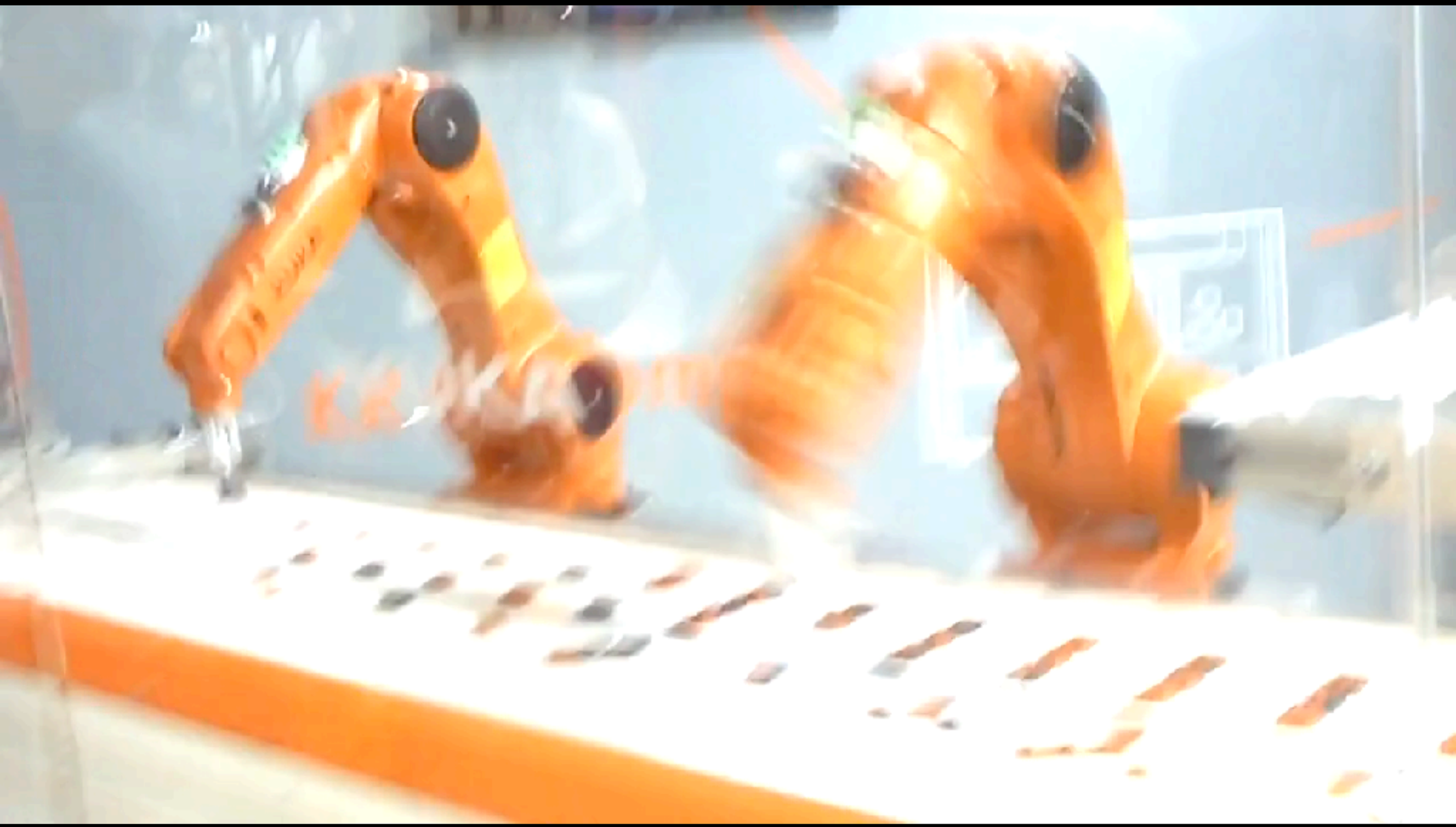
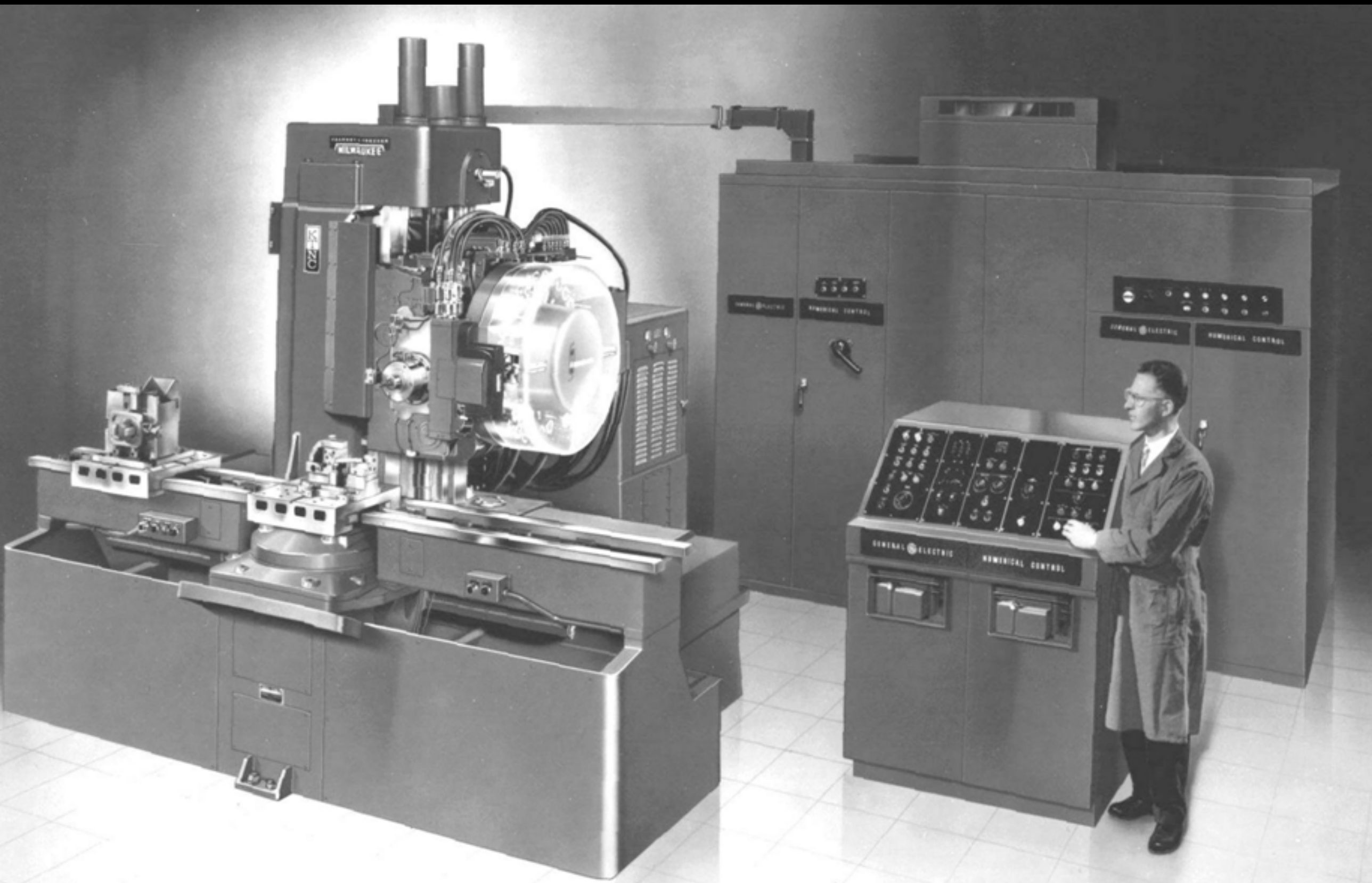


DIGITAL**FABRICATION**2018

CNC



TOOL TYPES

Additive

3d printing : selective laser sintering (SLS)

fused deposition (FDM + FFF) : stereolithography (light curing)

