
Introduction

Main Objectives:

- Learn about RPL processes and gain an understanding of the research machines
- Receive RPL staff contacts to expand your network
- Gain awareness of post-processing parts from different printers
- Learn about the RPL structure and positional needs
- Receive hands on knowledge of SLS and a sample part
- Receive knowledge of the Nanoscribe

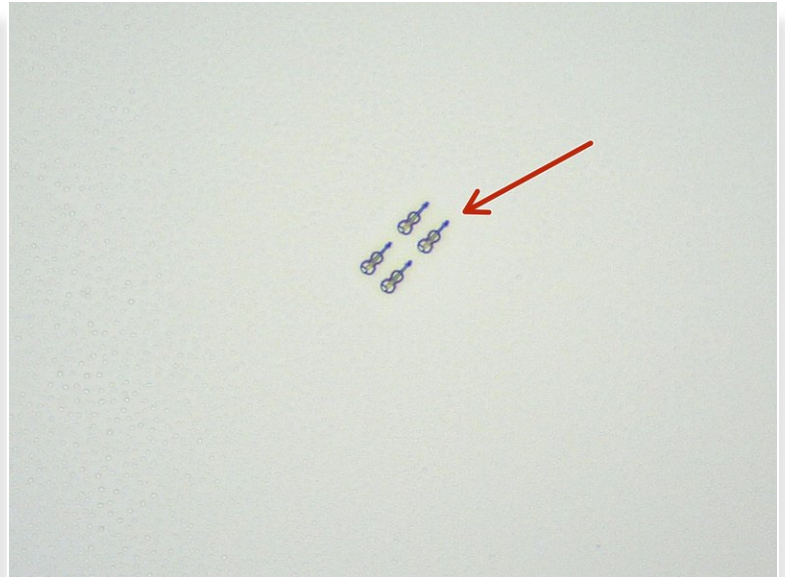
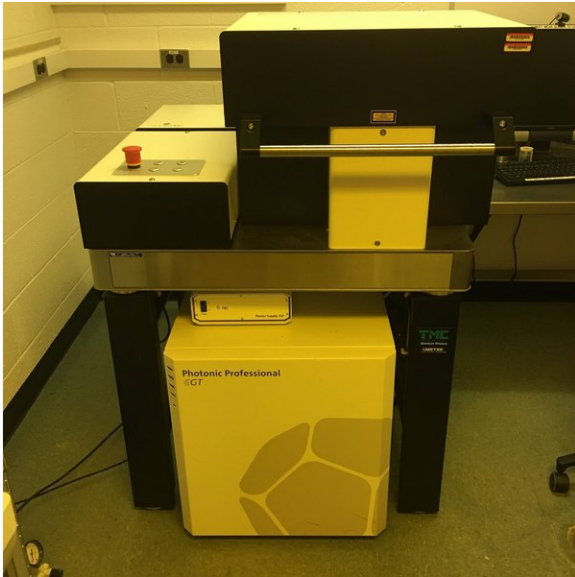
Ask questions if you don't know something!

Step 1 — Tour: Lab Safety



- Fire alarms are outside
 - Fire extinguishers are inside
 - Location of the first aid kit
 - Dangers of Nylon and Inconel powder
 - You must wear a PAPR when working with the ProX
- ⚠ Stay out of the area marked with caution tape when someone is using the ProX
- You must use the ProX vacuum when working with Inconel powder
 - Nylon powder is less dangerous, but you are required to use a mask and gloves when working with the Fuse

Step 2 — Tour: Nanoscribe



- Learn how the Nanoscribe works
 - Two-Photon Polymerization printer which uses microscope objectives to selectively cure resin
 - These violins are 30 μm long. A human hair is approximately 70 μm wide
- View some example Nanoscribe prints using the Jeweler's lens
 - Large Testudo
 - Eiffel Tower

⚠ Make sure to wear gloves anytime you are in the Nanoscribe room. All surfaces could be contaminated with resin

