



Product Development Technology Station

*Where good ideas become great products*

# ADVANCED MACHINING AND TOOLING

*Innovative solutions in machining and tooling*

SERVICES OVERVIEW

[www.pdts.co.za](http://www.pdts.co.za)

# ABOUT US

PDTS' Advanced Manufacturing and Tooling unit, works closely with the CUT's Mechanical and Mechatronics Engineering Department to implement an injection molding process for limited production quantities of products. This limit run injection molding process, also referred to as Rapid Tooling, was developed through numerous post graduate research studies conducted at CUT. The cost of injection mold tooling is the largest capital risk in the development of polymer components. In most cases a large capital investment needs to be made before a single product is manufactured.

This implies a major risk for SMEs and hinders products moving from product development to market uptake. PDTS, through case studies, showcased the effectiveness of the cost-effective process and successfully offered it as an important service within the product development process since 2019. This process can also be used during the development of medical devices to produce prototypes for certification purposes. The process is further complemented by the vast range of additive manufacturing and advanced manufacturing technologies available at the CUT.

## OUR CNC MACHINES

TYPE OF MACHINE	MAKE AND MODEL
<b>CNC Turnmill</b>	<b>Leadwell T-7am</b>
<b>3-Axis CNC Mill</b>	<b>Doosan CNM 4500</b>
<b>5-Axis CNC Mill</b>	<b>DMG Dori Milltap 700</b>
<b>Injection Moulder</b>	<b>Arburg Allrounder 470C</b>
<b>EDM Wire Cutter</b>	<b>Accutex 500iA</b>

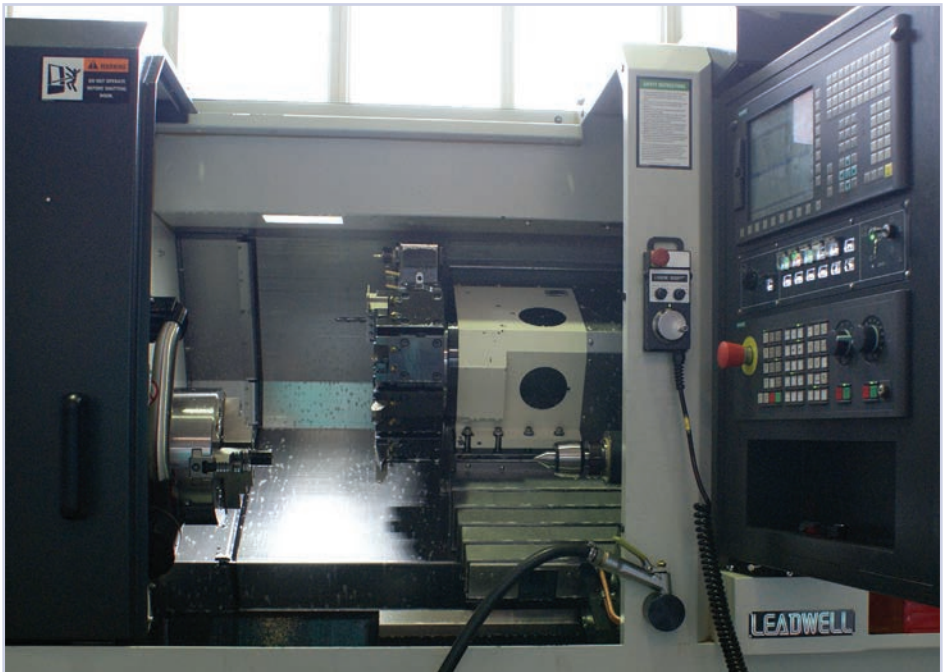


# CNC TURNMILL

## Leadwell T-7am

Turn-mill is a combination of a lathe and milling machine. You can do milling functions as well as turning functions depending on the tools that you add to the turret.

Machining materials like stainless steel, copper, titanium, brass, plastic with the exception of wood (we don't want wood chippings to mix with the metal chippings for recycling purposes).



# 3-AXIS CNC MILL

## Doosan DNM 4500

Doosan DNM 4500 is a 3-axis milling machine that we mostly use to machine or make injection mould inserts, supports and retainer plates. We are not only limited to injection moulding parts, but rather a variety of different things like wheel hubs (depending on

complexity) and other parts that our clients require. The machine has a controller that shows the simulation of the programme loaded, thus assist the operator to verify the programme before executing the work.



# 5-AXIS CNC MILL

## DMG Dori Milltap 700

PDTS plans to machine implants in the process of cleaning and surface finishing. Making sure holes are the correct size and the part is ready for

implanting. It is also used for very advanced milling operations that are not achievable with a 3-axis milling machine.

