Materials, Design & Manufacturing Facility (CWB)

材料、設計和製造中心（清水灣）

MDMF (CWB)

Introduction

Our Services – 5 Units

CAD/CAM/CAE (CAD)

Materials Services (MAT)

Development Studio (DS)

MATERIALS, DESIGN AND MANUFACTURING FACILITY (CWB)

Electrical & Mechanical Fabrication (EMF)

Instrumentation, Maintenance & Repair (IMR)

Services Scope – EMF

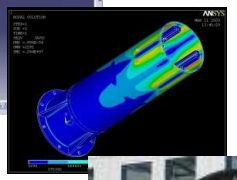
- Engineering design and fabrication supporting services

- Sophisticated mechanical & electrical parts/equipment for the university and industrial collaboration projects
  - Parts/equipment/controller is not available in market
  - Multidisciplinary and application oriented activities

Services Scope – EMF

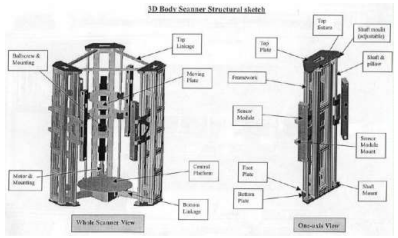


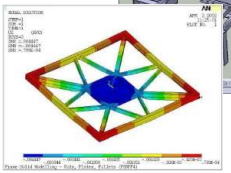
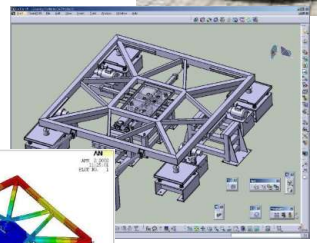




EMF Services

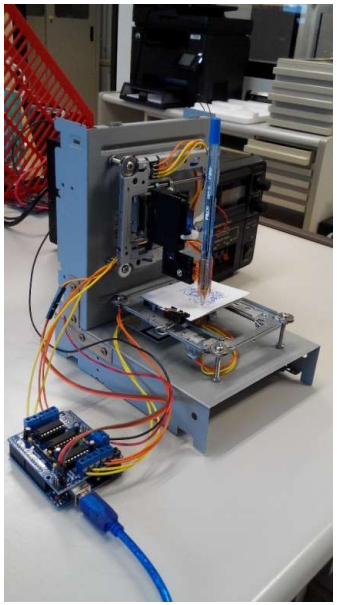
Materials, Design and Manufacturing Facility (CWB)

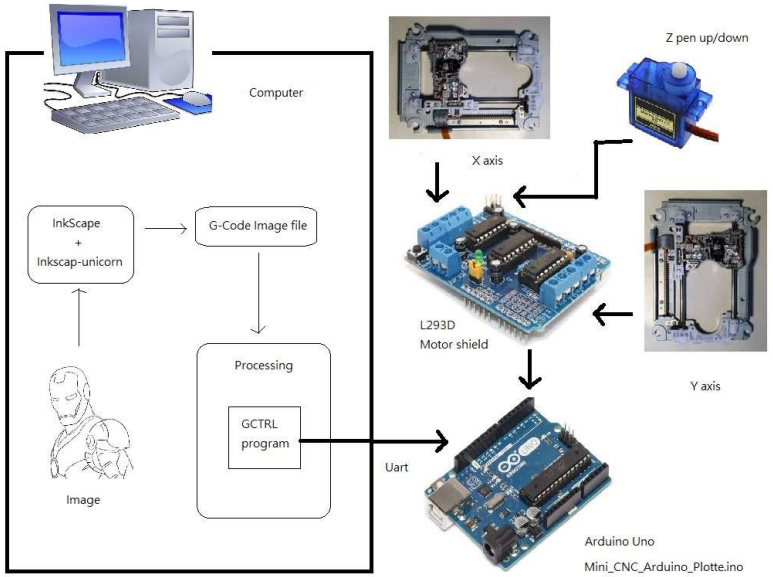



Services Scope – DS

- Controller design and fabrication supporting
  - Controller boards, MCUs, cam, motors, sensors (environmental, motion, light, etc.)
  - Eclipse for android development, Arduino IDE, Raspberry Pi, PLC
  - PCB prototyping



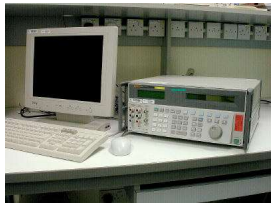


Services Scope - IMR

- Repair and maintenance of equipment
  - Scientific instruments, computer control machineries, laboratory equipment, and electrical safety
  - Especially for those which are no longer supported by the manufacturers

- Calibrations for multimeter, power meter, data logger, radiation monitor and temperature sensors

Services Scope - IMR

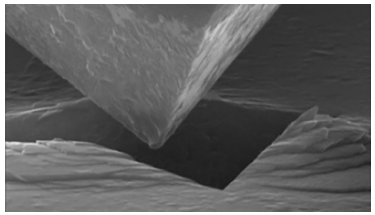




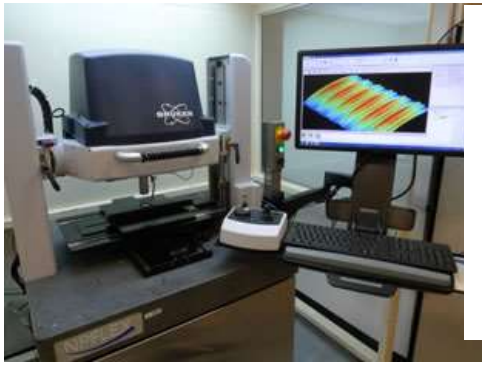


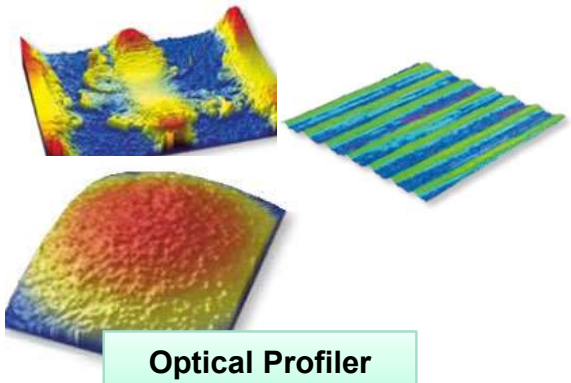
Services Scope - CAD

- Nano-measurement
  - Nano indenter, 3D surface metrology, optical profiler, contact angle meter

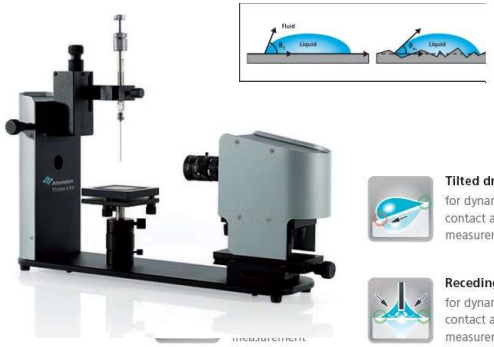


Nano Indenter





Optical Profiler



Contact Angle Meter

Services Scope - CAD

- Metal, Nylon & Plastics - 3D printing, Laser cutting

Metal 3D Printer

Nylon 3D Printer

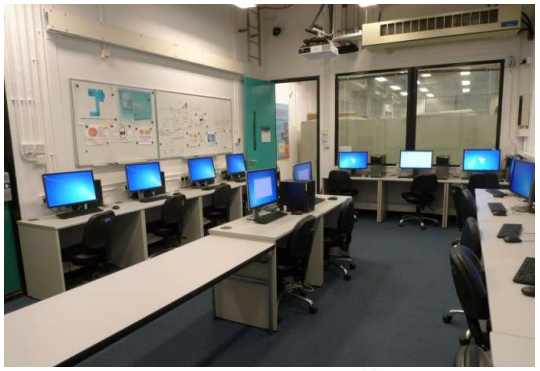
Plastics 3D Printer – Filaments FDM

Plastics 3D Printer – Resin SLA

Metal & Plastics Laser Cutting

Services Scope - CAD

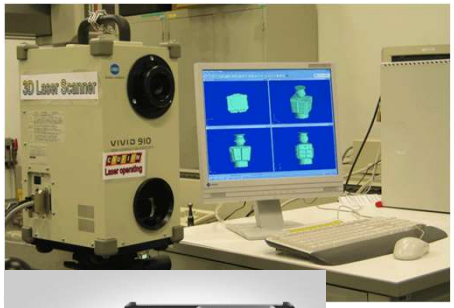
- CAD/CAM/CAE system support, 5-axis metrology, 3D scanning, reverse engineering