Step 3 — Tour: Formlabs Fuse 1



- Learn how the Fuse 1 works
 - Two parts: Printing and Post-processing
 - The Fuse uses Selective Laser Sintering (SLS) and prints in Nylon powder
 - The printer lays down a thin layer of Nylon powder and uses a laser to sinter (melt) the powder together
 - The un-sintered powder supports the parts as they are printed so there is no need for supports
- The Fuse is great for rapid, cheap prototyping

⚠ Make sure you wear a mask and gloves when working with the Fuse to avoid contact with Nylon powder

Step 4 — Tour: ProX 200

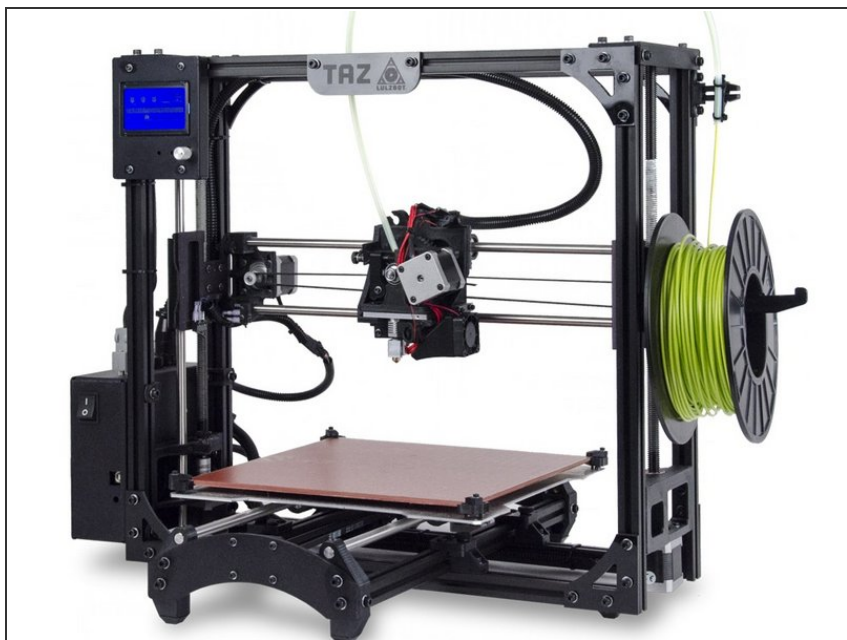


- Learn how the ProX works
 - Uses Direct Metal Printing (DMP) technology. Similar to how the Fuse prints
 - Very high accuracy and precision
 - Prints in Inconel

⚠ Wear a mask when working with the ProX, and be mindful of the caution tape on the floor

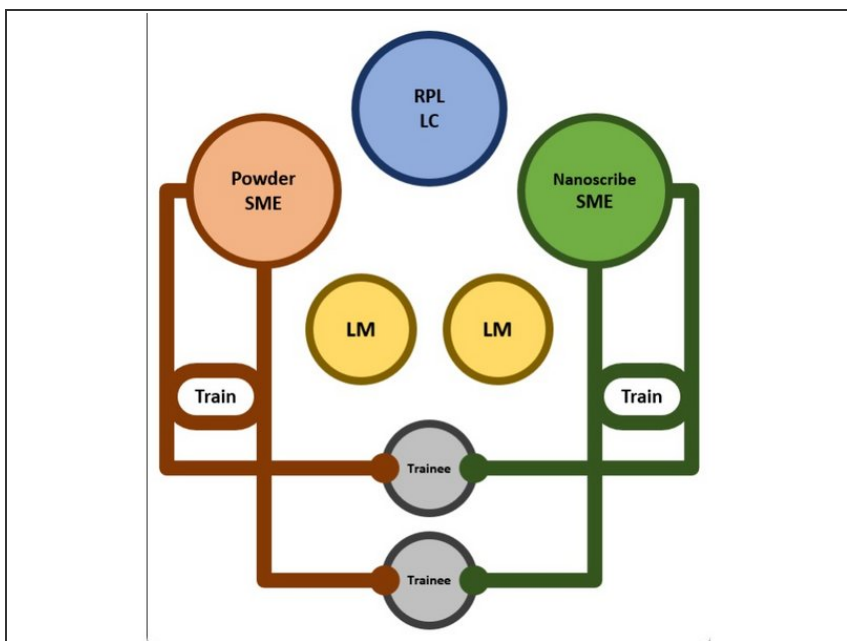
ⓘ The caution tape shows the area that could be contaminated with Inconel powder