Subtractive

drill : saw : torch : plasma cutter

laser cutting : milling : water jet

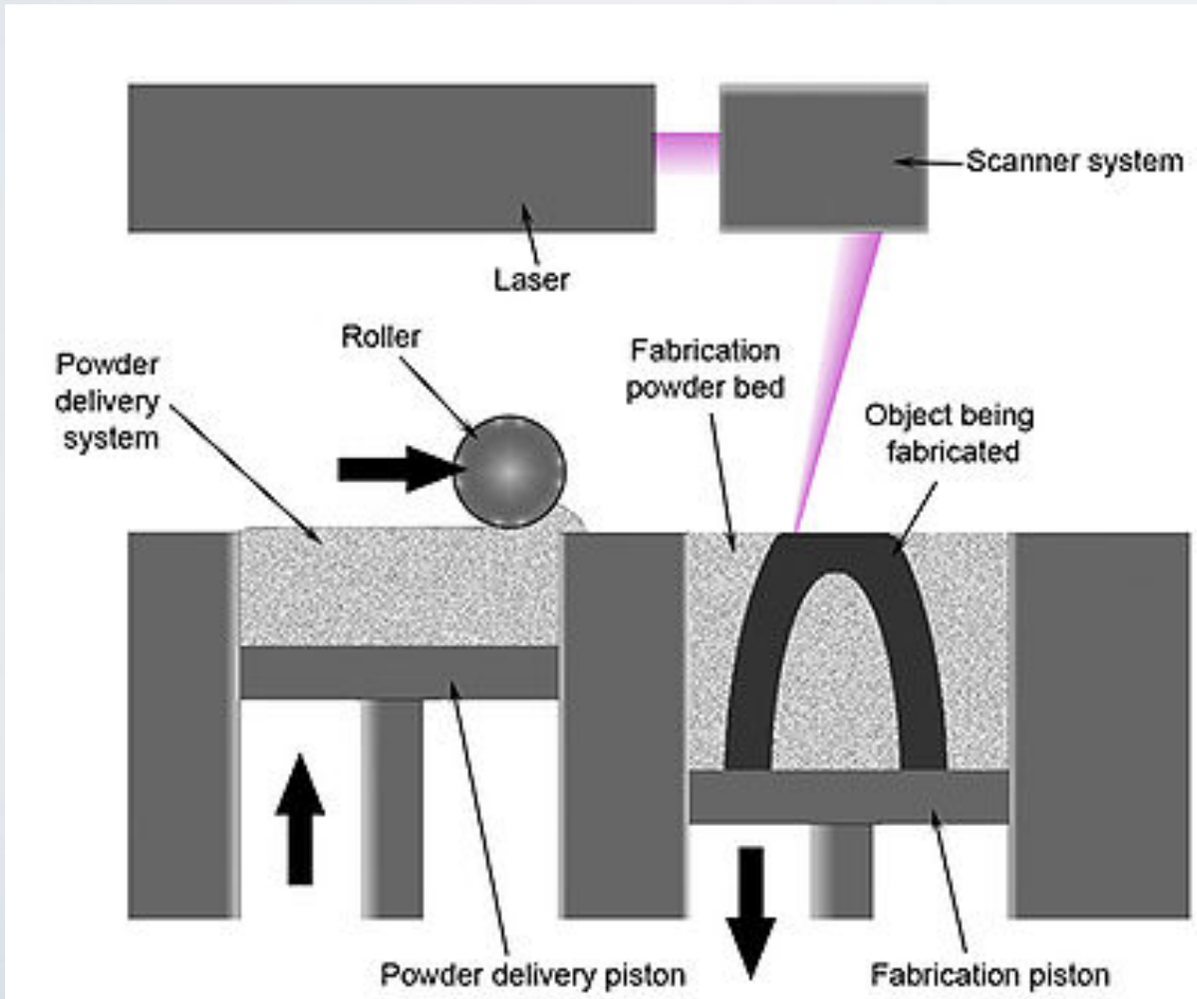
Manipulative

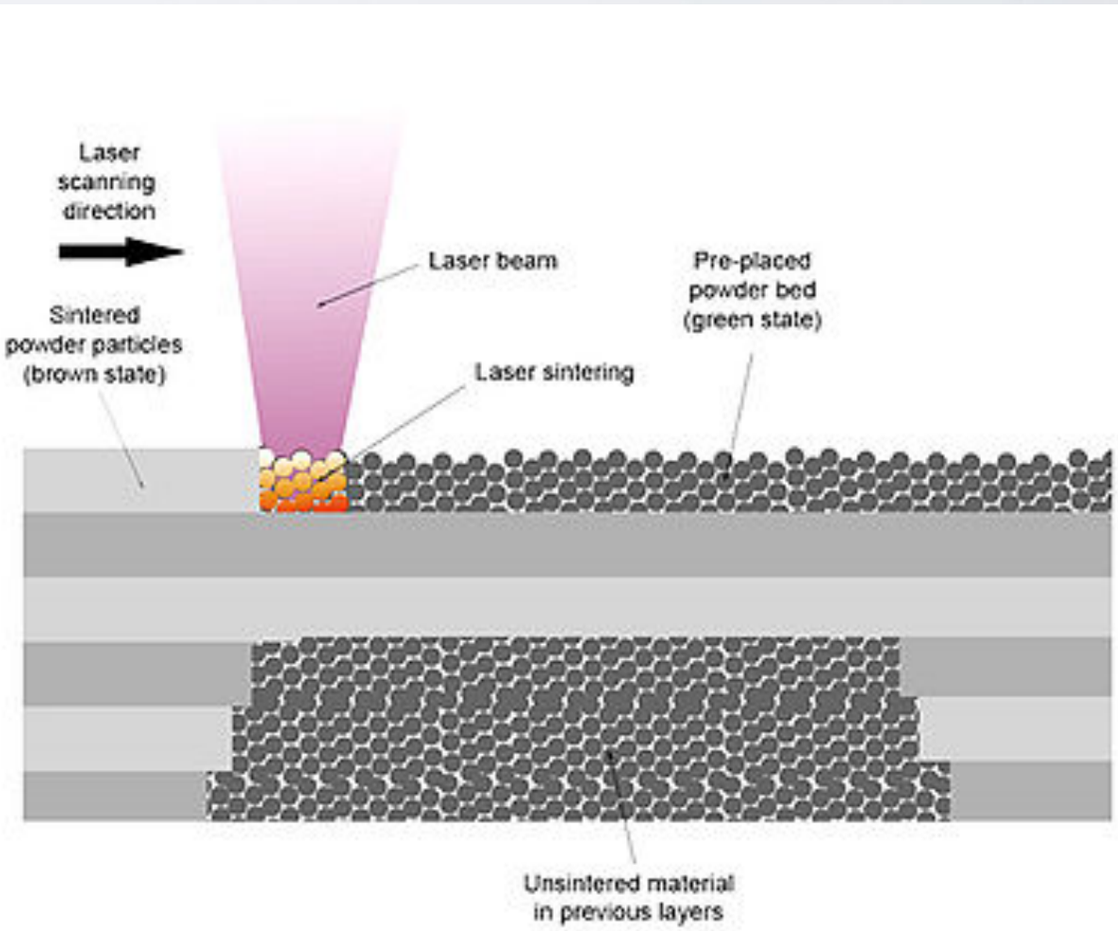
cool stuff

SELECTIVE LASER SINTERING : SLS : 1980

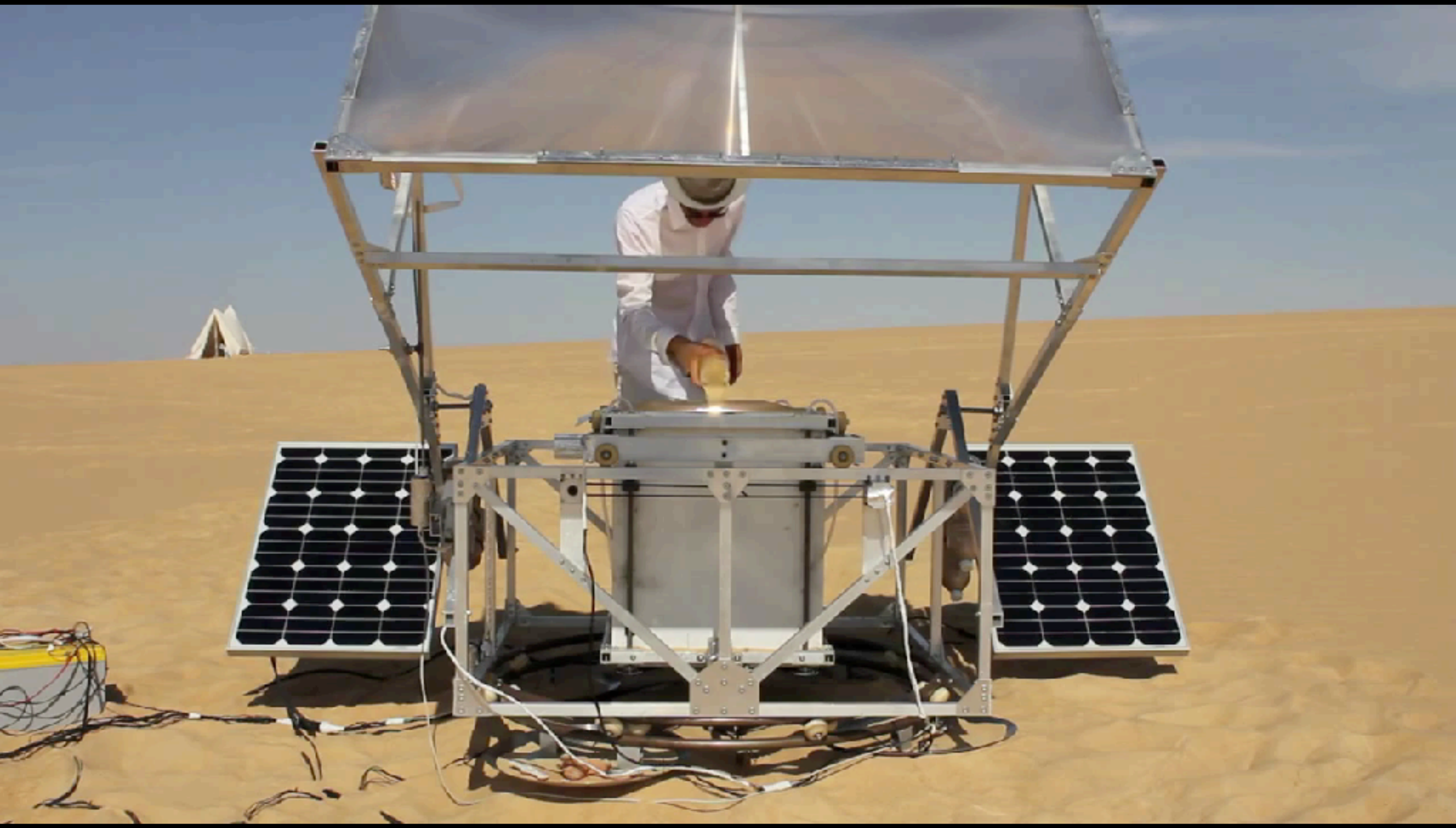
uses lasers as its power source to sinter powdered material, binding it together to create a solid structure

+ only uses one material (no support material needed)
+ can make casting molds
- depending on material can be brittle
+ works with plastics, ceramics, metals, etc.





SELECTIVE LASER SINTERING : SLS : 1980



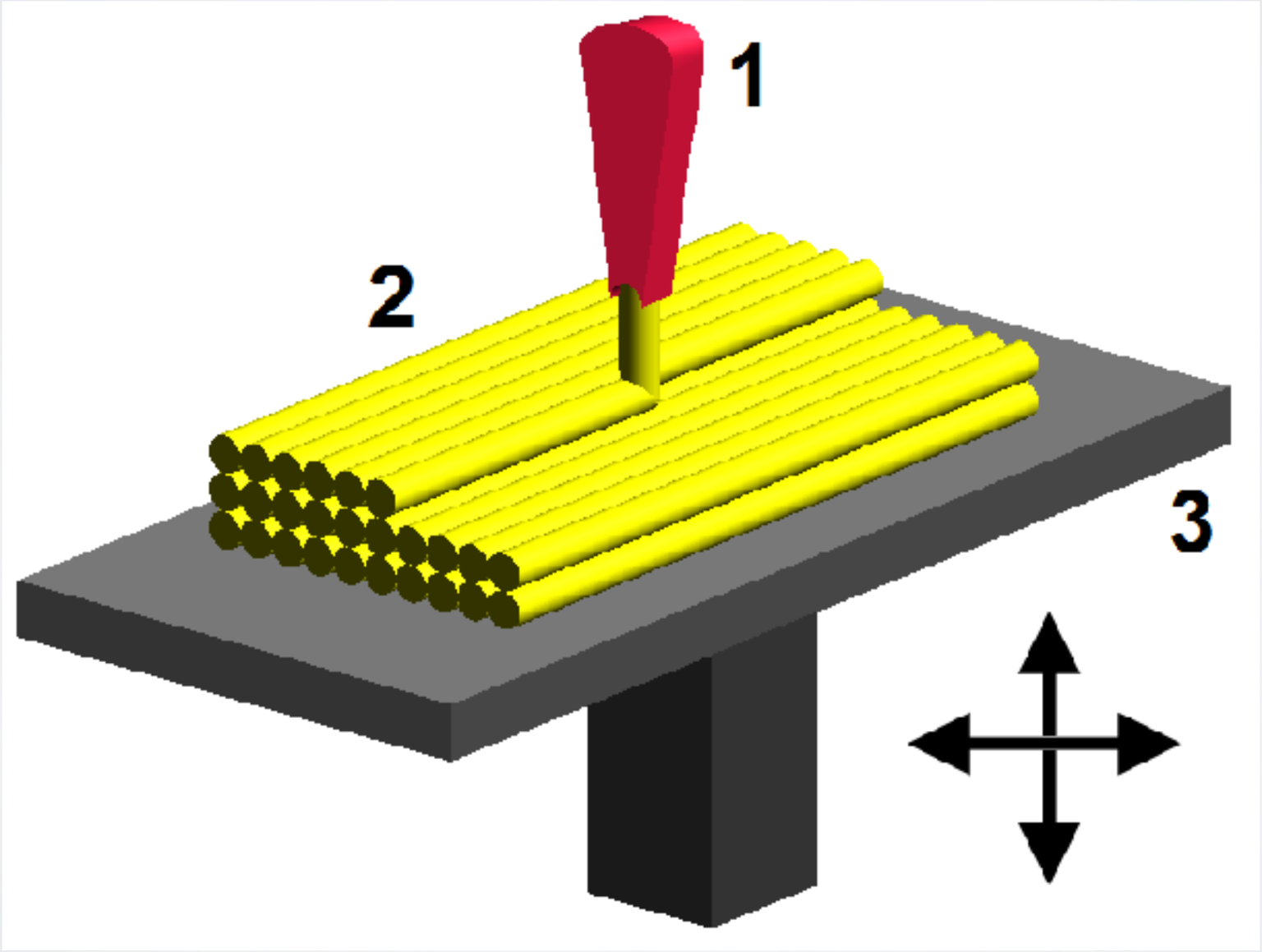
FUSED DEPOSITION MODELING (FDM)
FUSED FILAMENT MODELING (FFM)

spools of plastic are heated and layered up to create a solid object

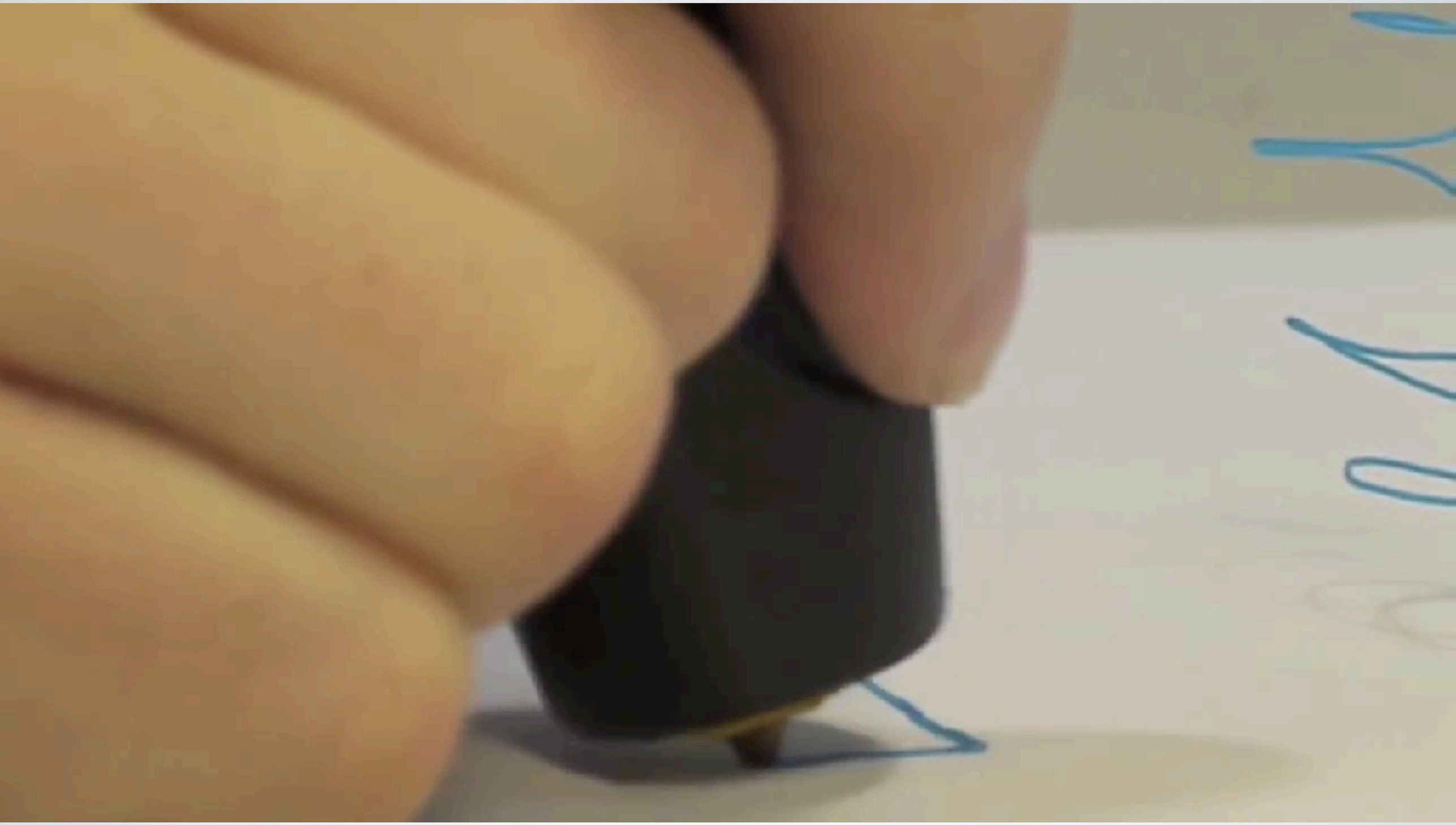
…think fancy CNC controlled hot glue gun

