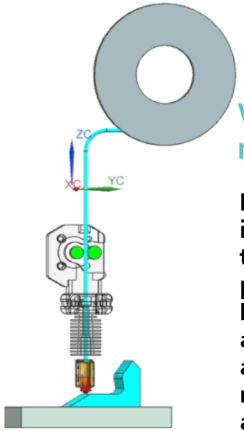


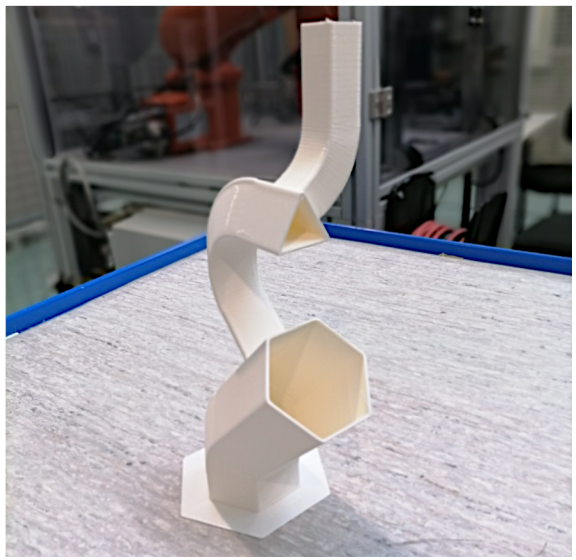
What is additive manufacturing?

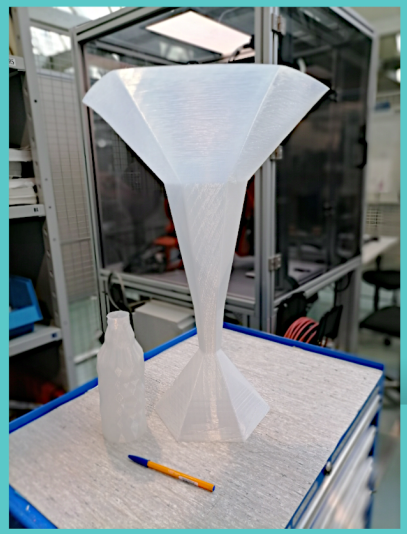
Layer-by-layer material deposition is used in additive manufacturing to convert digital designs into physical objects.
Different types of thermoplastics are widely utilized, although additional materials such as metals and composites are also available.

Freeform printing

A robotic arm has more degrees of freedom than a conentional 3D printer.

While a conentional 3D printer deposits plastic layer-by-layer, a printer mounted on a robot arm can deposit plastic from almost any direction, such as at horizontal angles. This allows for new and interesting designs to be created, such as the pipes pictured below.





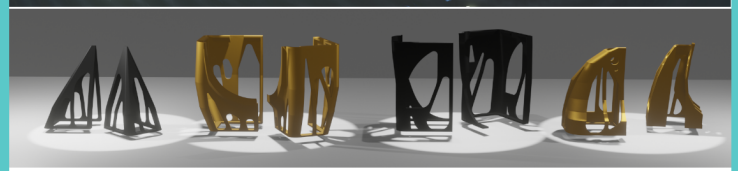
Large scale designs

The long reach and freedom of a robotic arm allows for a large scale-build volume.

Large designs can be made hollow to speed up the manufacturing process, such as the vase pictured to the left.

Modular designs

By utilizing the large form factor enabled by Robotic Additive Manufacturing, designs can be made much larger than in conventional additive manufacturing. Through modular design even larger objects can be created.



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TB-RAM CoE

Technobothnia Robotic Additive Manufacturing Center of Excellence

An additive manufacturing platform using robotics has been developed at Technobothnia laboratories.

The experiences and equipment developed in the project are available to visitors, companies and students in the form of demonstrations, prototyping and as a teaching environment. See contact information.

Österbottens förbund
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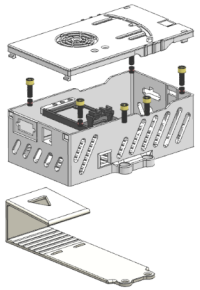
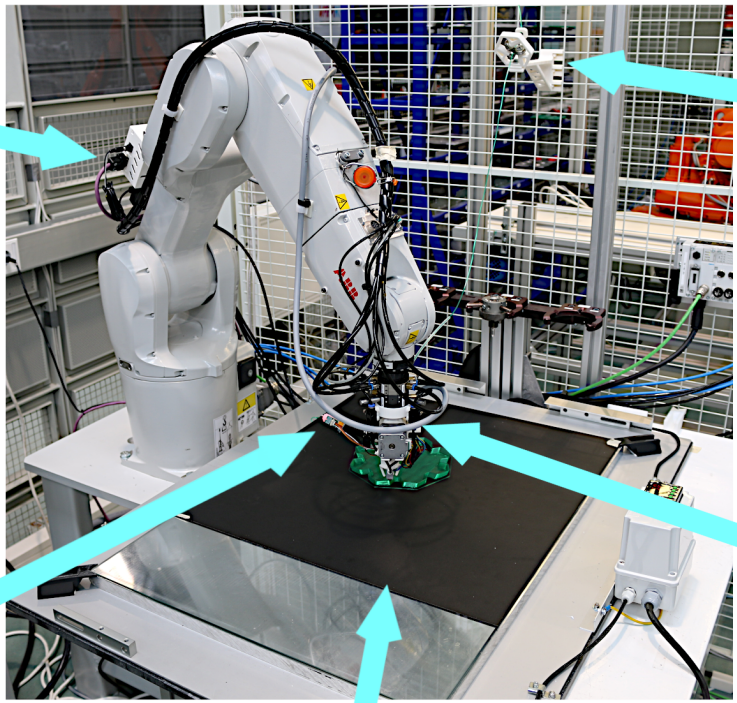
Hävkraft från EU 2014–2020