Step 5 — Tour: Lulzbot Taz



- Learn how the Taz works
- The Taz is a traditional Fused Filament Fabrication (FFF) printer
- Our Taz is fitted to print using Virtual Foundry Filament, which is a combination of plastic and metal powder
- This allows the Taz to print parts just like any other traditional 3D printer
- Then, the parts can be baked in a furnace to cook off the plastic and product a fully dense metal part
- Good for cheap, metal printing

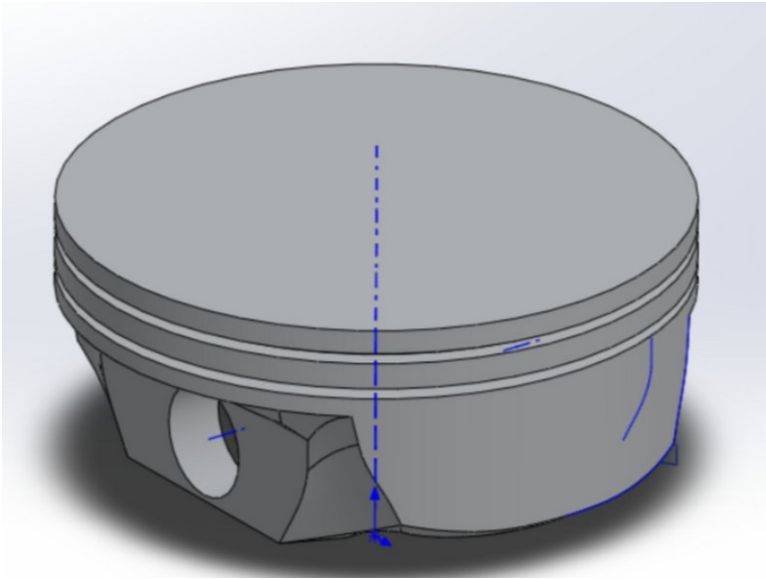
Step 6 — Lab Structure



- Learn about general LM responsibilities and expectations
- Lab Managers will be trained on all machinery in the lab and will help assist in completing customer/researcher requests. They will have the ability to focus their job on one of three tracks as a potential replacement for the Powder SME, Nanoscribe SME, or RPL LC.

- Lab Managers are also assigned specific projects throughout and work on a personal design project throughout the semester.
- The RPL LC is in charge of keeping the lab operational, ordering consumables for the lab/machinery, attending TW LC meetings, initial POC for external research, and scheduling employees.
- The SMEs are in charge of keeping the machines operational, working with customers/research to provide the highest level of consultation, as well as training new employees and researchers on the machines.
- Learn about the structure/hierarchy of the RPL
 - The RPL is different from other labs in that the LC and SMEs are on the same level and share many responsibilities
- Learn about the RPL team members and receive contact information for future interest/questions

Step 7 — Design Project Overview



- RPL Lab Managers have the opportunity to use free time during their shifts to work on a personal project that they find interesting.
- Throughout the semester, they can prototype and iterate their design on the Fuse
- They may print their design in Inconel once they have finished designing it

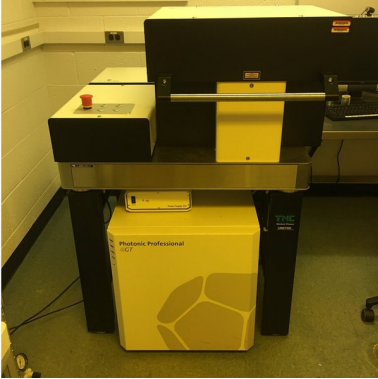
Step 8 — Hands on Experience: Fuse



- Post Process your part using the Sift and Bead Blaster

- ☑ Bring your part to your PDM

Step 9 — Summary



- Get a brief introduction to the printers in the RPL
- Learn about the hierarchy of the RPL and how it is different from other Terrapin Works labs
- Learn about the design project that RPL staff work on
- Get some hands on experience post-processing Fuse parts