+ uses soluble material

- often two materials: support + model

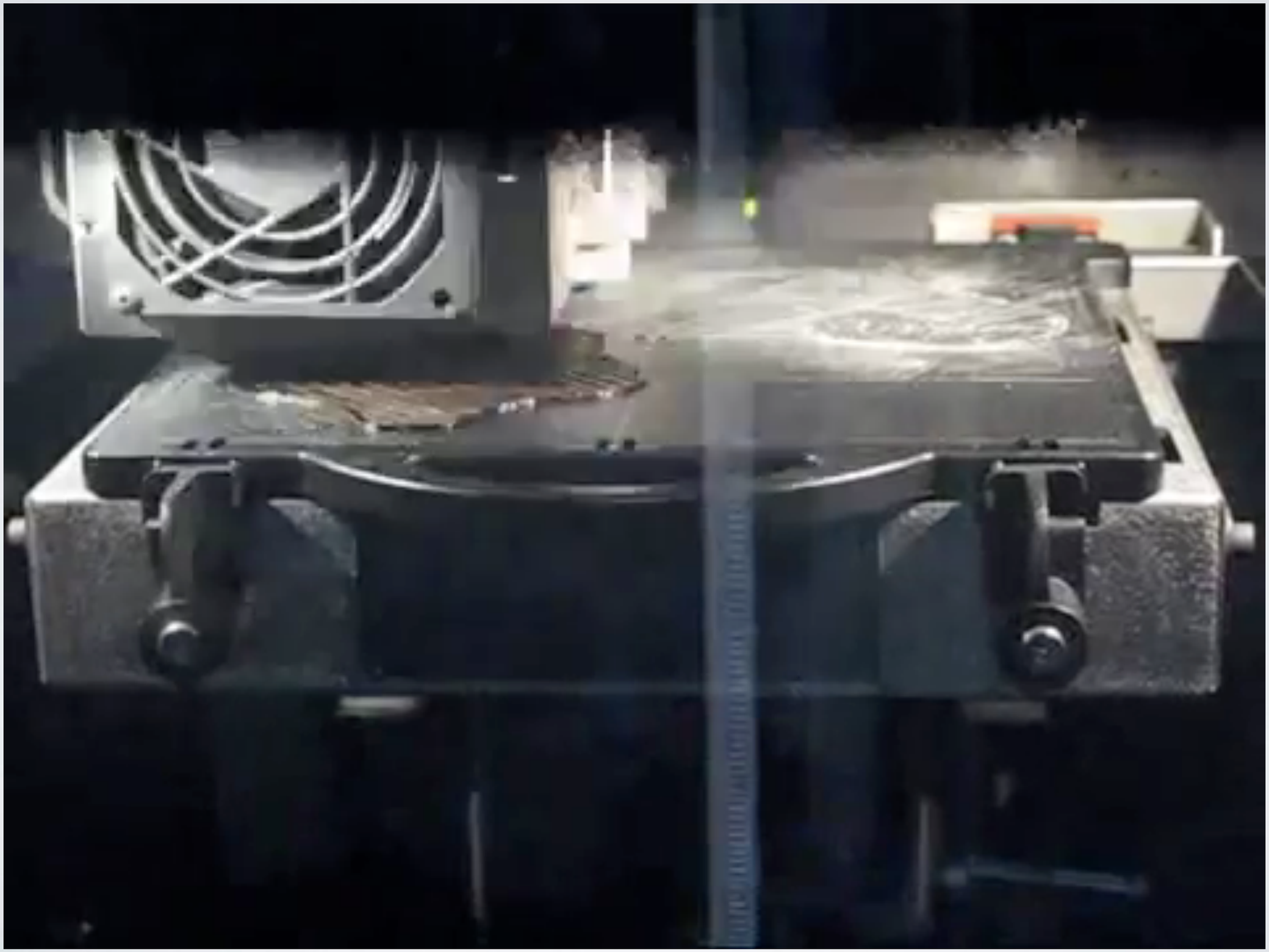


FUSED DEPOSITION MODELING (FDM)
FUSED FILAMENT MODELING (FFM)



3doodler

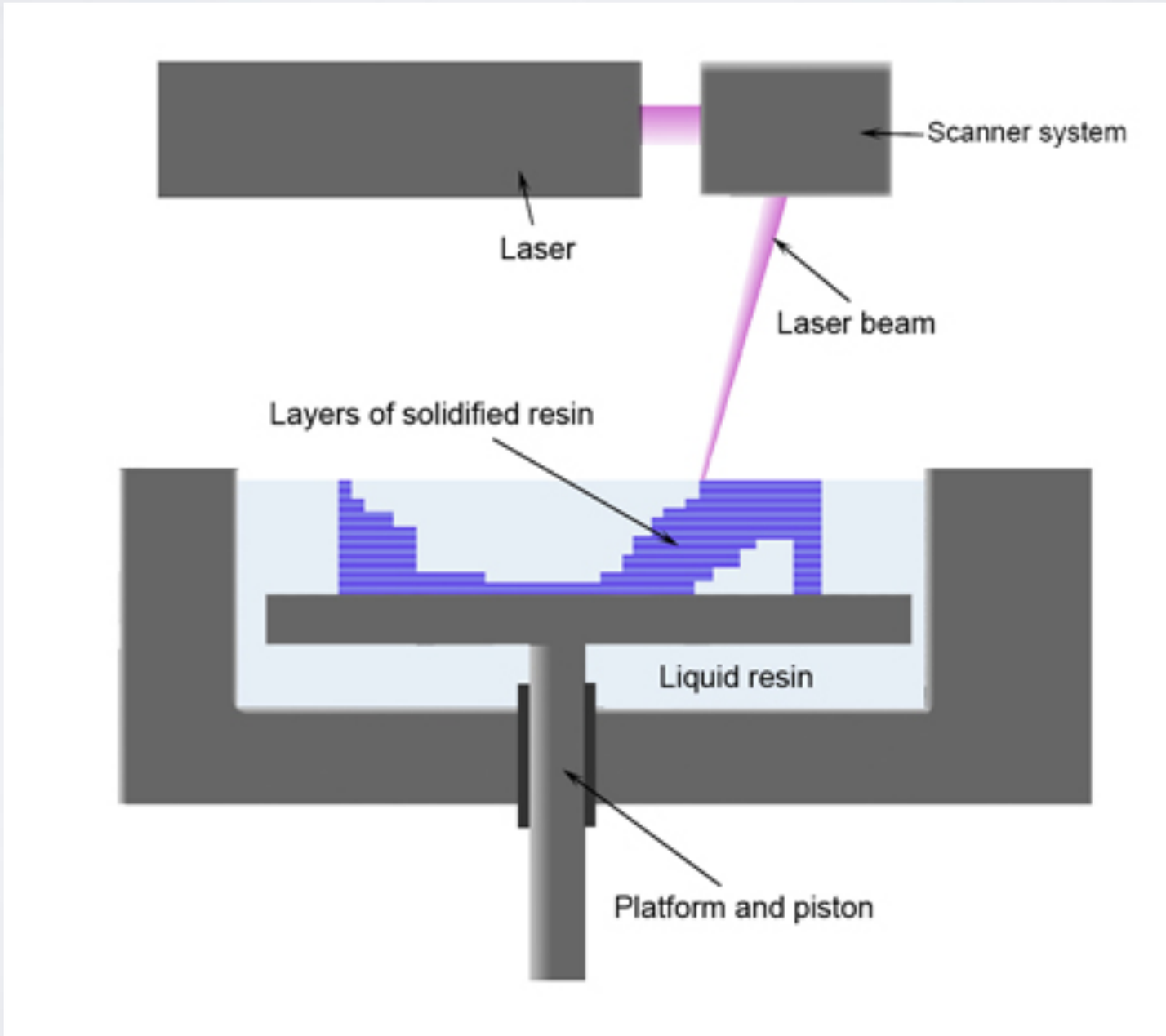
FUSED DEPOSITION MODELING (FDM)
FUSED FILAMENT MODELING (FFM)



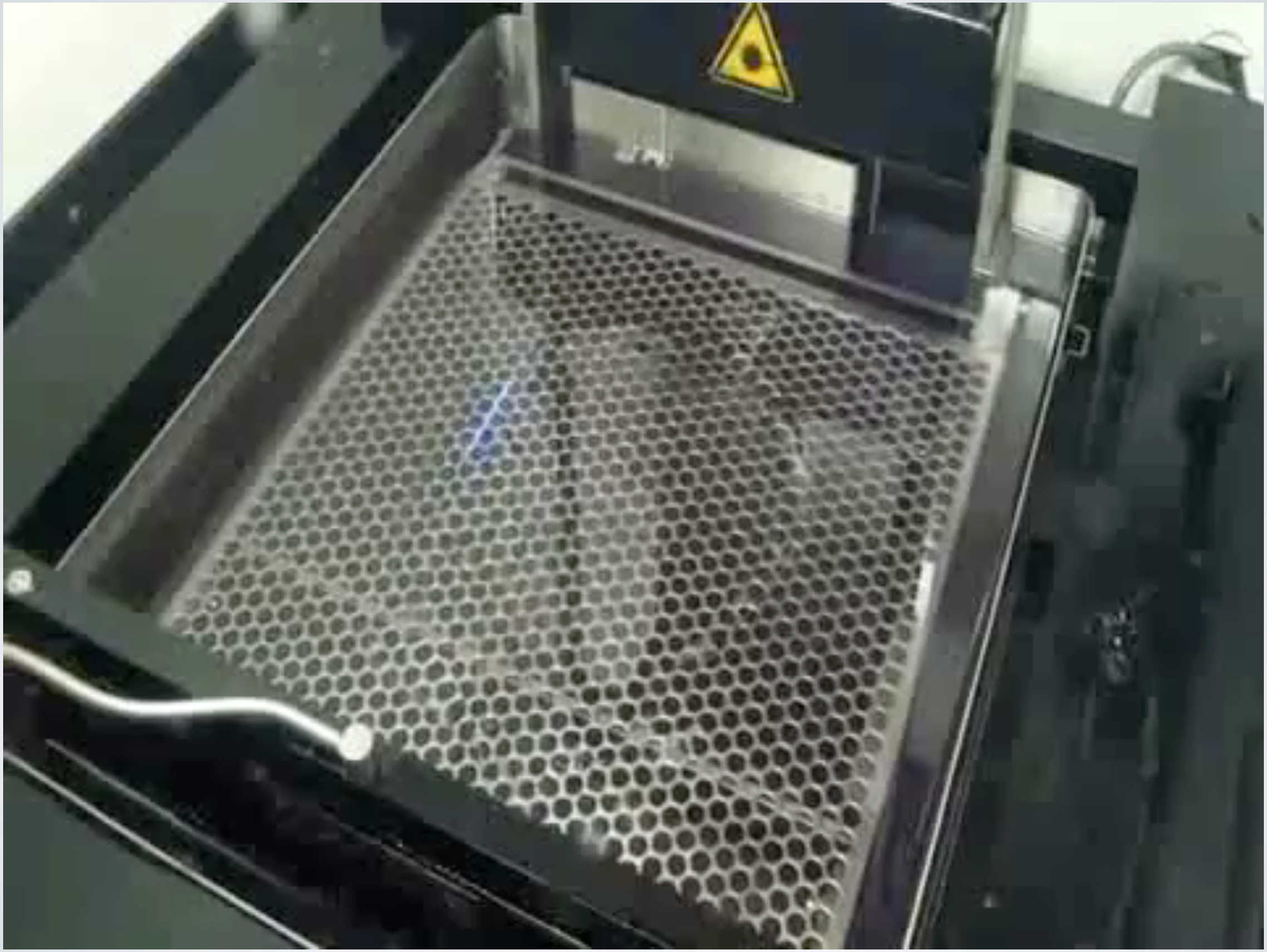
MULTI-JET MODELING

STEREOLITHOGRAPHY : SLA

light beams fuse particle together in a pool of photopolymer liquid
curing a photo-reactive resin with a UV laser or another similar power source
+ very high accuracy