SolidWorks CATIA SOLUTIONS ANSYS

CAD/CAM/CAE Support

5-Axis Metrology



3D Scanning & Reverse Engineering

Services Scope - MAT

- Mechanical Testing
  - also known as destructive testing, reveals the properties of a material under dynamic or static force

MTS 810
5KN to 100KN

MTS 858
15kN Axial and 100 Nm Torsion

MTS 858 Mini Bionix
25KN Axial, 250 Nm Torsional

Services Scope - MAT

- Inspection and Failure Analysis
  - determining the root cause of parts/assembly failure and working out the means for correcting and preventing current/future problems

Zeta Potential / Nano-particle Analyzer: ZetaPlus
Zeta Potential Range : -150 to + 150 mV
Size Range : 10nm to30μm

TecScan 7 Axis Immersion Scanner
1600mm x 800mm x 800mm sample length

C-SAM: Sonix Quantum 350H
Spatial resolution:0.5 μm
Depth resolution: 8 μm

Services Scope - MAT

- Inspection and Failure Analysis
  - determining the root cause of parts/assembly failure and working out the means for correcting and preventing current/future problems

Particle Size Analyzer
Measurement capability from 0.01 to 2800 microns

Microscope: Topcon TMM-13OZ
Measuring range: 130 x 130 x 50 mm
Minimum indication: 0.001 mm
Accuracy: (3 + 2.5L/100) µm

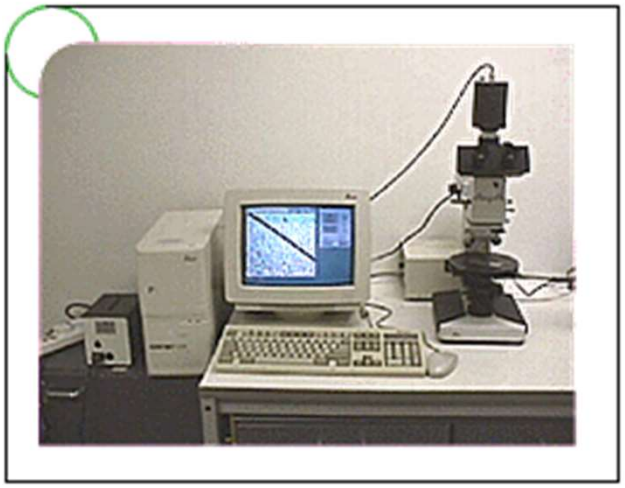


Image Processing System
Leica QUANTIMET 500+

Services Scope - MAT

- Sample Processing
  - processing of metal heat treatment, polymer and carbon composite

Reactive Ion Etching System

Ultracut & Ultramicrotome and EM FCR

Centrifuge Z 326

Autoclave

Oven: Heating and Drying

Furnace

Hydraulic Hot Press

Diamond Precision Saw

Misonix XL2020 Sonicator

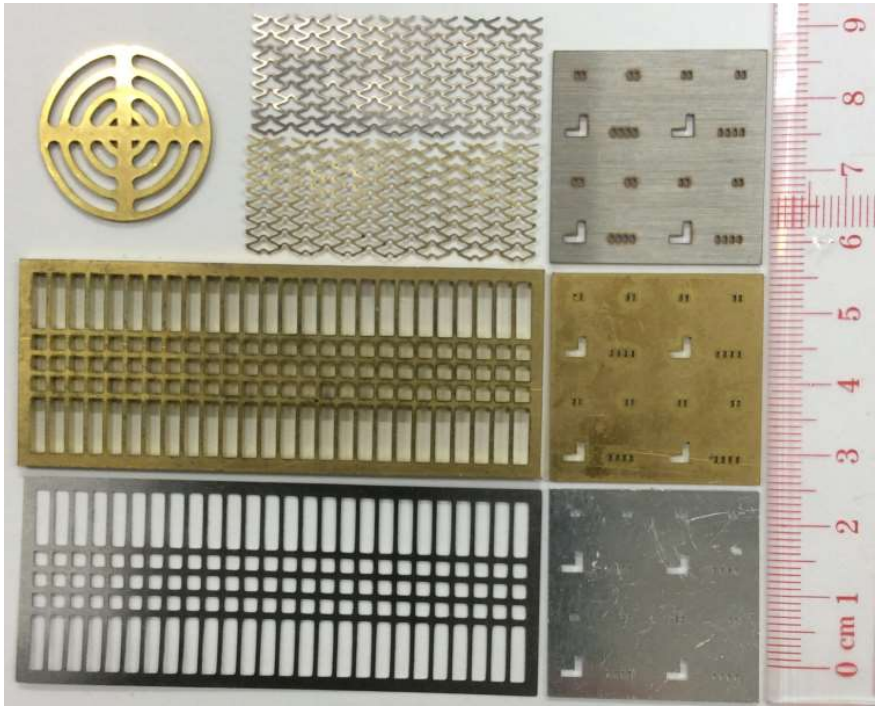
Hot Melt Prepregger

Humidity Chamber

Project – Metal Laser Cutting

- Fiber laser cutting machine of 1.5kW
  - Working area: 630 x 530 x 90 mm
  - 4th rotary axis for round pipe cutting

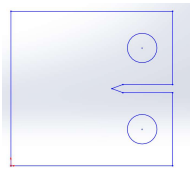
Mild Steel (mm)	0.2 ~ 16
Stainless Steel (mm)	0.2 ~ 8
Aluminum (mm)	0.5 ~ 5
Copper (mm)	0.5 ~ 2
Brass (mm)	0.5 ~ 4

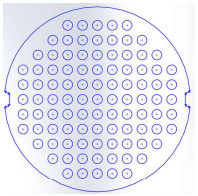


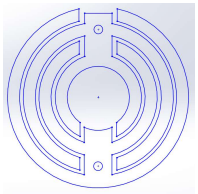
Project – Metal Laser Cutting

- Examples
  - SMA specimens
    - Tensile specimen:
      - Materials / Thickness: 1mm
      - Production time: 45 second
    - Crack specimen:
      - Materials / Thickness: 1.5mm
      - Production time:1 min.
  - S.S. Filter specimen
    - Materials / Thickness: 1.2mm
    - Production time:8min. 30 second
  - Ti Electrode specimen
    - Materials / Thickness: 1mm
    - Production time: 2min.