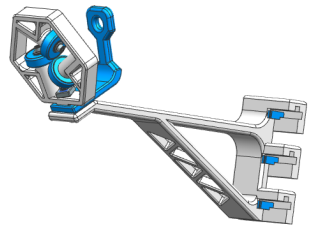
ROBOTIC ADDITIVE MANUFACTURING HARDWARE

Robotic Additive Manufacturing (RAM) extends the classical approach of 3D printing by mounting a 3D printer on a robotic arm, overcoming the physical limitations of conventional 3D printers. This gives RAM the ability to not only do layer-by-layer plastic deposition, but to also do freeform and large-scale prints. The articulated robotic arm used in the TB-RAM CoE project is the IRB-1200 90/5 from ABB.

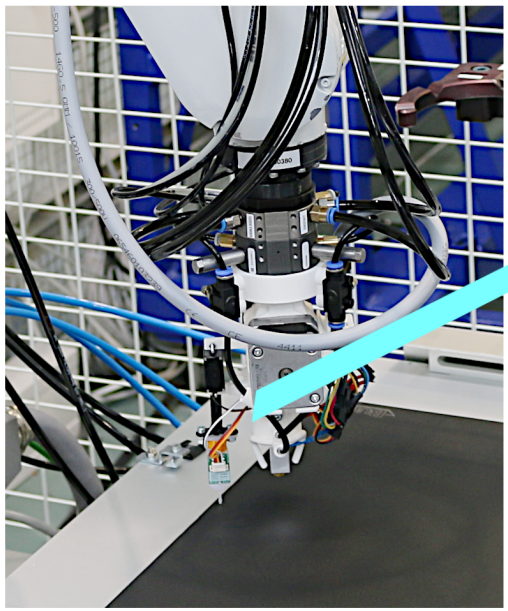


The designed extruder tool is controlled by a MKS Gen 1.4 mainboard.

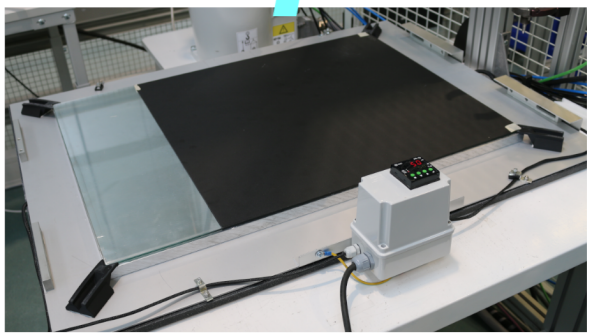




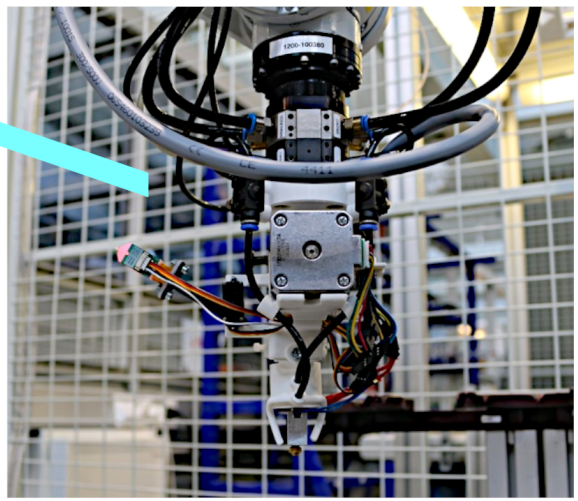
A filament guide limits the movement of the filament strand exiting the filament spool and keeps the filament spool from unrolling itself. The filament guide uses ball-bearings to smoothly guide the filament strand through a center hole.



An automatic bed leveling probe was integrated into the extruder tool. The probe allows for automatic leveling of the build platform. A servo controls the deployment and stowing of a touch probe. This ensures that the probe stays out of the way during the printing process, which aids in freeform printing.



A build platform uses several thermostat-controlled heaters below a large aluminium block to keep a glass bed heated during printing.



The extruder tool serves multiple purposes:

- It pulls in the thermoplastic filament.
- It heats up the hotend which melts and extrudes the thermoplastic.
- It keeps track of the temperature of the hotend.
- It deploys and stows the bed leveling probe.
- It uses air cooling to dissipate heat from the hotend and printed parts.