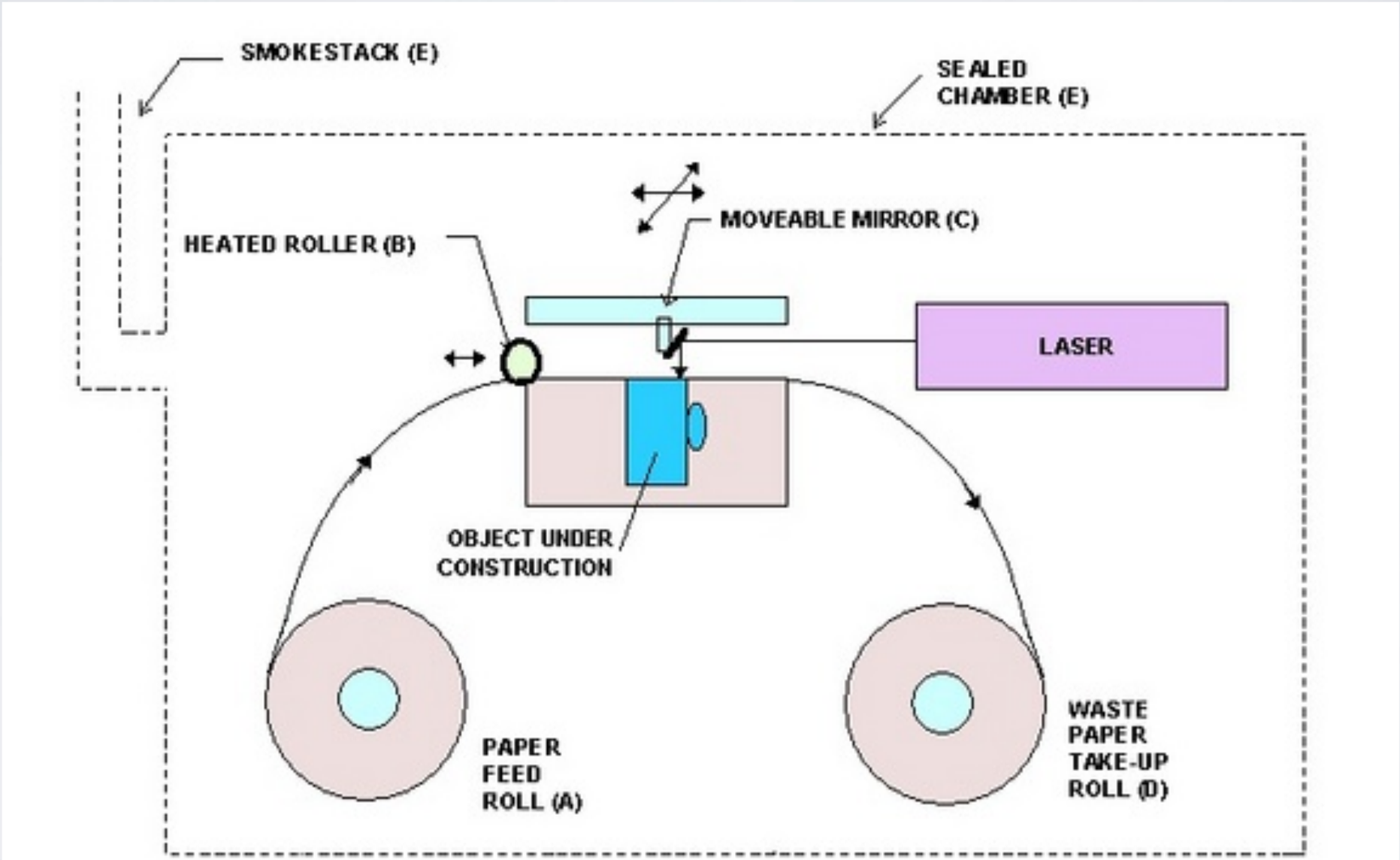
STEREOLITHOGRAPHY : SLA



CONTINUOUS LIQUID INTERFACE PRINTING (CLIP)

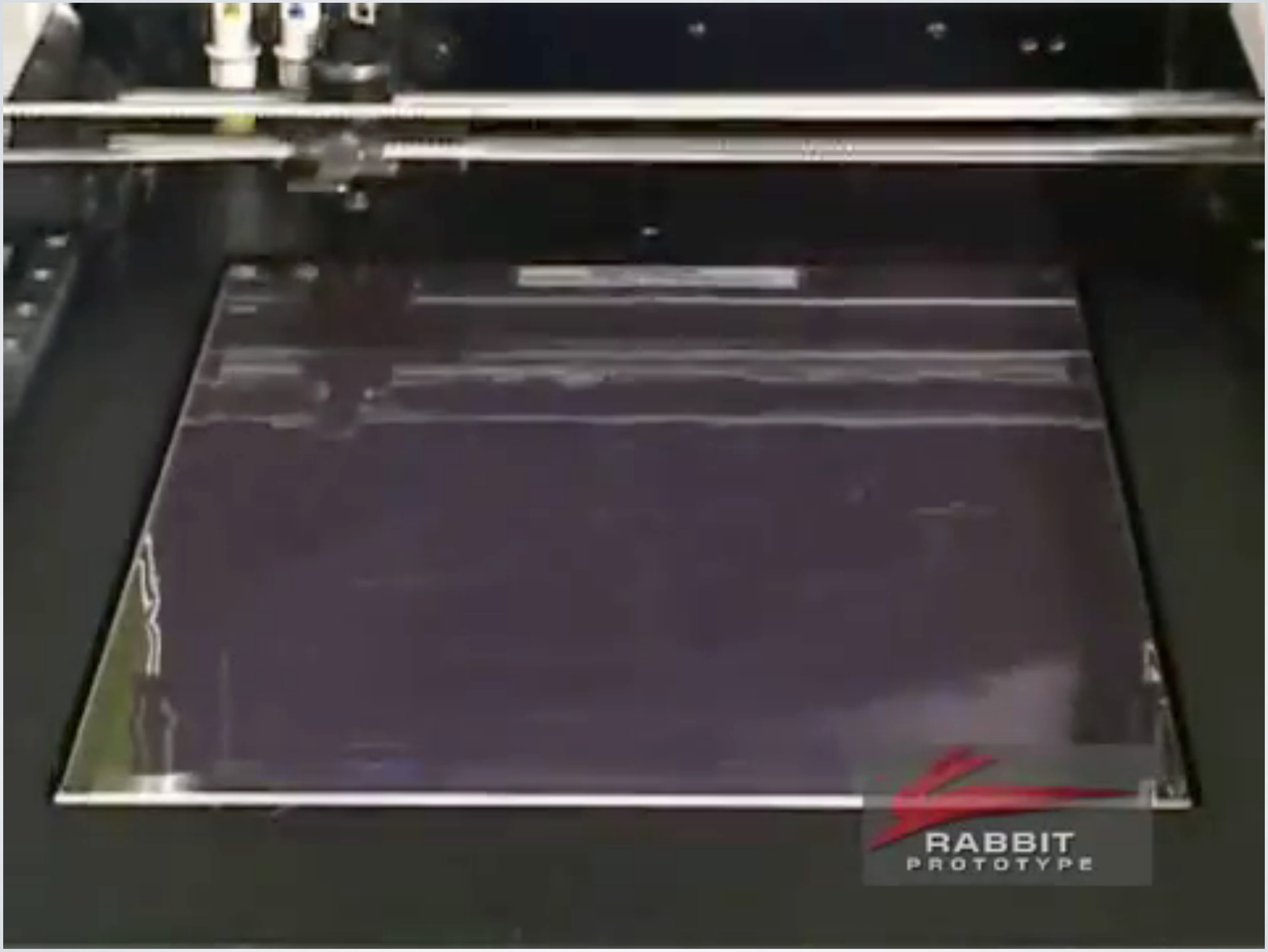
LAMINATED OBJECT MANUFACTURING

cutting and glueing thousands of sheets of material such as paper to form a solid object

