Capstone Design Resources

(Commonly used)

GJ Design Suite

- The ME shop and the Design Suite are “Open” from:

  ~8:00 am – 4:30 pm (weekdays)

- Card access after hours and weekends (except 12:00 – 6:00 am)
- Can “check out” a workbench for working on projects

ME Shop

- Best method to get something machined is via the graduate student mentors
  - They can attend team meetings, but are also available via email
  - They need to have a clear drawing and access to material, then they can help make parts for you

- Lots of stock materials, fasteners, and connectors available in shop

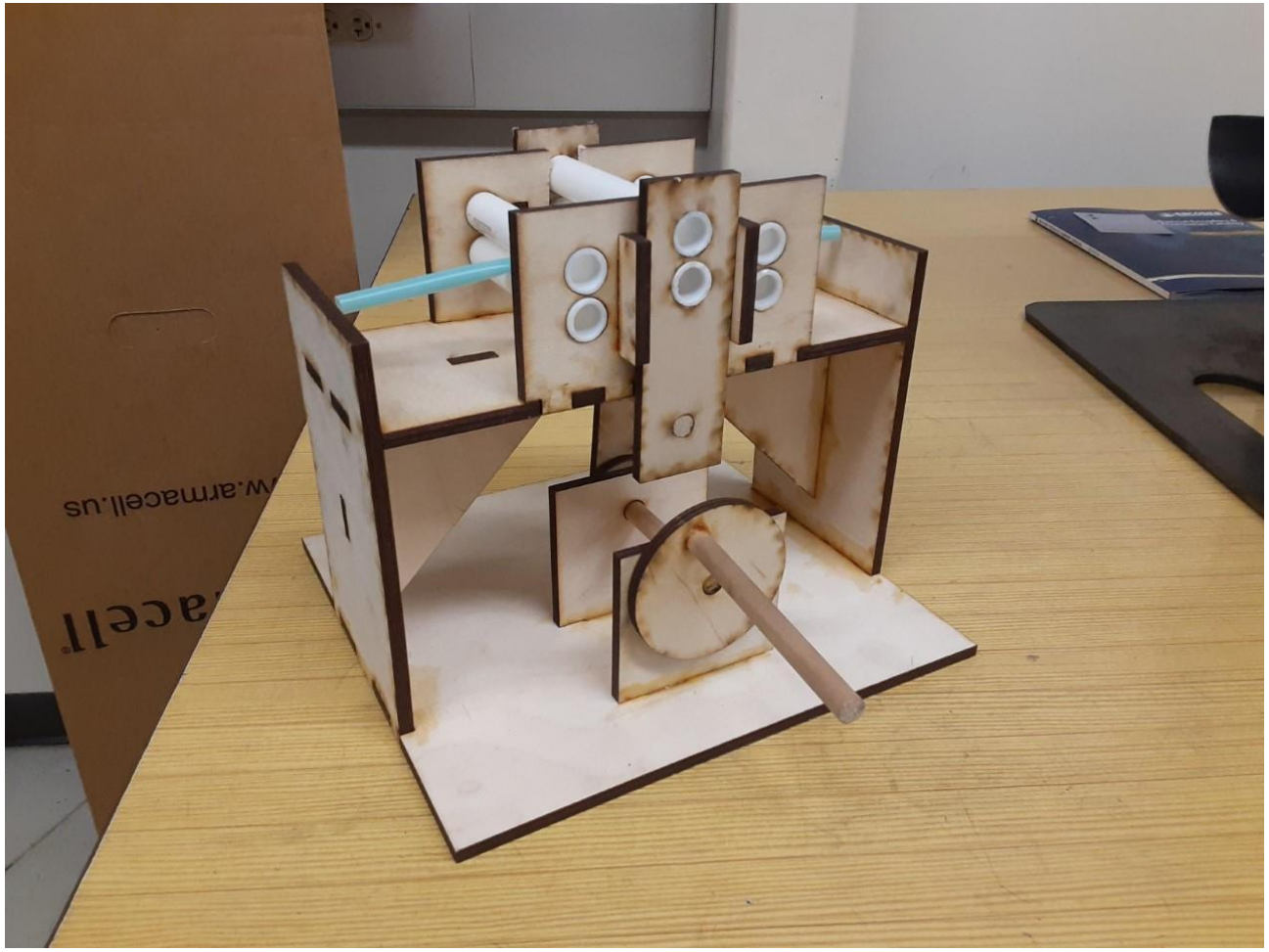
3D printing

- Grad Student Mentors are available to help with printing parts
- Need a drawing and 3D CAD file

