

CNC Routers and Laser Cutting

CNC Routers

CNC Router Materials

- Wood (plywood, MDF, hardwood)
- Plastic (acrylic, PVC, ABS)
- Foam (polyurethane, polystyrene)
- Non-ferrous metals (aluminum, brass)
- Composites (fiberglass, carbon fiber)

CNC Router Tooling

- End mills
 - Straight
 - Ball nose
 - V-bit
- Engraving tools
- Drill bits
- Diamond-coated tools
 - Non-ferrous metals and composites

CNC Router Settings

- Feed rate
- Spindle speed
- Depth of cut
- Step-over (for 3D cutting)
- Toolpath generation

Water Jet & CNC Router



Laser Cutting

Types of Lasers for Cutting

- CO₂ Lasers
 - Cutting and engraving non-metallic materials
 - Wood, acrylic, plastic, paper, fabric, some ceramics
 - Wavelength 10.6 micrometers
- Fiber Lasers
 - Cutting and engraving metals and dense materials
 - Stainless steel, aluminum, brass, copper, mild steel
 - Wavelength around 1 micrometer
- Nd:YAG Lasers
 - Cut range of materials
 - Wood, plastic, ceramic, and thin metals
 - Wavelength of 1.06 micrometers

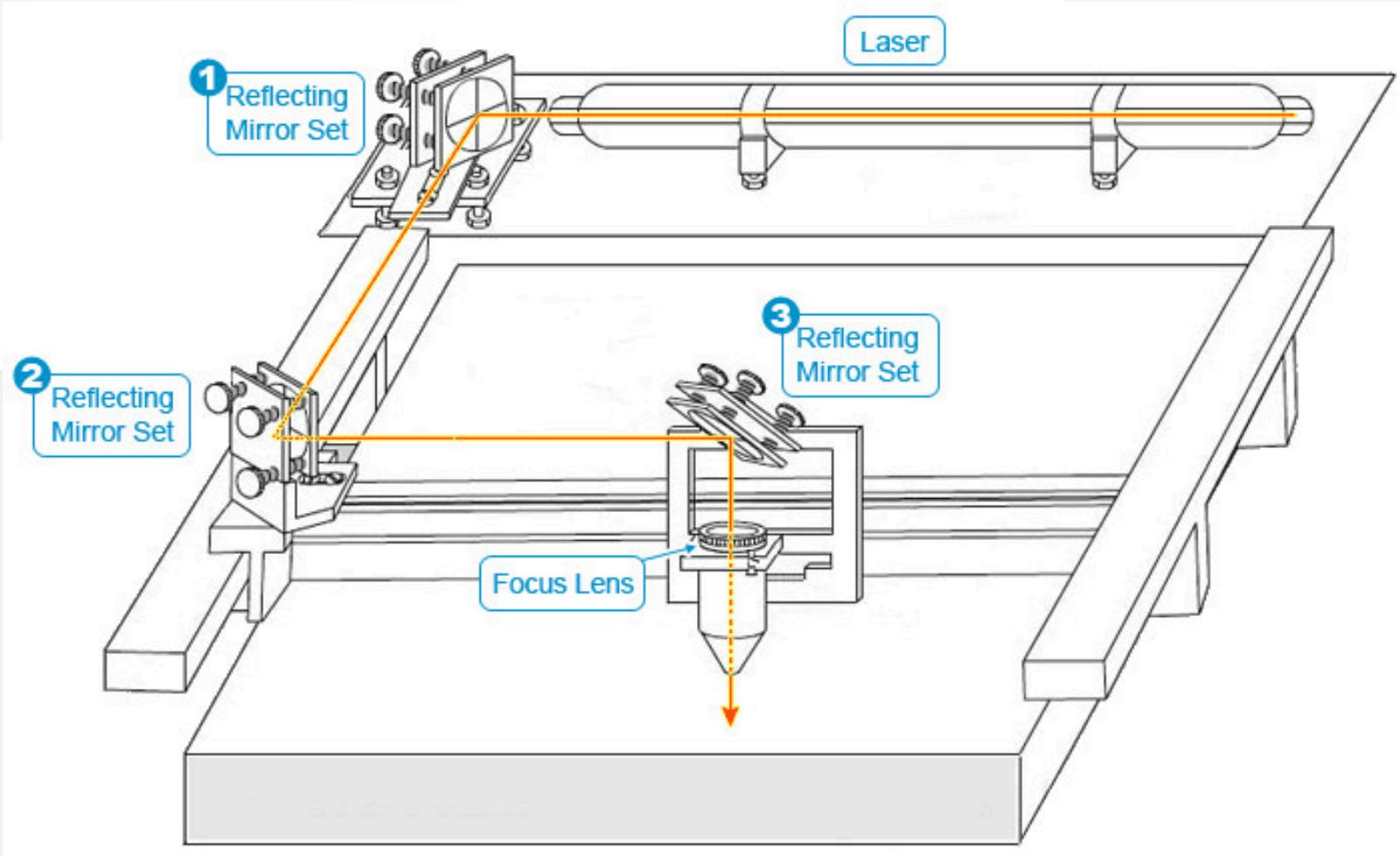
CO₂ Laser



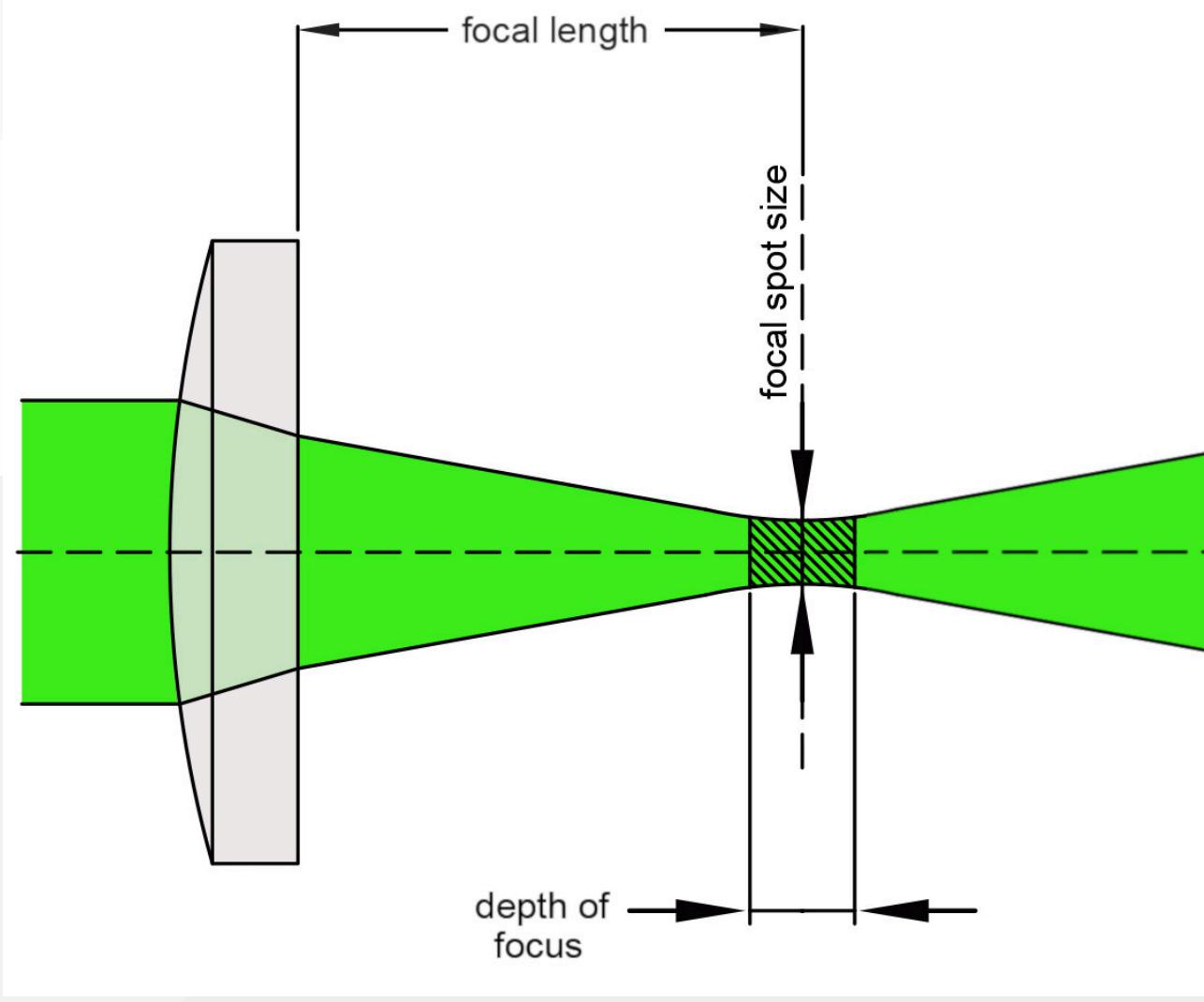
Laser Firing



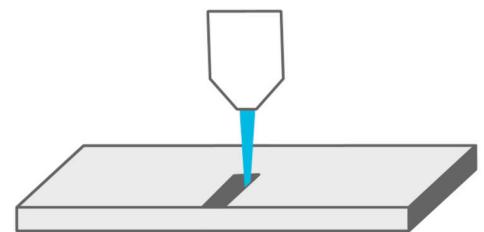
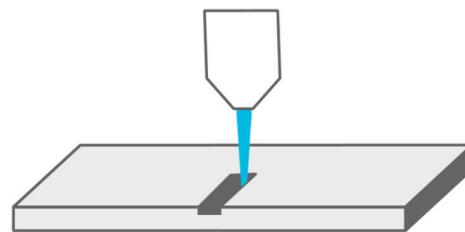
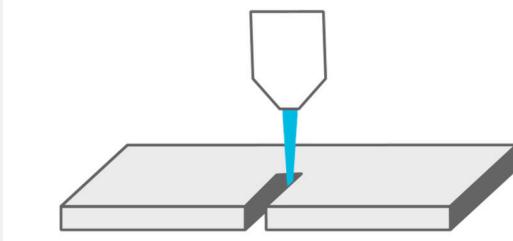
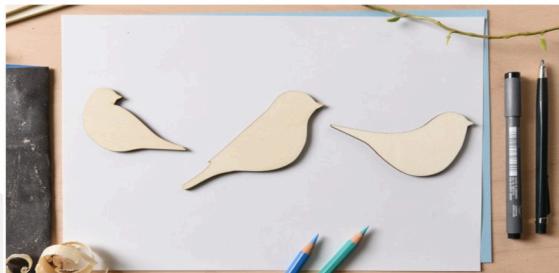
Laser Mirrors and Lens