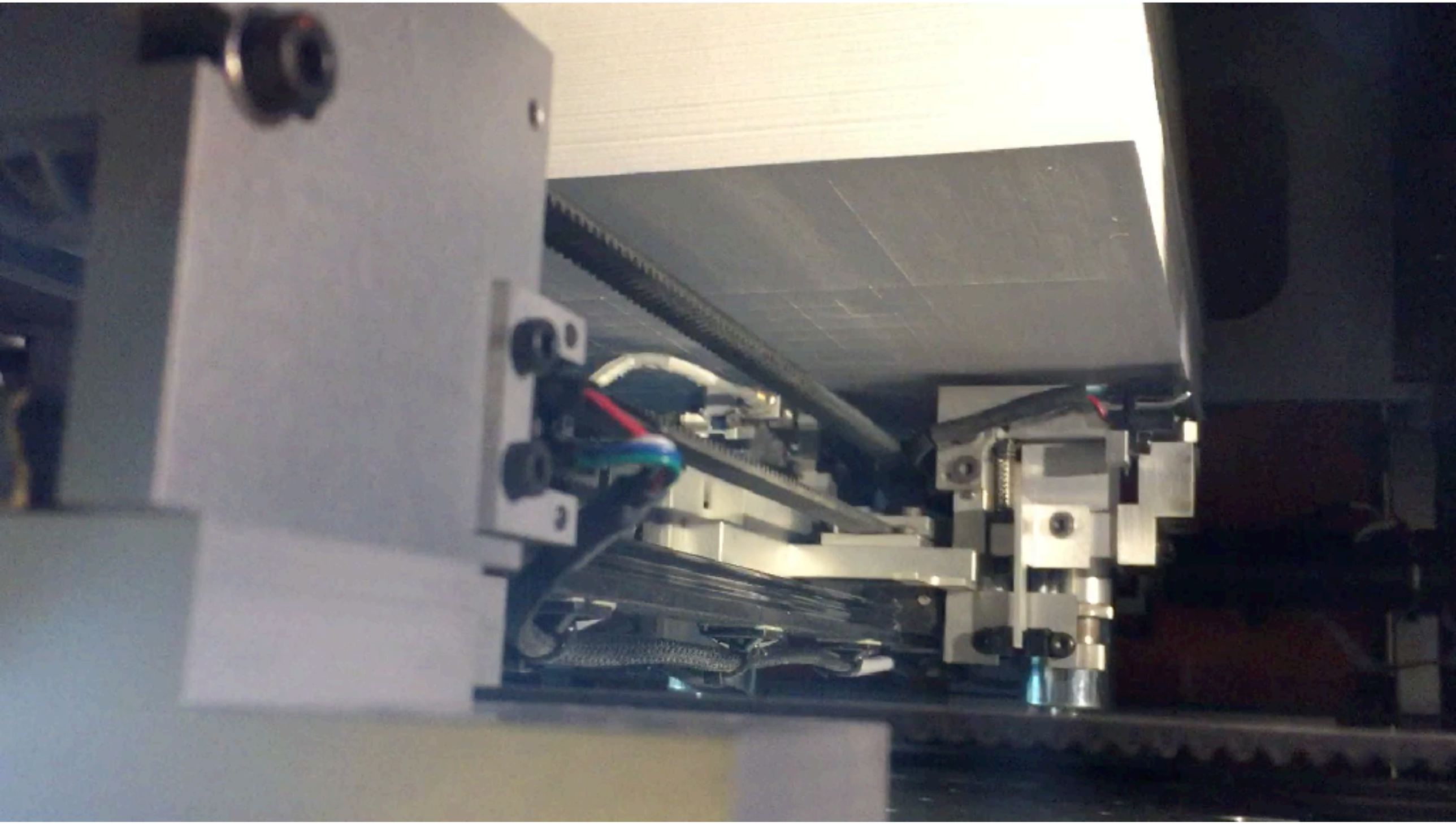


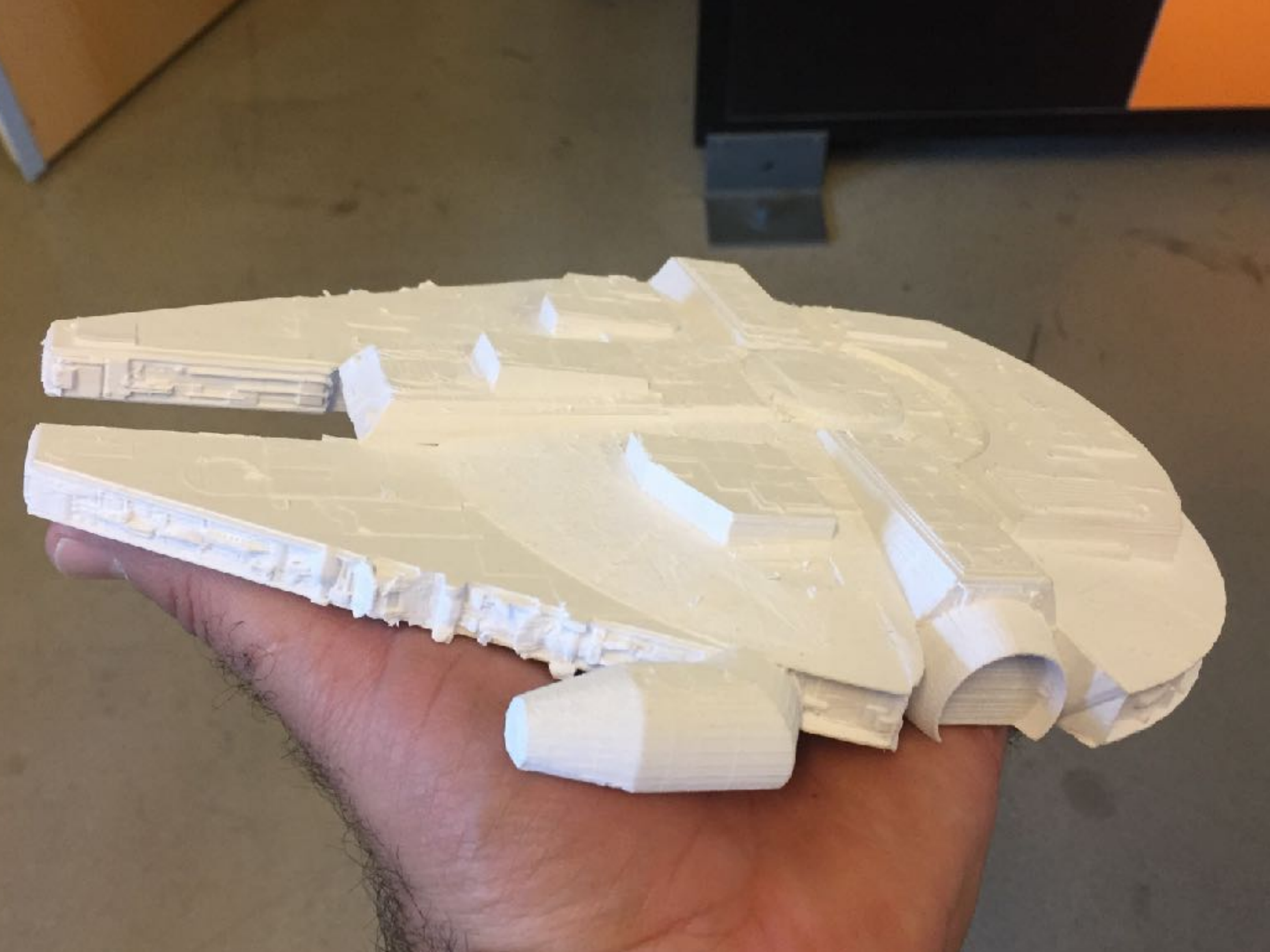
Laminated Object Manufacturing

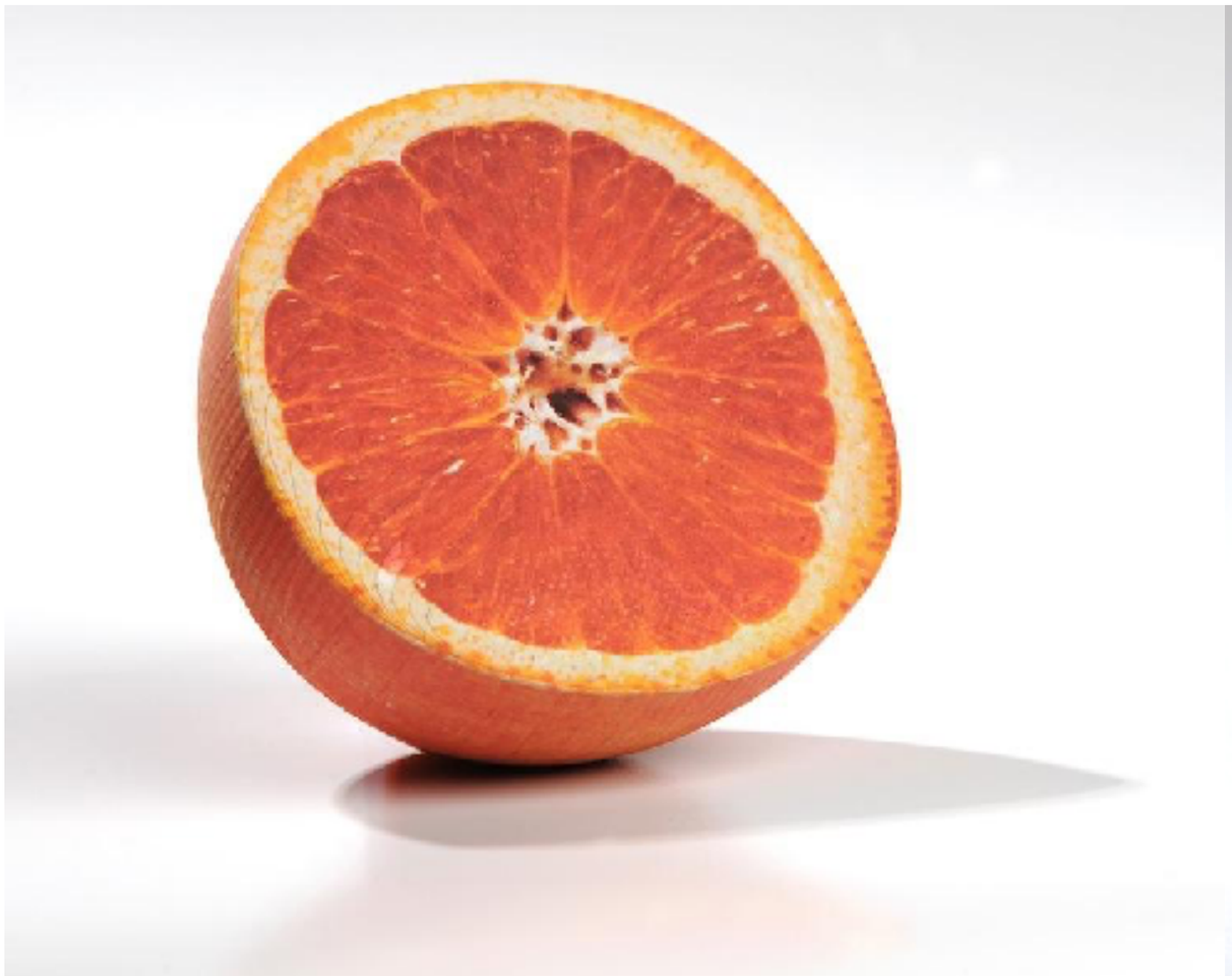
LAMINATED OBJECT MANUFACTURING



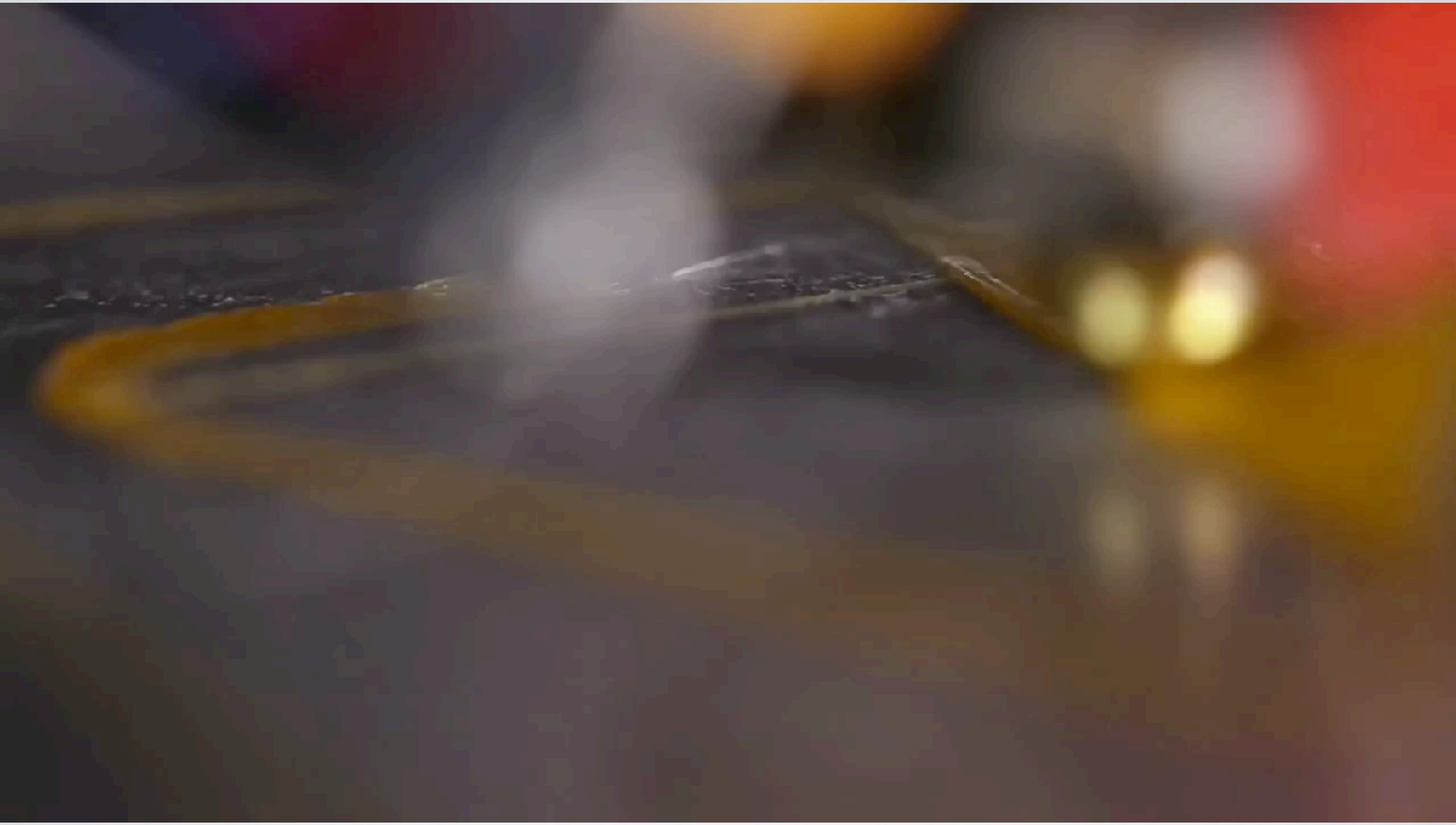

HAVE YOU
CHANGED THE
KNIFE?