Laser Cutting - wood

- Grad Student Mentors are available to help with cutting parts

- You need to provide them with material
  - Moscow Building Supply is a good source
  - Typically, ¼” plywood



Plasma Cutting - metal

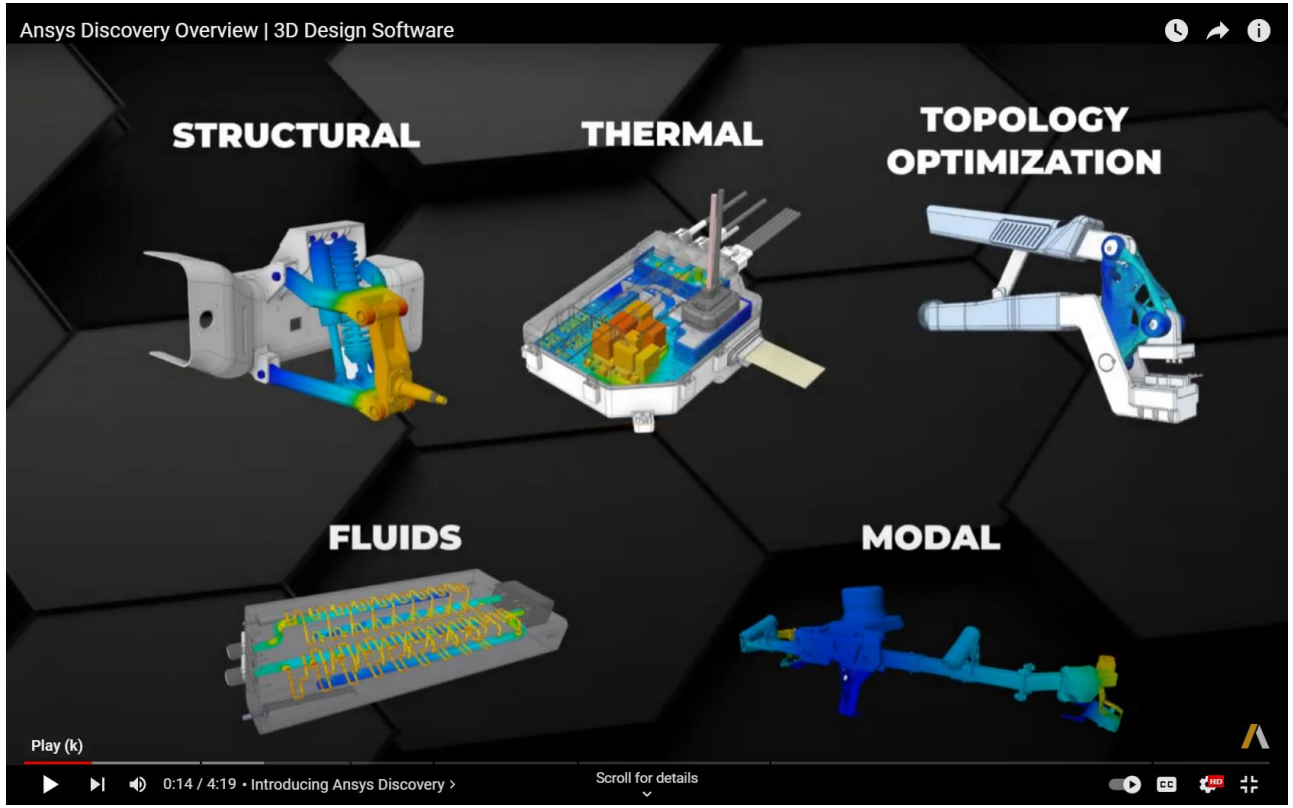
- We have a CNC plasma arc cutter on campus in J.L. Martin building
- Can cut steel parts up to ¼” thick
  - Need to have drawings and dxf files of the “flat pattern”
  - Need to provide material, which can be purchased at UI Facilities or at Mundy’s (local shop)
- Grad Student Mentors can help
- → turn around in 3-5 days