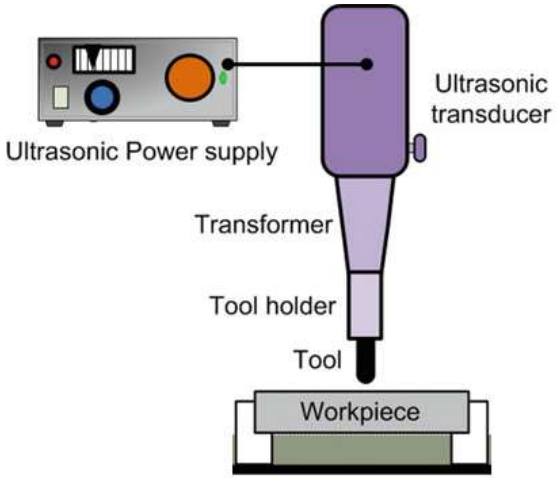


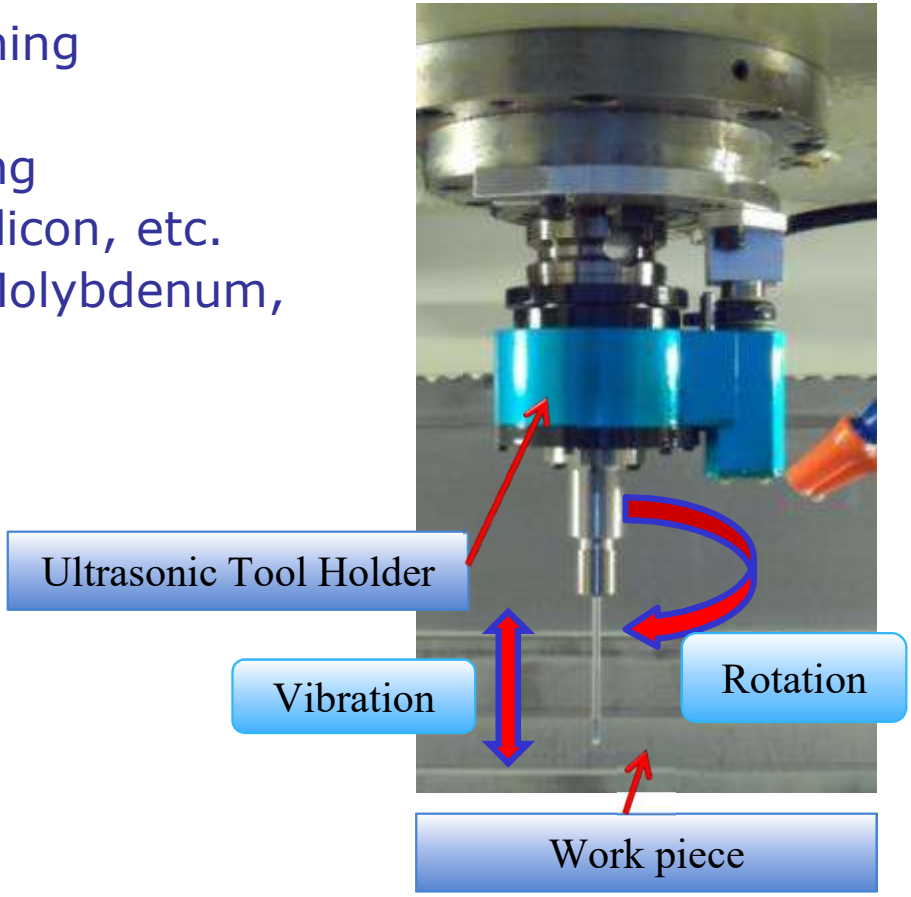
Project – Laser Marking & Engraving

- Laser Marking Machine
  - 10W fiber laser
  - Max. size is 110mm X 110mm

Project – Ultrasonic-Assisted Machining

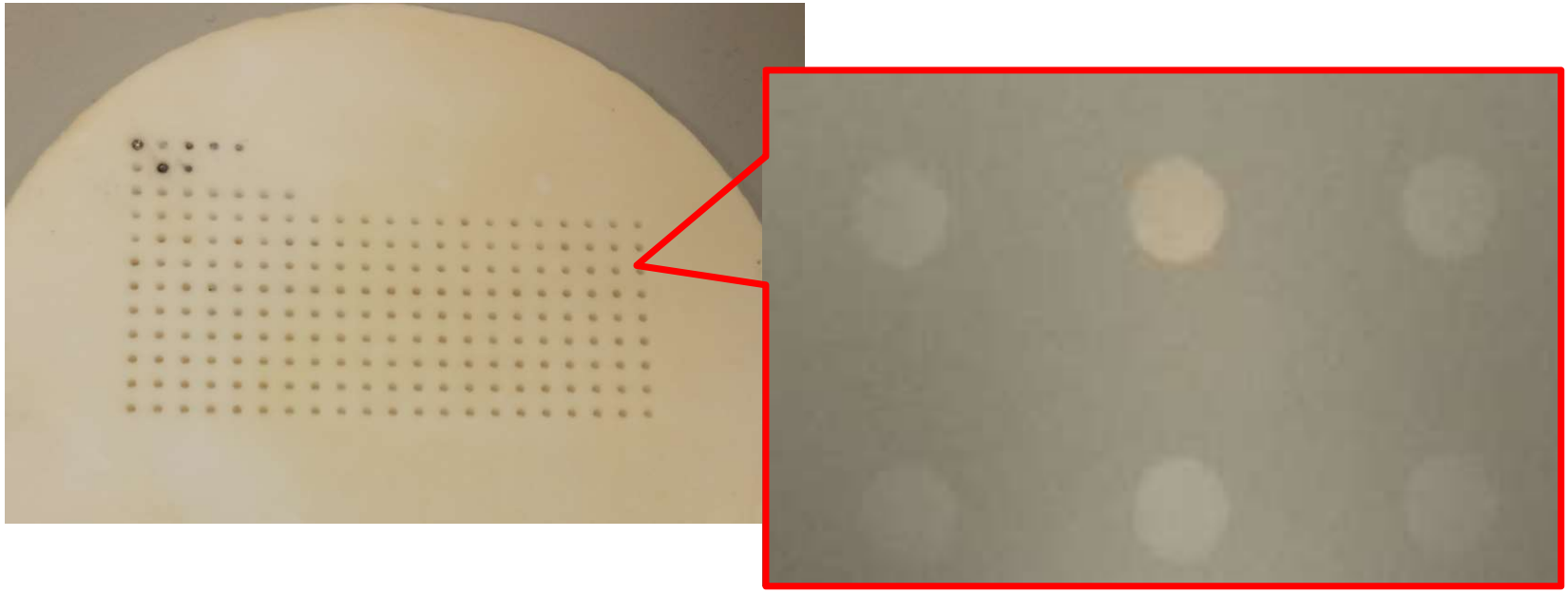
- Ultrasonic tool holder
  - Fast, small and deep hole machining
  - Length / Diameter > 10
  - Hard or ultra-hard material cutting
  - Glass, Ceramics, Vulcanization silicon, etc.
  - Stainless steel, Tungsten steel, Molybdenum, etc.