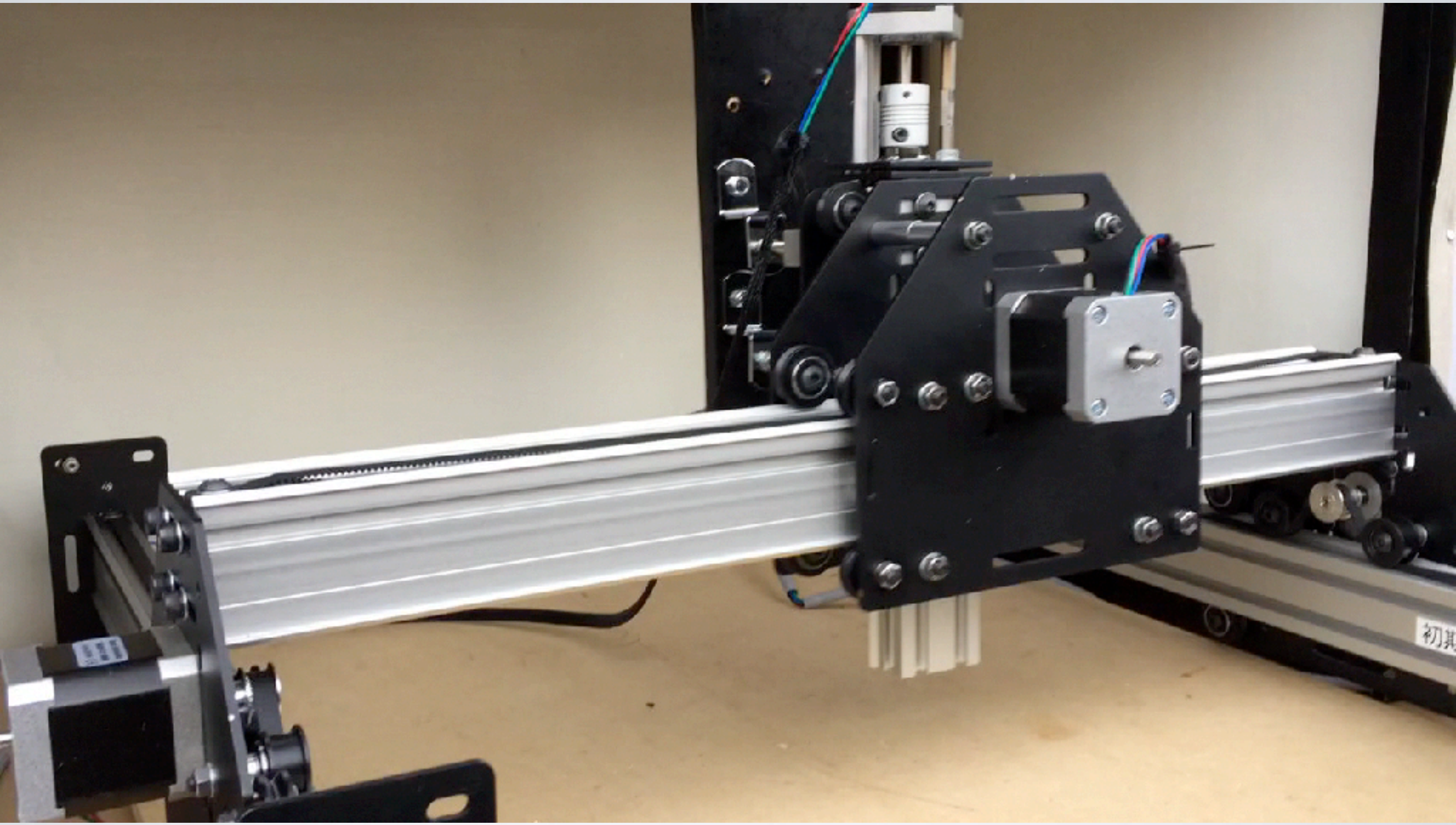


MULTI-MATERIAL



FOOD

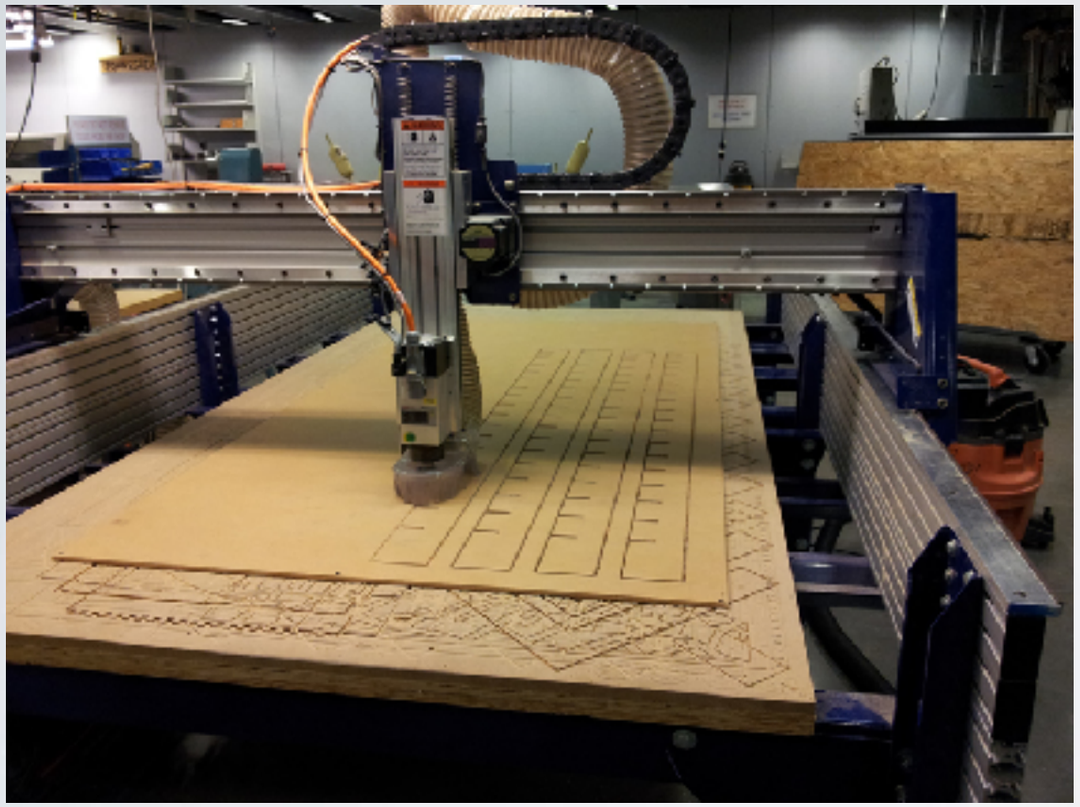
FLAME?



FREE UNIVERSAL CONSTRUCTION KIT

FREE UNIVERSAL CONSTRUCTION KIT

SUBTRACTIVE



sheet based / flatbed

- relatively straightforward to use
- relatively inexpensive
- laster cutter, flatbed router, water jet

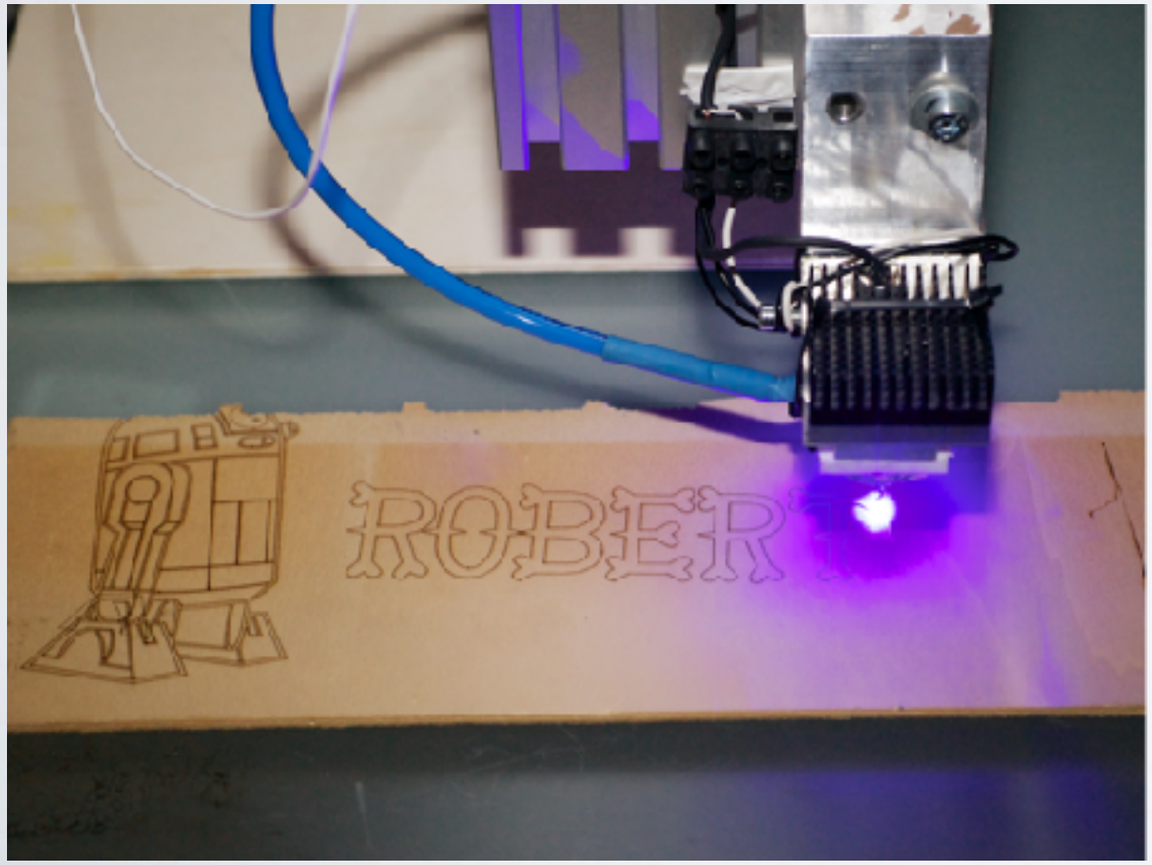
mass based

- generally 4-axis or more
- more difficult to utilize
- price doubles for each additional axis
- 5 axis CNC milling machines