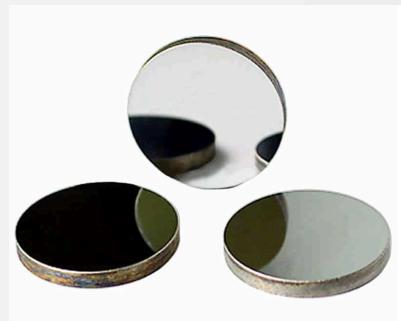
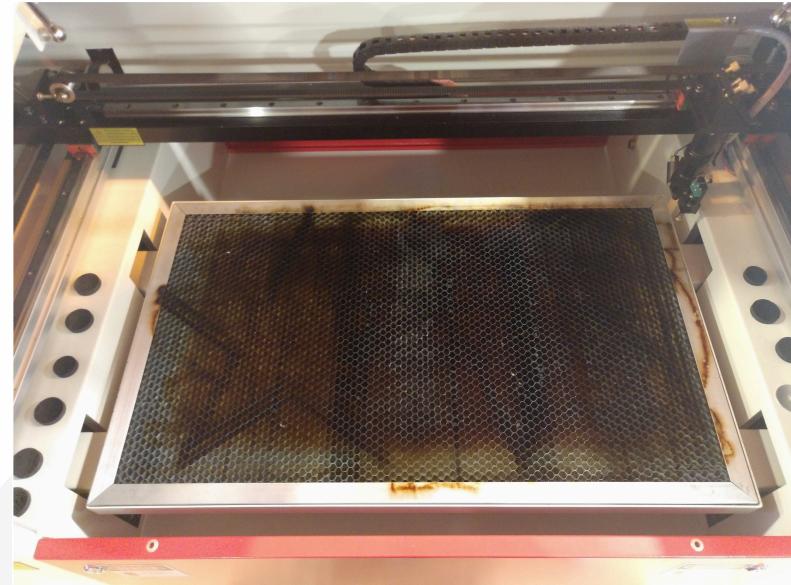
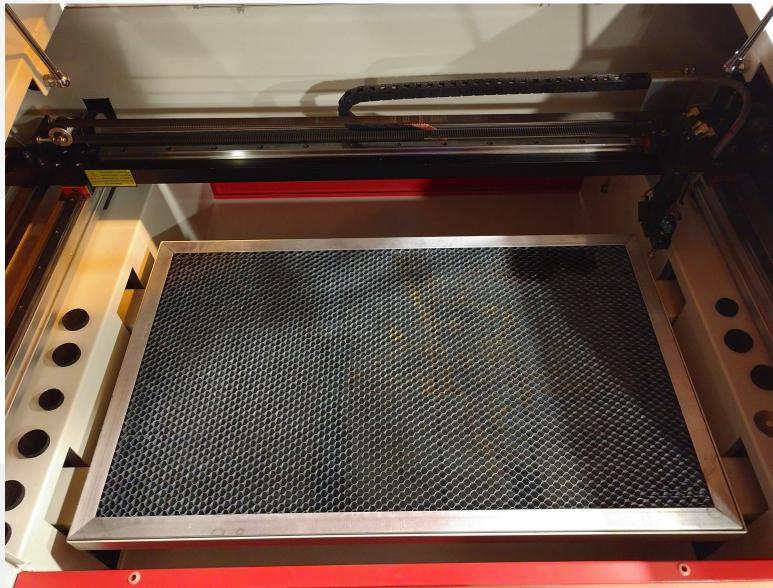
Laser Beam



Cut Engrave Mark



Maintaining a Laser Cutter



Materials for Laser Cutting

- Wood (plywood, MDF, hardwood)
- Acrylic
- Plastic (ABS, PVC, polycarbonate)
- Paper and cardboard
- Fabric (cotton, felt, leather)
- Ceramic
- Metals
 - stainless steel, aluminum, brass, copper, mild steel

Laser Items



Laser Items



Software

- Autodesk Fusion 360
- Autodesk Inventor
- Blender
- FreeCAD
- Inkscape
- Lightburn

Laser Cutting Settings

- Power
- Speed
- Frequency
- Focus
- Gas assist (for cutting)

Applications of Laser Cutting and CNC Routers

- Eye and skin treatments
- Military Defense and Offensive
- Prototyping
- Signage and engraving
- Architectural models
- Product manufacturing
- Woodworking and cabinetry
- Automotive and aerospace components

Safety Considerations

- Laser safety
 - Eye protection
 - Enclosures
- Dust and fume extraction
- Personal protective equipment (PPE)
- Proper training and operation procedures

Questions