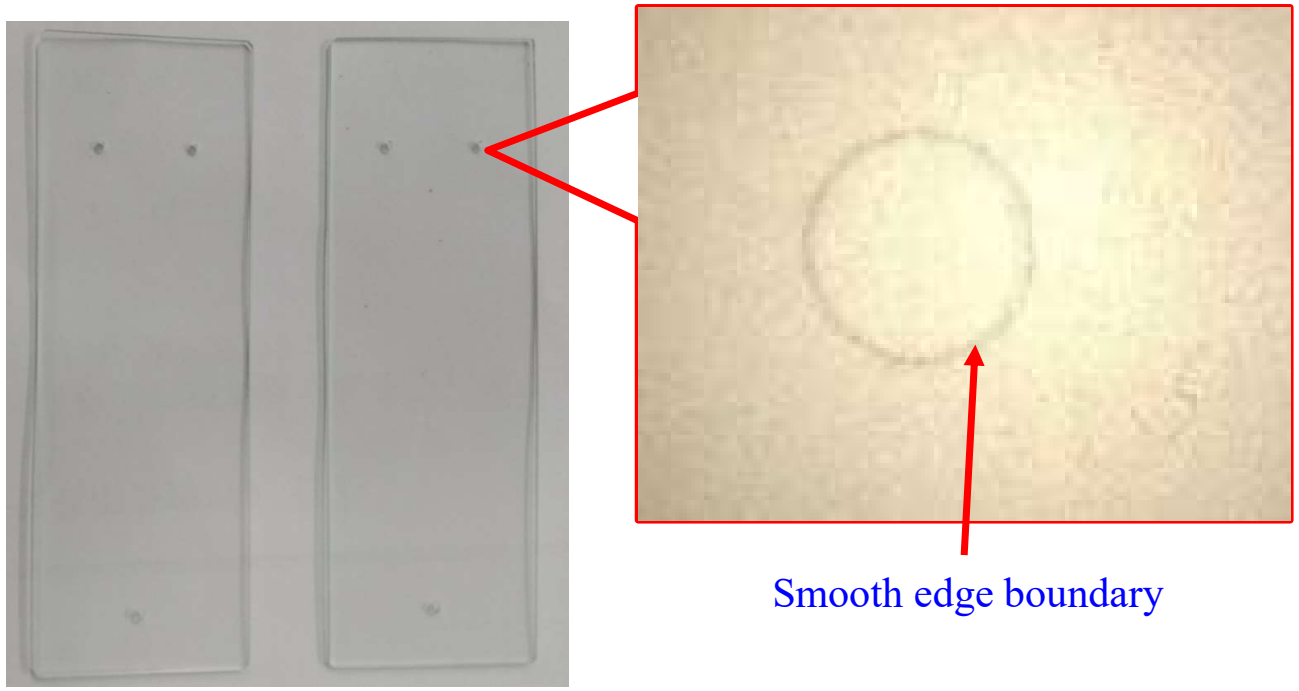
Project – Ultrasonic-Assisted Machining

- Examples
  - Alumina, Small hole drilling / milling (blind hole)
    - Hole diameter = 1.2mm; depth = 1.4mm
    - # of holes to be drilled per workpiece = 400



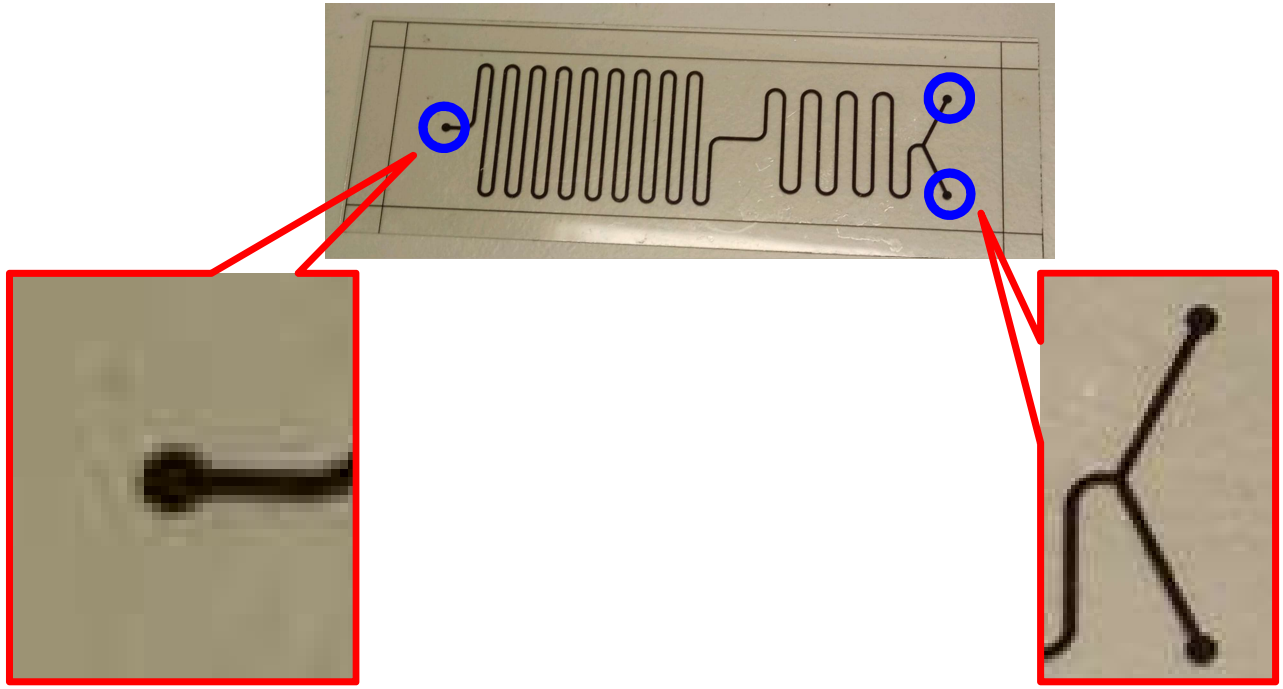
Project – Ultrasonic-Assisted Machining

- Examples
  - Glass, Small hole drilling (thru' hole)
    - Hole diameter = 0.6mm; Glass plate thickness = 1mm
    - # of holes to be drilled per workpiece = 4



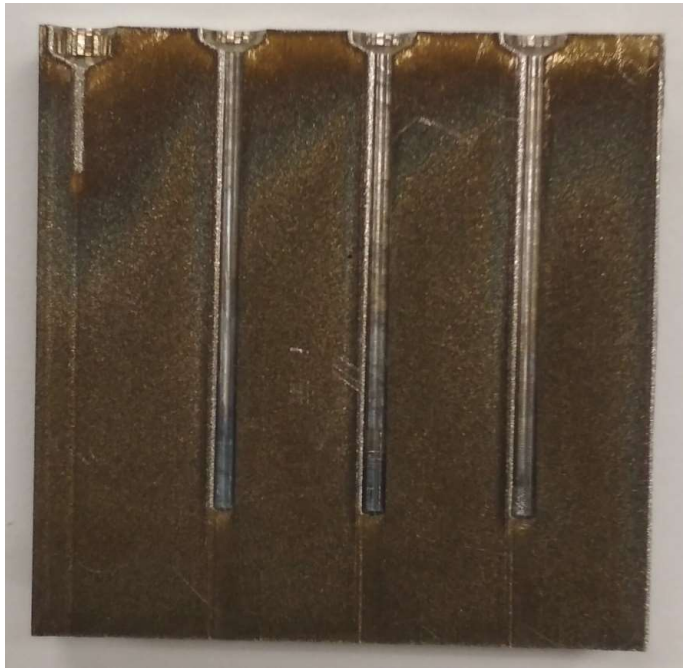
Project – Ultrasonic-Assisted Machining

- Examples
  - Glass channel, Small hole drilling (thru' hole)
    - Hole diameter = 1.0mm; depth = 1mm
    - # of holes to be drilled per workpiece = 3



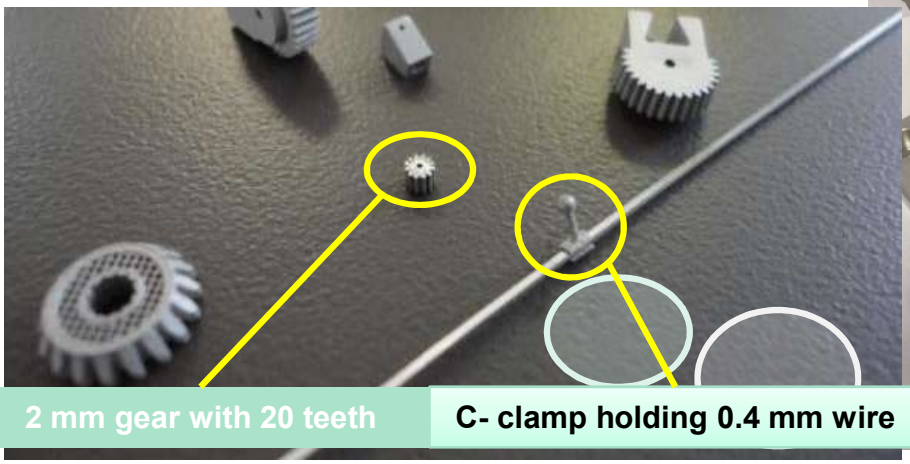
Project – Ultrasonic-Assisted Machining

- Examples
  - Stainless steel, Small hole drilling (blind hole)
    - Hole diameter = 0.2mm and 0.9mm
    - Depth = 5mm and 20mm
  - SMA Shape Memory Alloy, Small hole drilling (thru' hole)
    - Hole diameter = 0.075m
    - Thickness = 2mm