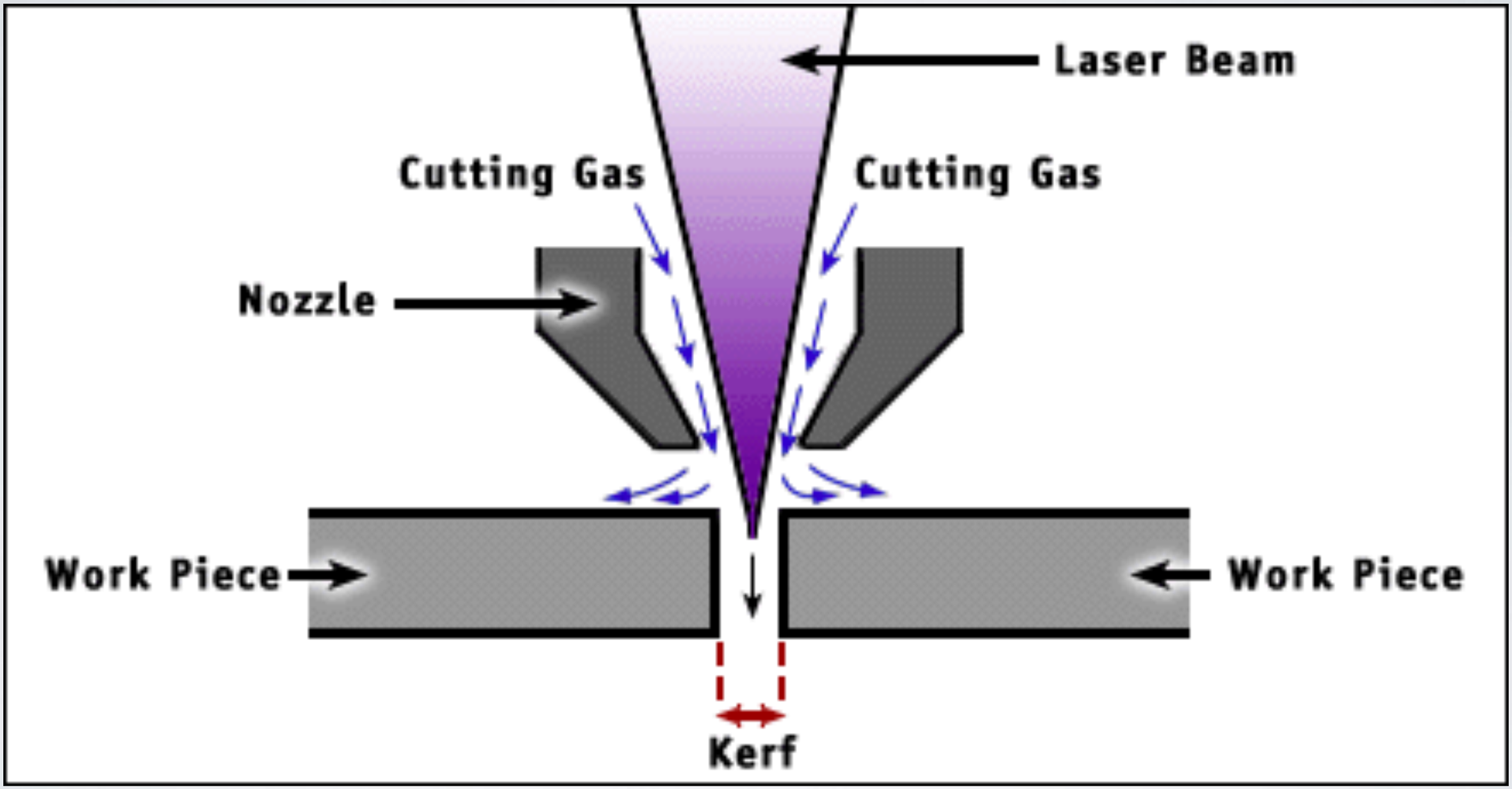
LASER CUTTER / ENGRAVER

focused beam of light vaporizes material

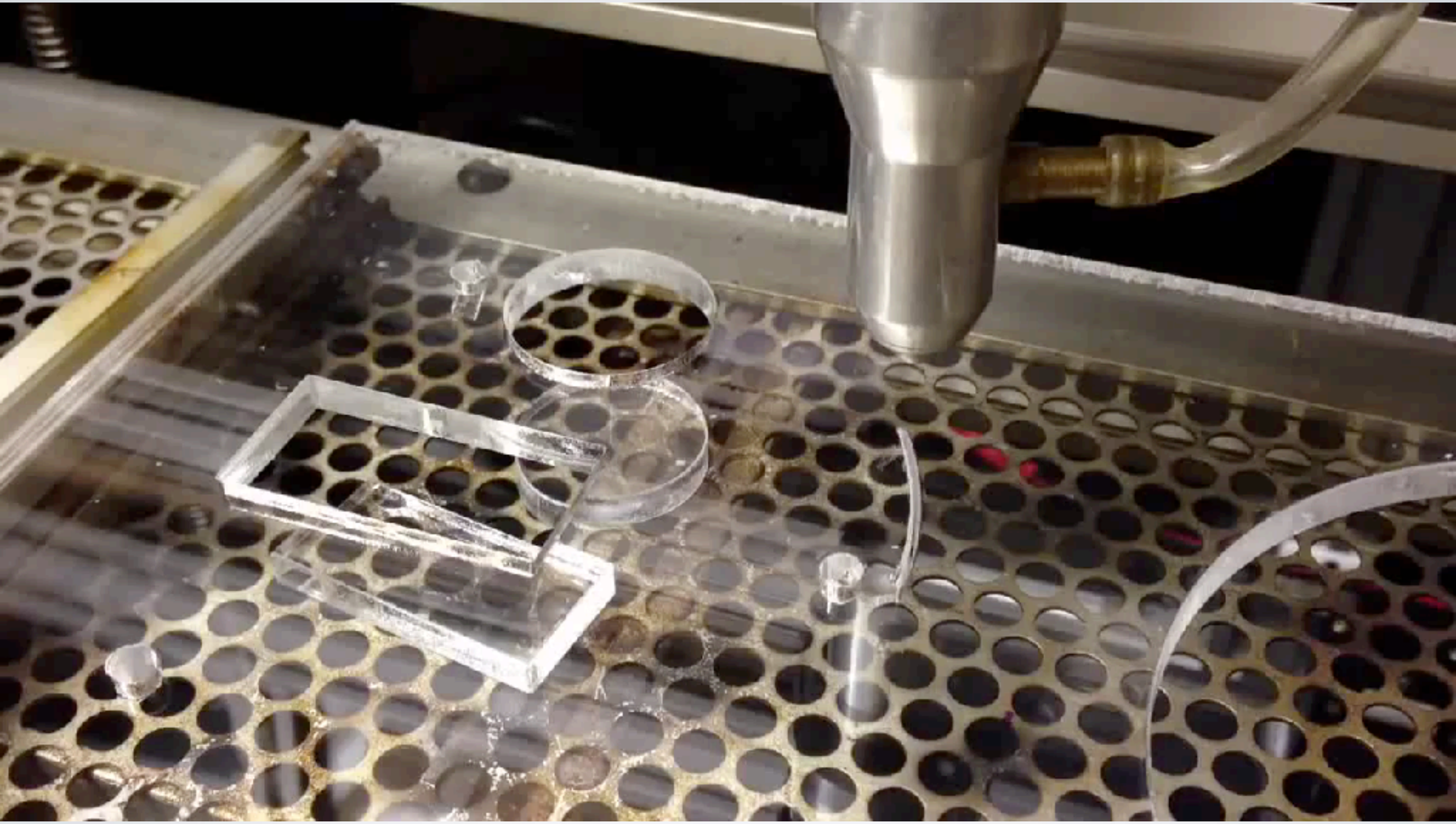
+ narrow kerf (kerf is the width of material removed by a cutting process)
+ clean edges
+ variety of materials - plastics, wood, paper, metals (very high wattage)
+ precise and fast



LASER CUTTER / ENGRAVER



LASER CUTTER / ENGRAVER



ROUTER

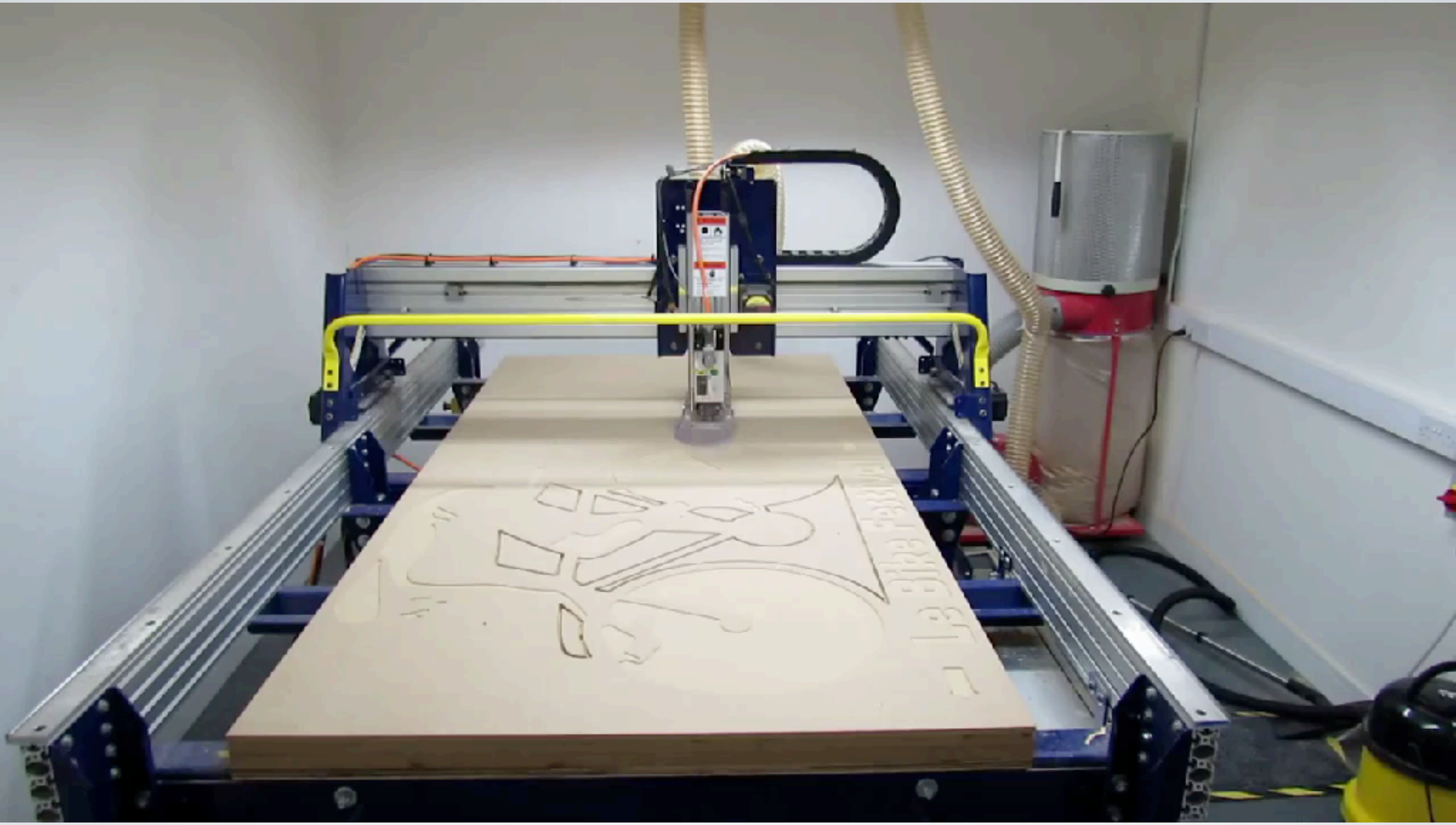
spinning side cut removes material like a small saw blade

kerf width depends on bit

2D cutting embossed in third dimension

materials - plastics, wood, paper, soft metals (carving)

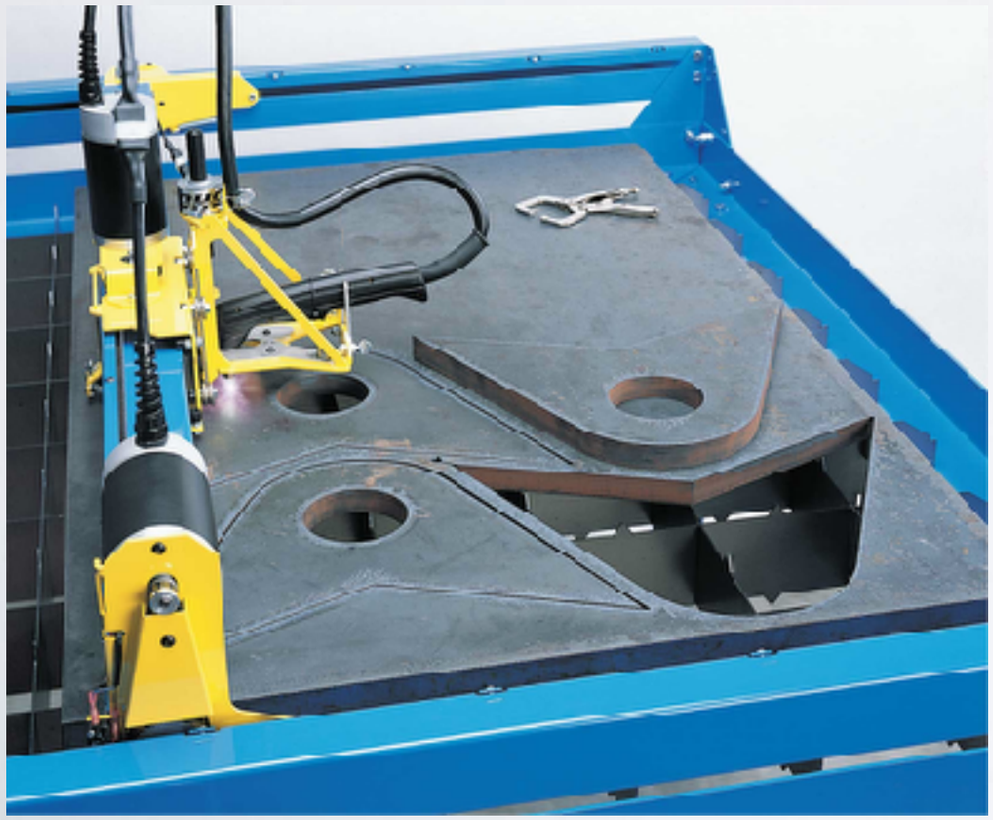
ROUTER

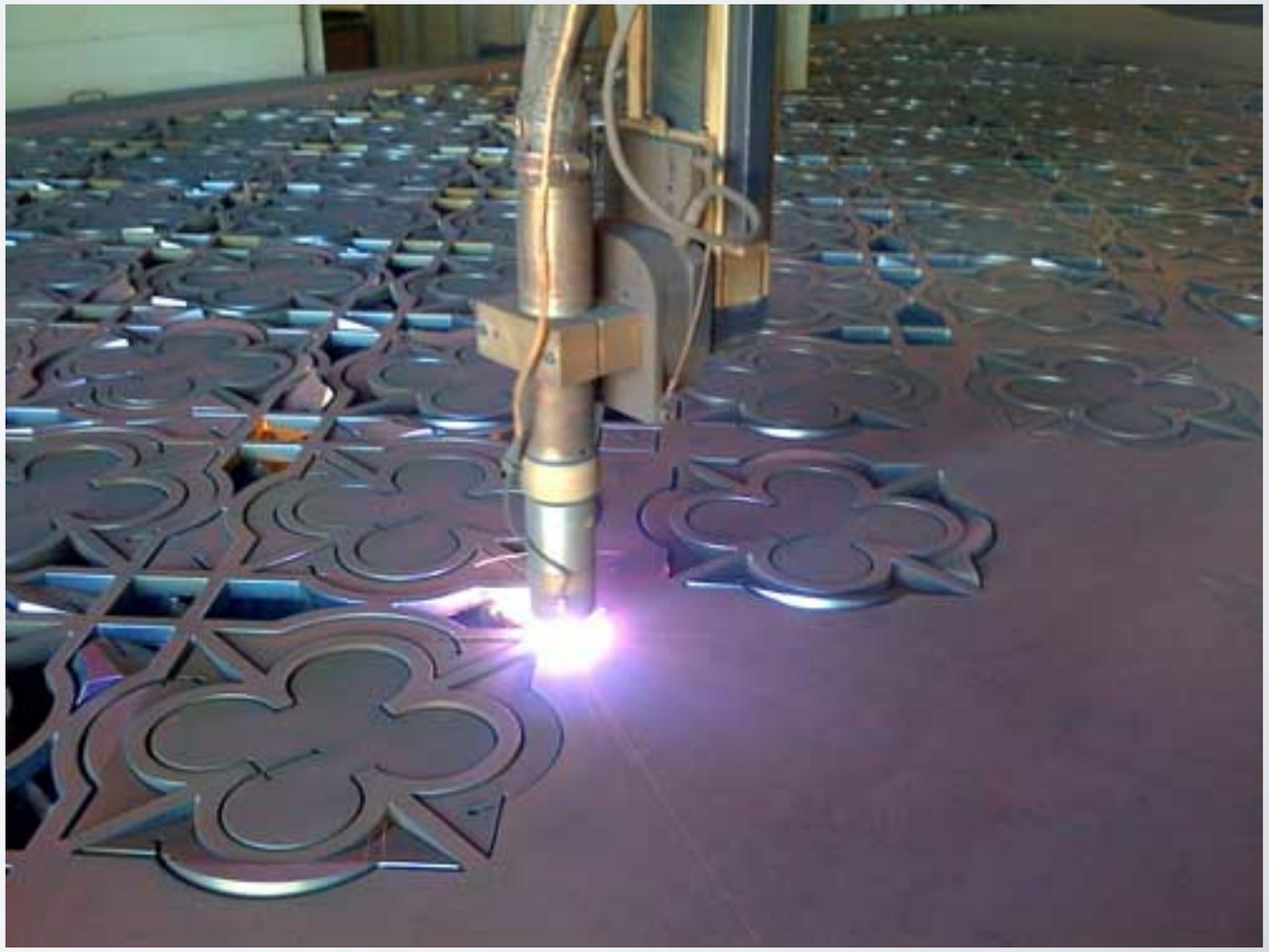


PLASMA CUTTER

superheated pressurized gas melts metal and blows away the liquified metals

- larger kerf than laser
- rougher with metal slag
+ materials - metals but some of which are dangerous because of off-gassing