U of I Facilities

- Located at the West of Campus
- Capabilities
  - Large stock of steel materials (sheet, plate, tubing, pipe, etc.)
  - Full Machine Shop
  - Welding
  - Sheet Metal Forming
  - Large-scale fabrication
- Can drop off drawings and let them build it
- Cost: Materials + $42.50 per hour
- Recommend getting a quote, or informing them what you budget limitations are

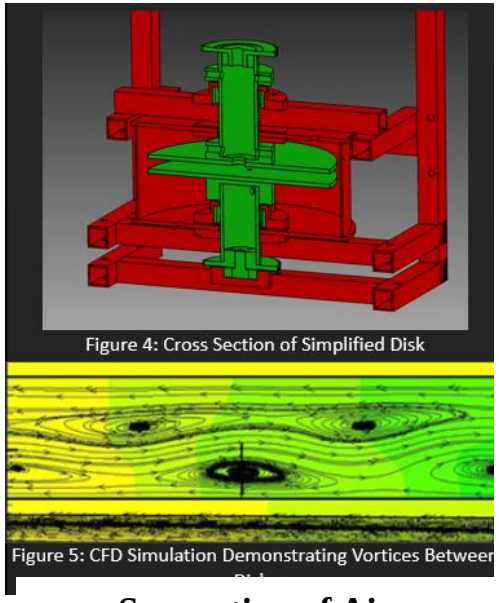
ANSYS Discovery

- Analysis Software available in Computer Lab (GJ 115)
- Capable of providing "quick feedback" analysis
  - 4-minute Ansys Discovery Overview video
  - 3-minute Customer Success Example

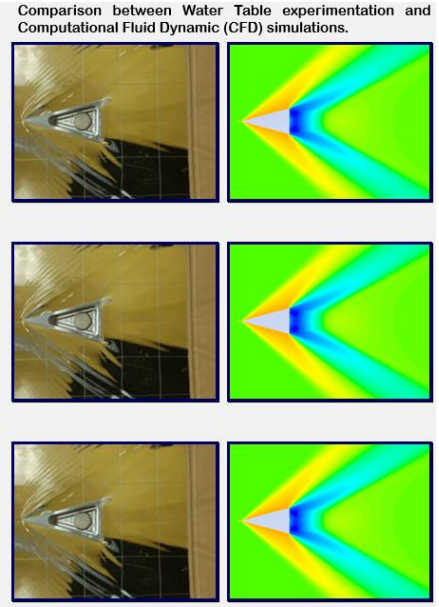


What is CFD, why use CFD, where CFD used?

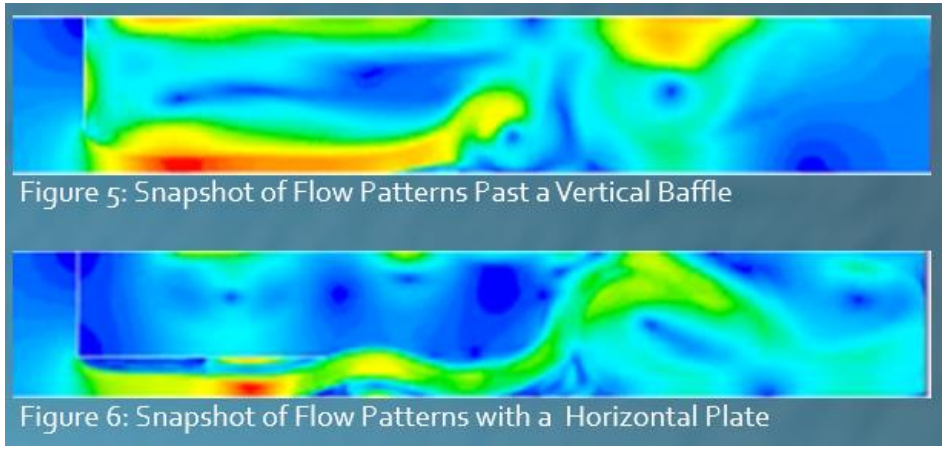
- **Definition**: computational fluid dynamics (CFD) is the simulation of fluids engineering systems using modeling (mathematical physical problem formulation) and numerical methods (discretization methods, solvers, numerical parameters, and grid generations, etc.)
- **Why use CFD**: Knowledge learned in ENGR 335 Engineering Fluid Mechanics, i.e., analytical fluid dynamics (AFD), is limited to 1D, laminar flow, and simple geometries. CFD has no such limitations and therefore helps achieve "**simulation-based design**" instead of "Build & Test"
- **Where CFD is used**: aerospace, automotive, biomedical, chemical processing, HVAC, power generation, sports, renewable energy, and hydraulics, etc.
- **Resources**: campus-wide ANSYS Multiphysics license that covers fluid mechanics, solid mechanics, fluid-structure interactions, and electro-magnetics simulations, etc;
- **Course**: **ME 450 Fundamentals of CFD** (offered every fall semester); email instructor Dr. Tao Xing (xing@uidaho.edu) for questions