Project – Metal 3d Printing

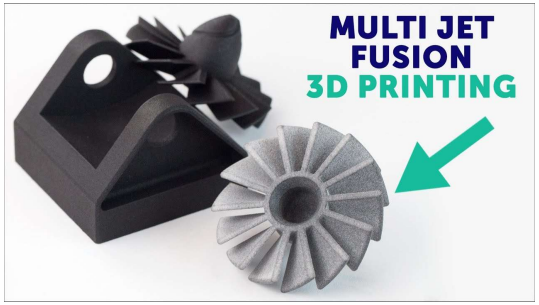
- Metal 3D printer – DMP Flex100
  - Build volume 100 x 100 x 80 mm
  - Layer thickness: 10 ~ 100 μm
  - Typical accuracy: ± 0.1-0.2% with ± 50 μm minimum
  - Supported materials:
    - LaserForm 316L (B)
    - LaserForm 17-4PH (B)
    - LaserForm CoCr (B)



Project – Nylon 3d Printing

- Nylon 3D printer – HP Jet Fusion 540
  - Build volume 332 x 190 x 248 mm
  - Layer thickness: 0.08 mm
  - Typical accuracy: ± 0.3% with ± 0.2 mm minimum
  - Supported materials:
    - Nylon PA12



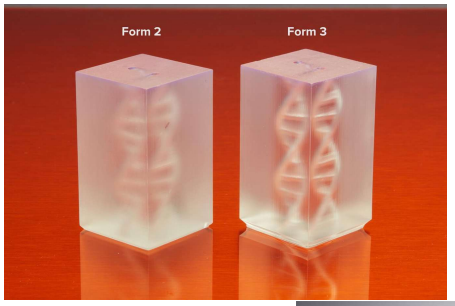



Project – Desktop SLA 3d Printing

- Desktop SLA 3D printer – Form 2
  - Build volume 145 x 145 x 175 mm
  - Layer Thickness 0.025 - 0.1 mm
  - File Formats for Printing: STL, OBJ
  - Professional print quality

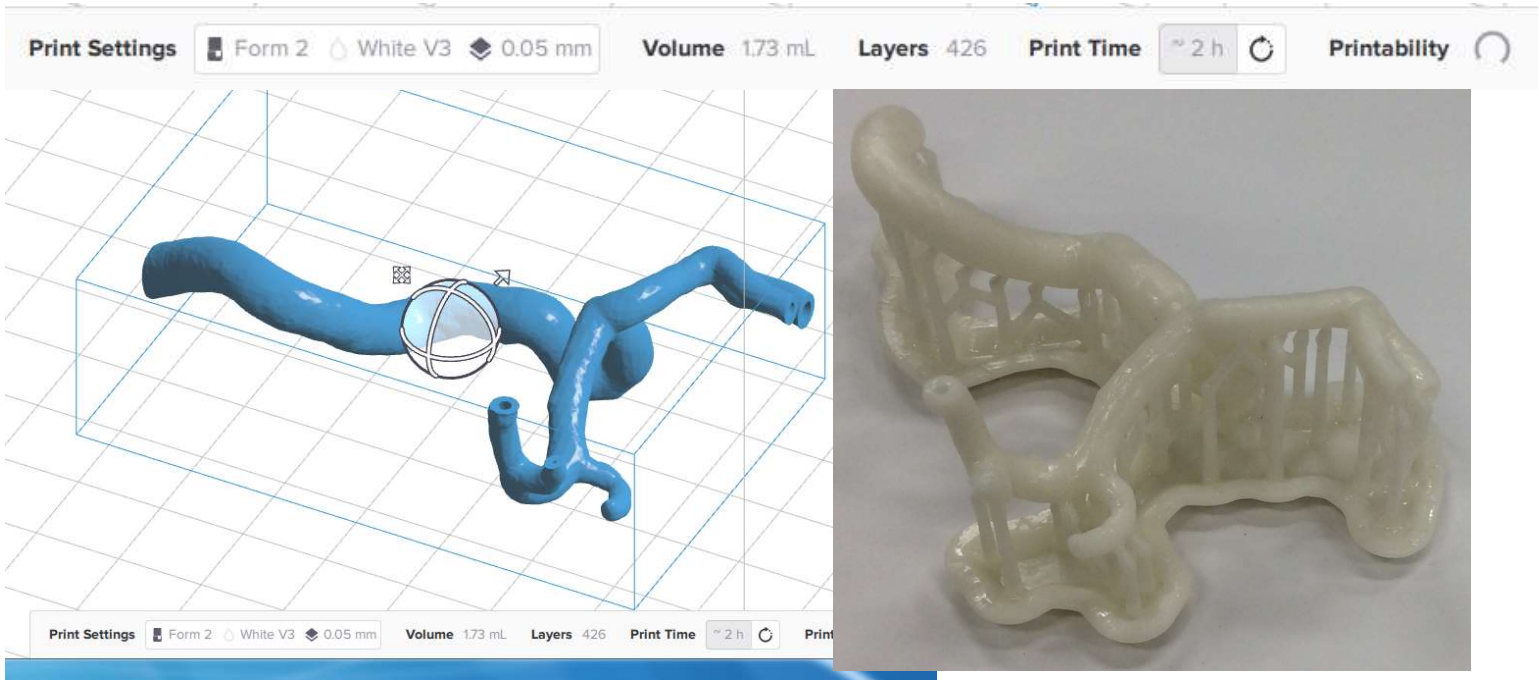
Project – Desktop SLA 3d Printing

- Desktop SLA 3D printer – Form 3L
  - Build volume 335 x 200 x 300 mm
  - Layer Thickness 0.025 - 0.3 mm
  - File Formats for Printing: STL, OBJ
  - Low Force Stereolithography (LFS)™



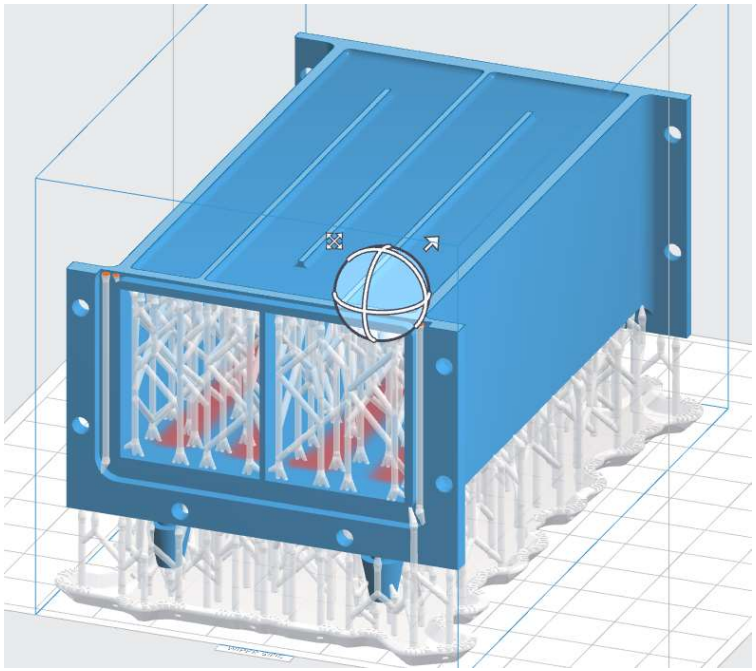
Project – Desktop SLA 3d Printing

- Examples
  - Blood vessel
    - Materials – Standard White
    - Minimum feature size = 0.5mm