WATER JET

90,000+ PSI stream of abrasive laced water

+ small kerf

+ very clean

+ very expense

+ materials - virtually anything of any thickness

MILL

add additional axes to router to great more complicated cuts

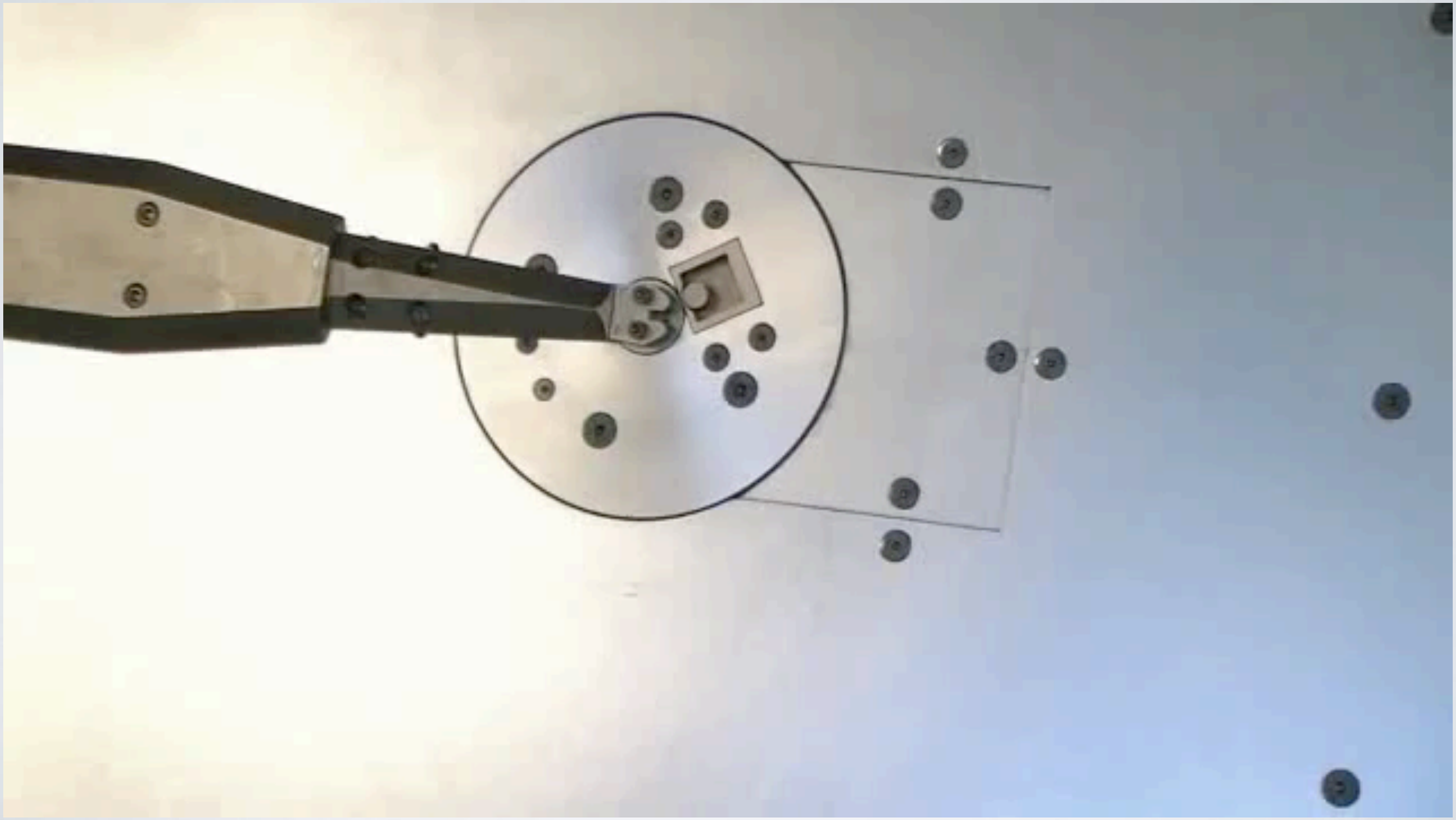
materials : metals, woods, clay, foam

MANIPULATIVE

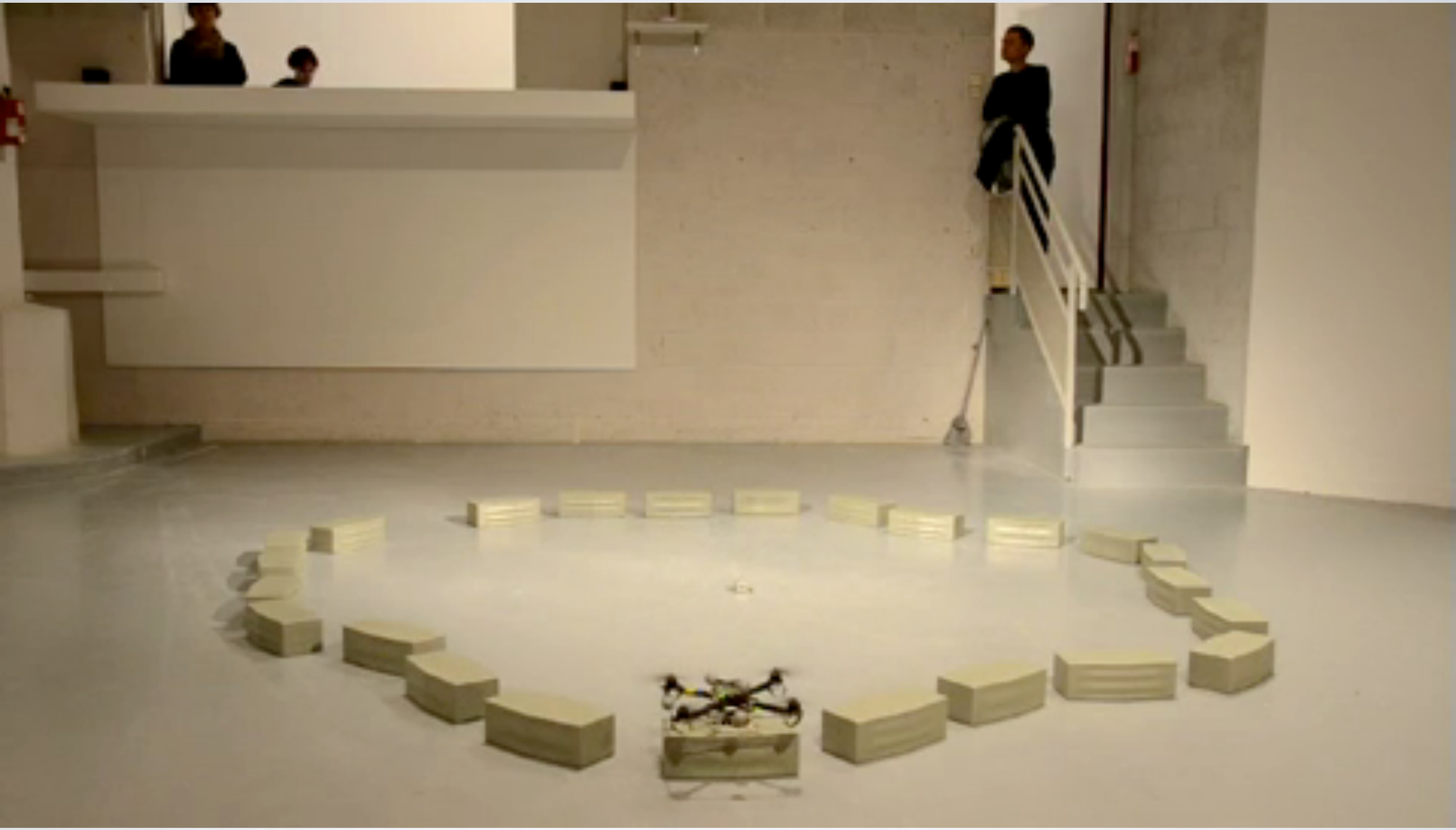
pipe bending

MANIPULATIVE

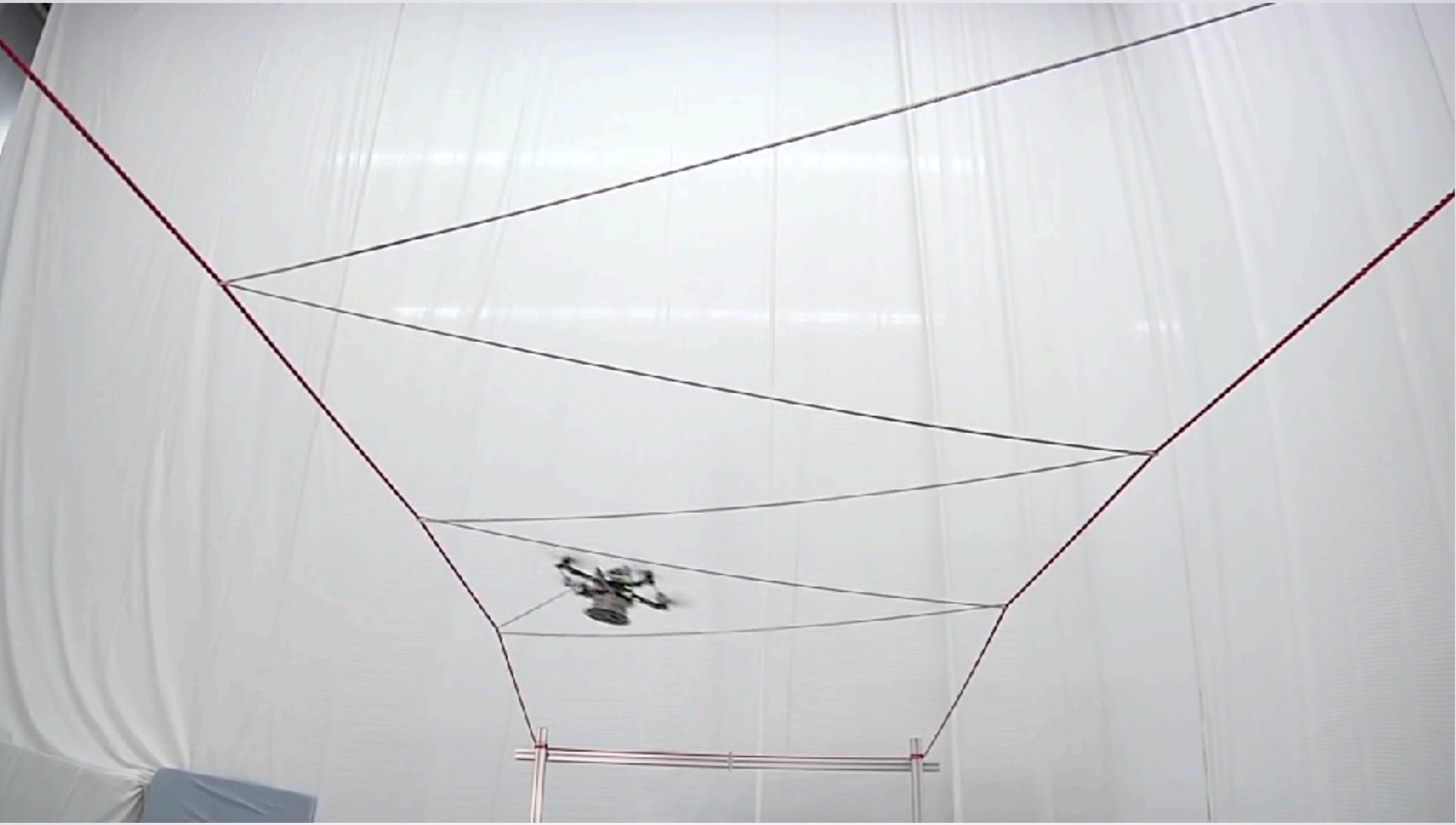
wire bending



QUADCOPTER



Gramazio & Kohler and Raffaello d'Andrea



Gramazio & Kohler and Raffaello d'Andrea


HPI
Protopiper
physically sketching room-sized objects at actual scale
H. Agrawal, U. Umapathi, R. Kovacs, J. Frohnhofen, H.T. Chen, S. Mueller, P. Baudisch