Separation of Air Pollutants from Flue Gas



Integrated Rocket



Dynamic Commercial Fishery Raceway Cleaning System

University of Idaho 3D Imaging and Printing Laboratory

Physical Address: Integrated Research & Innovation Center (IRIC 221), 685 South Line Street, Moscow, ID 83844
Mailing Address: IRIC 221, University of Idaho, 875 Perimeter Drive MS 1122, Moscow, ID 83844-1122
Web: https://www.uidaho.edu/3dip; Lab Phone: (208) 885-1227
Director: Dr. Tao Xing (xing@uidaho.edu), Professor of Mechanical Engineering, Phone: (208) 885-9032

3D MicroCT Scanner (SkyScan 1275)

Specifications:

Feature	Specification	Benefit
X-ray source	20 – 100 kV 10 W < 5 µm spot size at 4 W	Maintenance-free sealed X-ray source Fast scans for QC, or 4D XRM
X-ray detector	Active pixel CMOS flat-panel 3 MP (1944 x 1536) 75 µm pixel size	Excellent signal-to-noise Large Field-of-View
Object size	96 mm diameter 120 mm height	Capable to scan a large range of sample sizes
Sample changer (optional)	16 samples up to 50 mm diameter 8 samples up to 96 mm diameter External access	Unattended high throughput Any combination of large and small samples Add/remove samples at any time without interrupting the actual scan
Dimensions	W 1040 mm x D 665 mm x H 400 mm Weight 170 kg	Space-saving desktop system that fits in every lab

Stratasys J850 Pro

Specifications:

Model Materials	• Vero™ family of materials in black, white and gray • Agilus30™ family of flexible materials • Transparent VeroClear™ and VeroUltraClear • VeroUltra™ materials in black and white
Digital Model Materials	Composite materials including: • Digital ABS Plus™ and Digital ABS2 Plus™ in ivory • Rubberlike materials in a variety of Shore A values • Translucent color tints
Support Materials	SUP705™ (water jet removable) SUP706B™ (soluble)
Build Size	490 x 390 x 200 mm (19.3 x 15.35 x 7.9 in.)
Layer Thickness	Horizontal build layers down to 14 microns (0.00055 in.) 55 microns (0.002 in.) in Super High Speed1 mode
Workstation Compatibility	Windows 10
Network Connectivity	LAN — TCP/IP
System Size and Weight	System: 1400 x 1260 x 1100 mm (55.1 x 49.6 x 43.4 in.); 430 kg (948 lbs.) Material Cabinet: 1119 x 656 x 637 mm (44 x 25.8 x 25.1 in.); 153 kg (337 lbs.)
Operating Conditions	Temperature 18 – 25 °C (64 – 77 °F); relative humidity 30-70% (non-condensing)
Power Requirements	100–120 VAC, 50–60 Hz, 13.5 A, 1 phase 220–240 VAC, 50–60 Hz, 7 A, 1 phase
Regulatory Compliance	CE, FCC, EAC, RCM, R-NZ