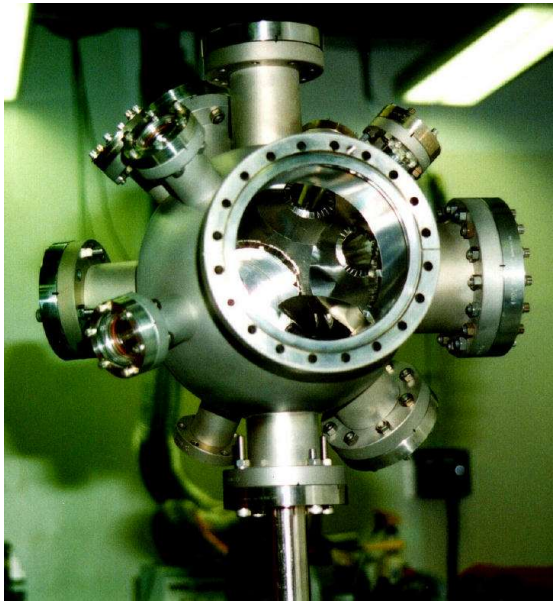
Project – Desktop SLA 3d Printing

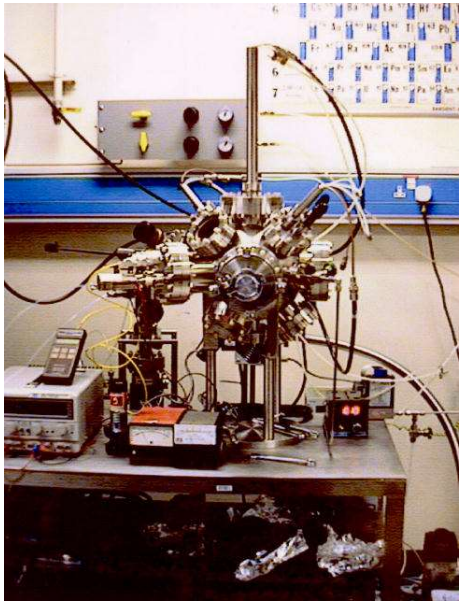
- Water channel model
  - Materials – Standard Clear
  - Channel size = 2.5mm
  - Internal water circulation



Project – High Vacuum Chamber

- High vacuum stainless steel chamber
  - Design and build an enhanced HVC with tailor made functionalities
  - Vacuum level less than 10^{-8} torr



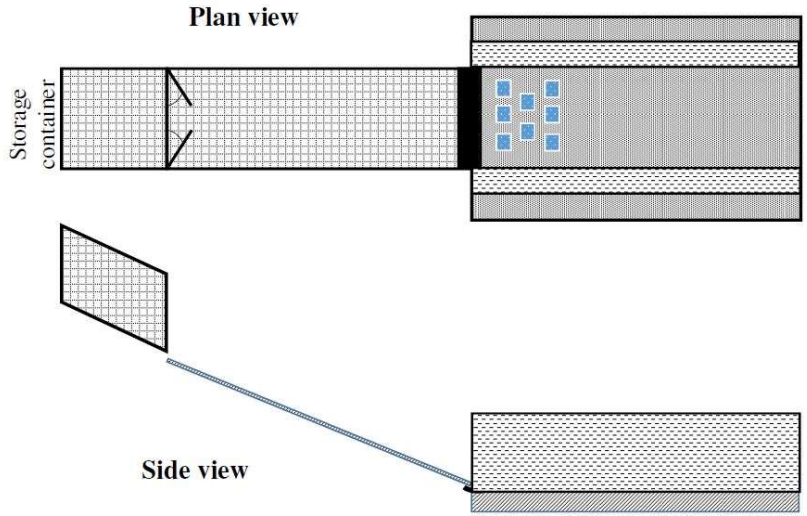


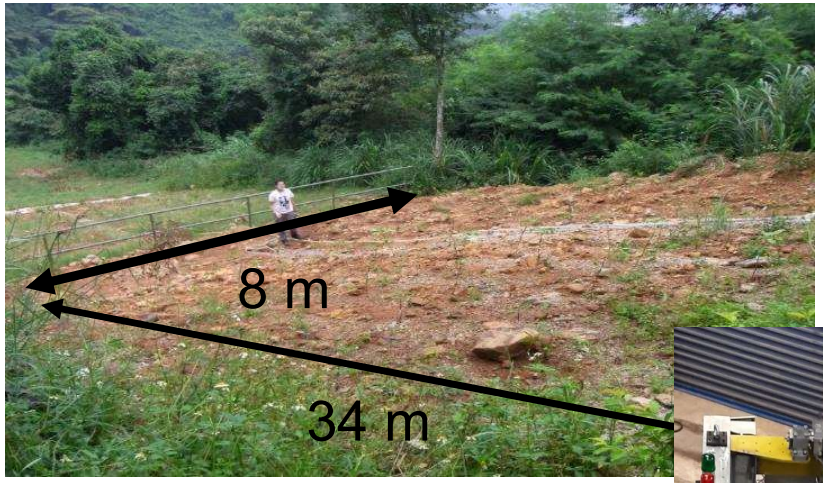
Project – Reactive Ion Etcher

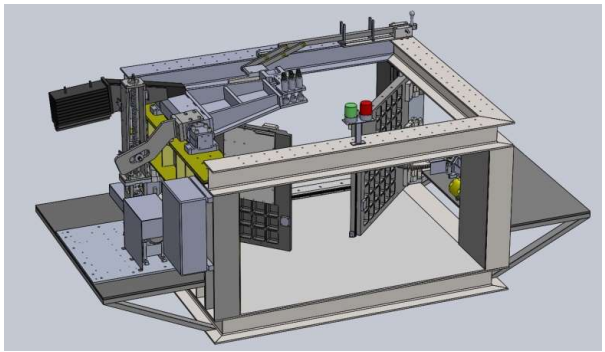
- Design and build the reactive ion etcher in wafer fabrication
  - Tailor made functionalities

Project – Soil Retaining Gate

- Design and build the soil retaining gate of a flume model

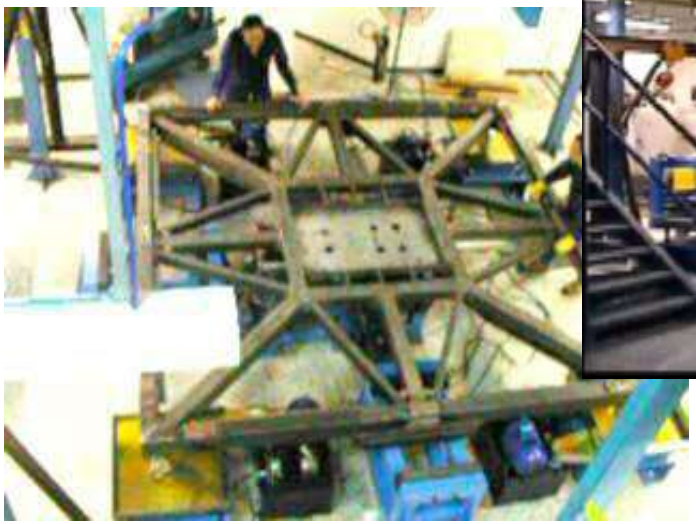


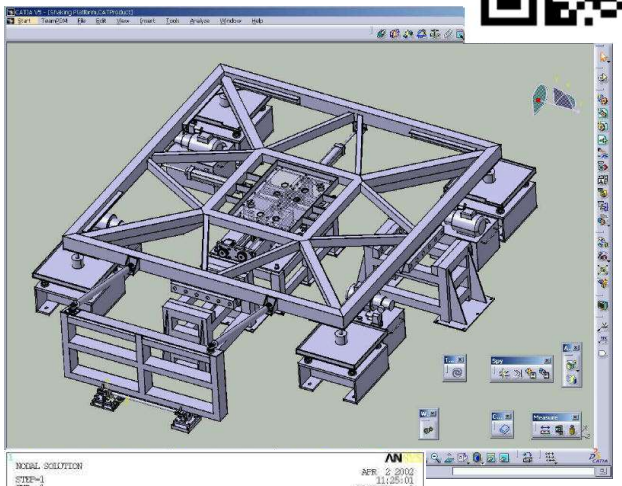


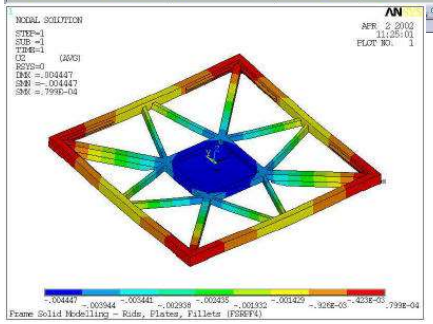


Project – Shaking Platform

- Design and build the shaking platform for
  - Active vibration control of earthquake / wind excited structures
  - Assessment of motion acceptance criteria for human occupancy in the design of flexible structures

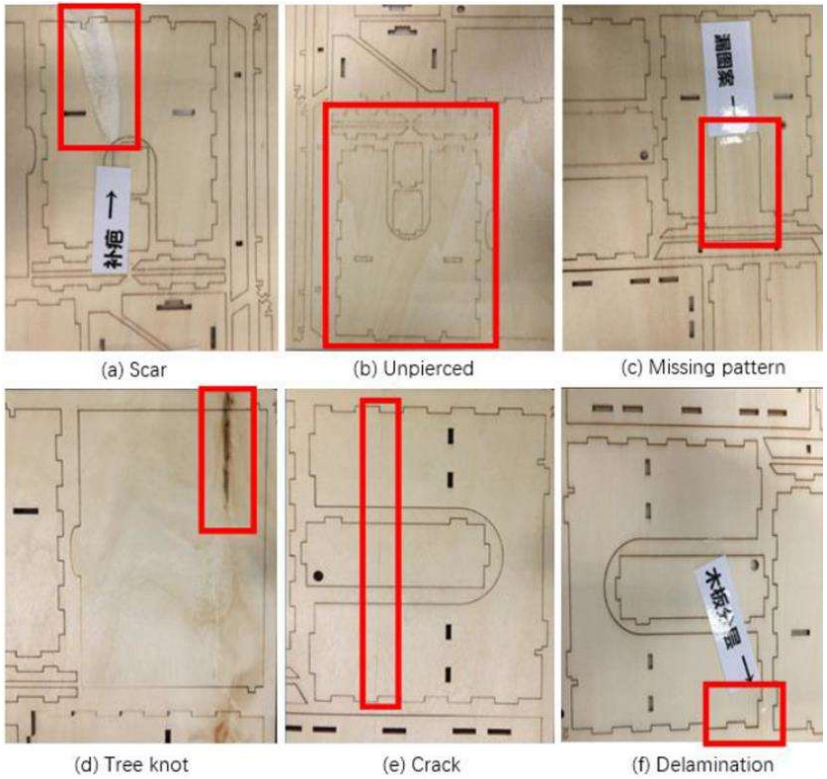


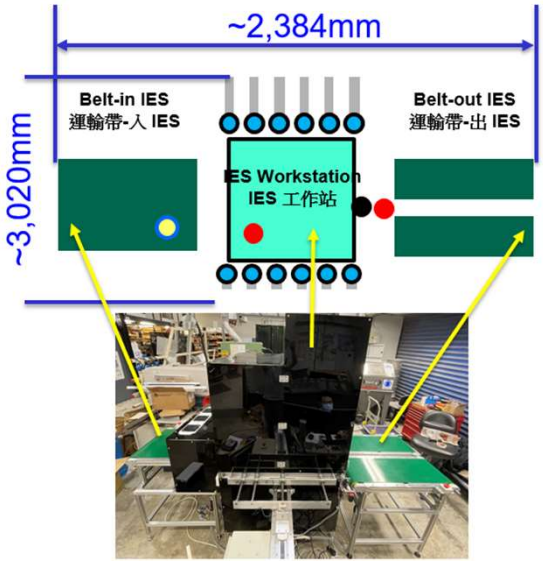


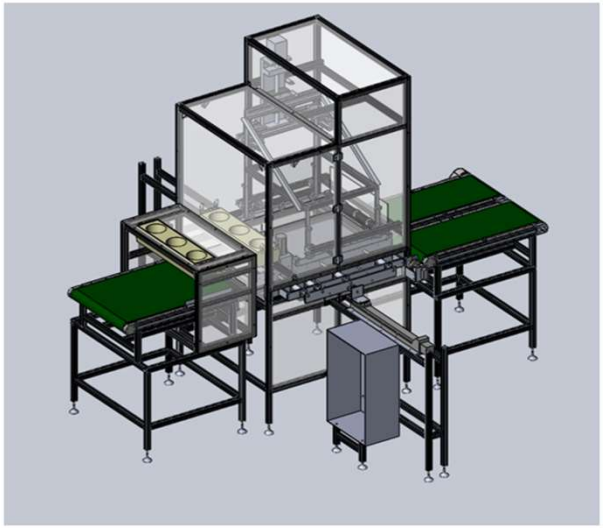


Project – Automatic Flaws Inspection System

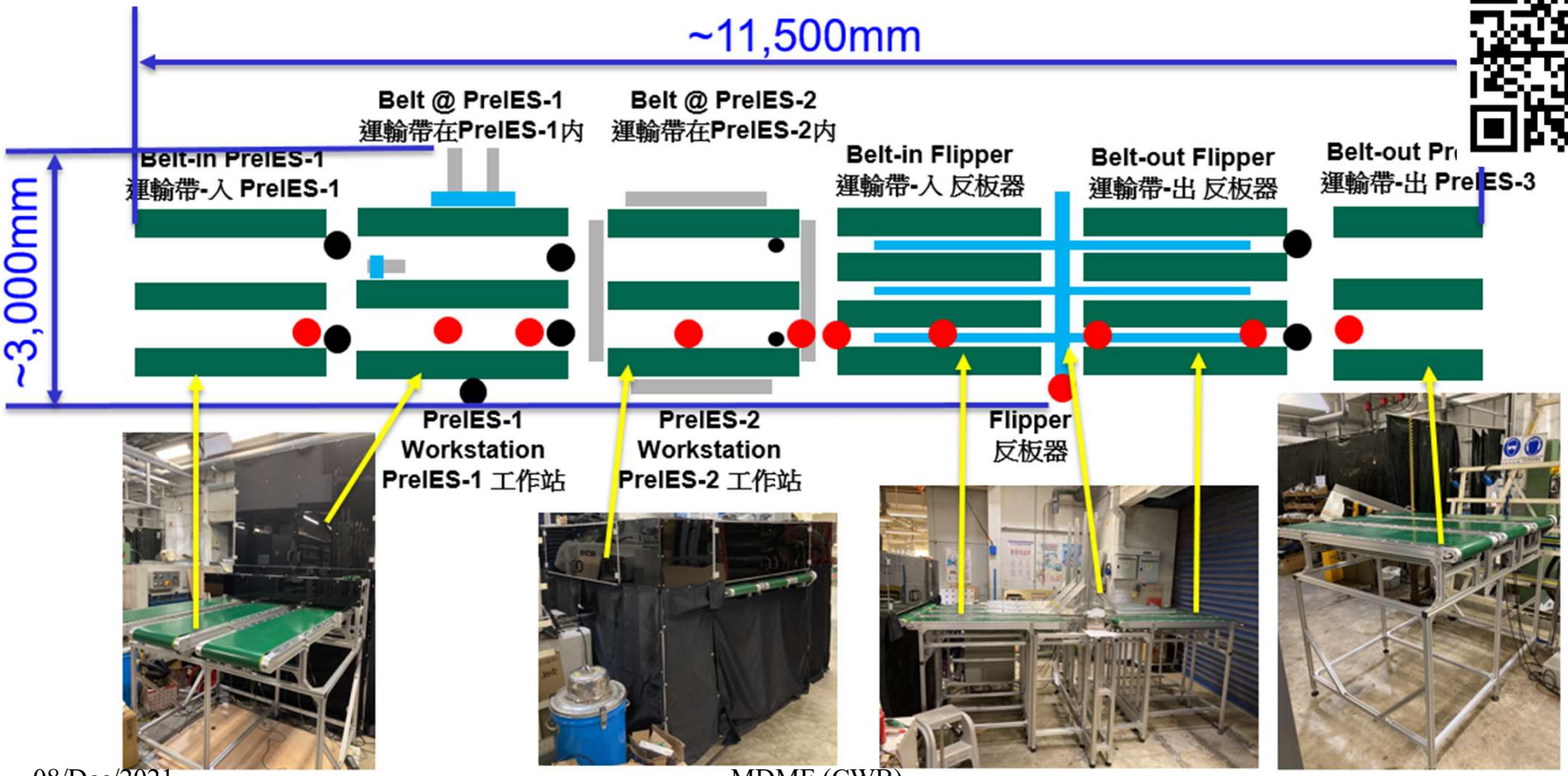
- To automate the detection process of natural and manufacturing flaws before/after laser cutting a plywood board.





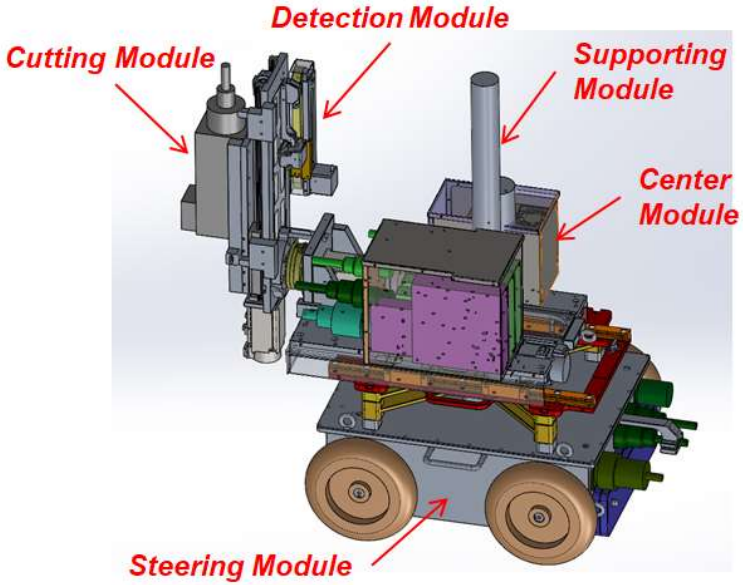


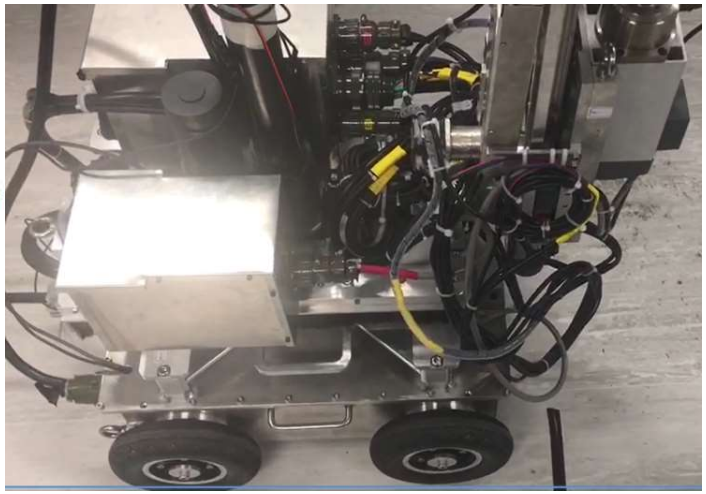
Project – Automatic Flaws Inspection System

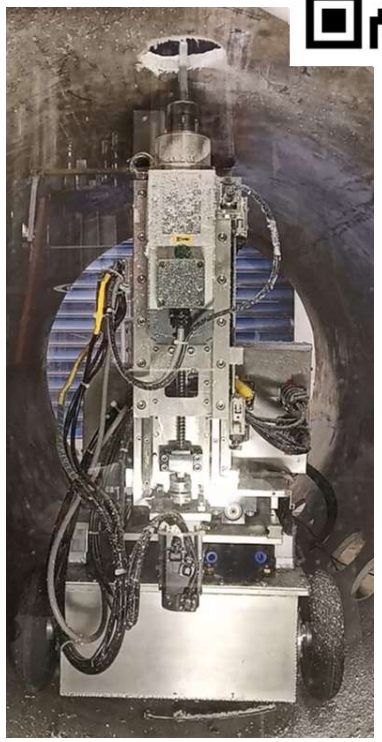


Project – CIPP Repair Robot Cutter

- To develop an automatic robot cutter that can cut the lateral connection branch opening during underground drainage pipe repairing in Hong Kong.







Project – Diamond Sorter

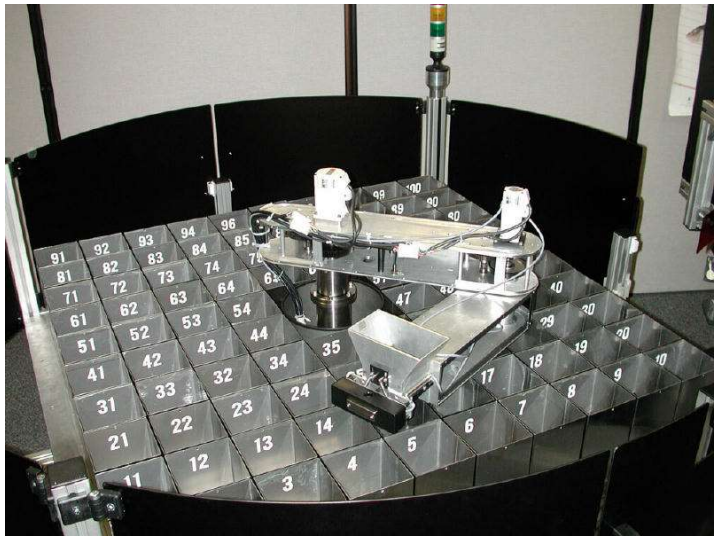
- An automation system to sort gems into different size / color / shape / transparency grades and to measure the cutting / cracks on diamonds
  - Involves the R&D of a vision system, image processing module and an electromechanical mechanism

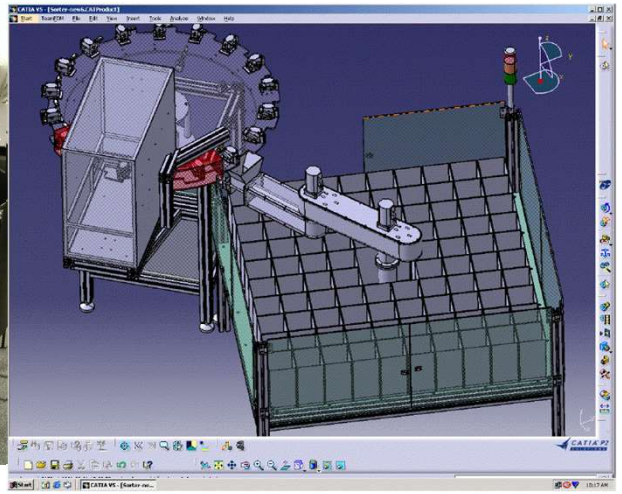




Project – Feather Sorter

- To sort feathers of different features for the shuttlecock manufacturing industry.
  - Involves the R&D of a turning table, an image processing system and a robotic arm, which selects feather into the bin matrix according to their degree of curvature





Project – Controller for Embroidery Machine

- Design and develop a controller to control the embroidery machine more precisely and at higher speed, with less vibration
  - Linux in an embedded system, with advanced control algorithms for accurate positioning, tension control, automatic compensation of vibration

Engineering / Robotic Design Competition

- RoboCon
- ROV
- Cybathlon
- Pedal Kart
- Power Bike
- …