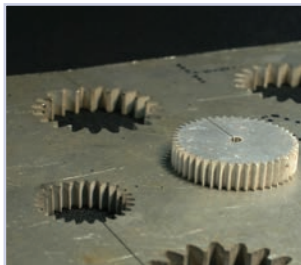


# EDM WIRE CUTTER

## Accutex 500iA

The machine uses Brass a wire of 0,25mm diameter to electrify the part that is fully submerged in water. This gives a very precise cut especially in intricate parts such as gears, and even

keyways. The machine can cut any metal, including aluminum, stainless steel, copper, titanium, anything that conducts electricity.

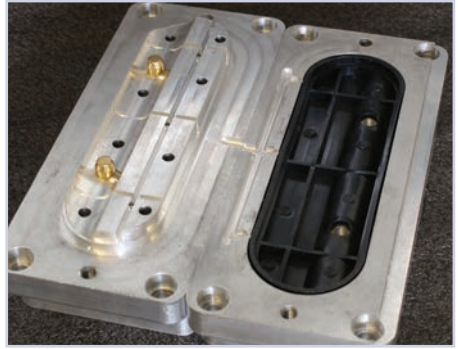


# INJECTION MOULDER

## Arburg Allrounder 470 C

Injection molding is used in making plastic shapes using moulds and melted plastic. It melts polymer in the heat barrel and injects the molten plastic into the mould cavity. The machine can be programmed to different temperatures and varying pressure settings depending on the plastics used and the depth of the cavity of the parts. Once the plastic cools and hardens inside the mould, the part can be taken out and becomes the finished plastic product. The costs depend on the complexity of the part, the mould, labour, materials, and machine maintenance.



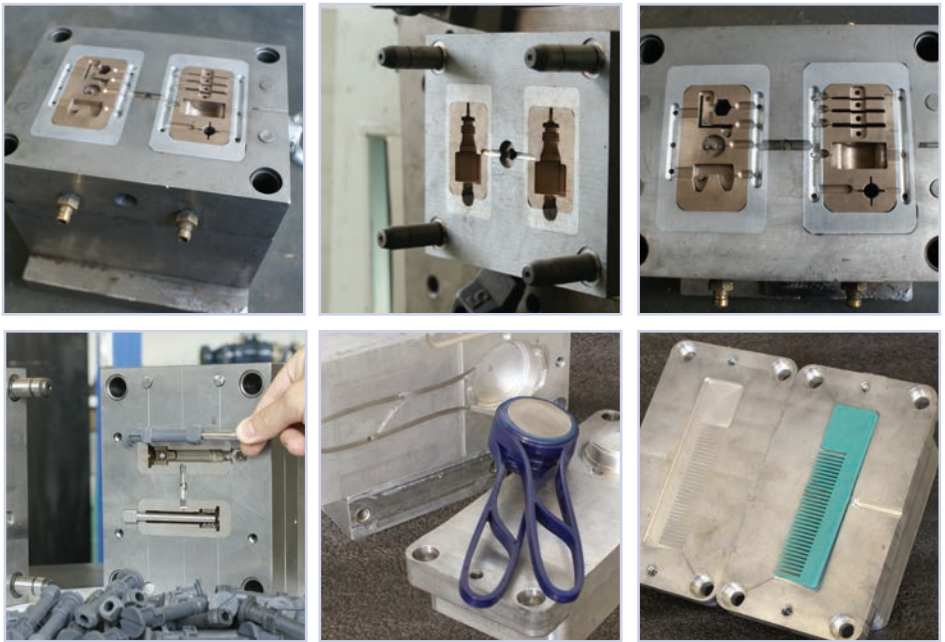


# RAPID TOOLING

## ALSO KNOWN AS LIMIT RUN TOOLING

For production, we are able to produce limit-runs of up to 400 units per project. Injection molding can be quite expensive because of the mould development. The mould is the most important tool in the process. PDTS developed a method called Rapid Tooling, with aluminium inserts in a modular injection molding system. This drastically reduces the capital cost of producing injection molded parts. A cost-effective solution for injection molding can make a significant impact on the Free State's economy.

The diagram below demonstrates the various options in our cost-effective process to reduce capital costs of producing injection mould tooling for the production of injection moulded parts:



### **FMD (Polymer)**

(Visual Prototype) – Normal Printing

**(1 part may take  $\pm 24$  hours)** *Not cost effective for production.*

### **SLS** (Powder polymer)

(Visual + working Prototype)

**One mold -  $\pm 100$  parts**

### **SLA** (photopolymer)

(Visual + working Prototype)

**One mold -  $\pm 40$  parts**

### **CNC** (Aluminum)

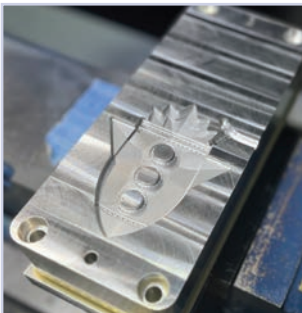
(Visual + working Prototype)

**One mold -  $\pm 5\ 000$  parts**

### **SLM** (Maraging Steel/Titanium)

(Visual + working Prototype)

**One mold -  $\pm 100\ 000$  parts**





Central University of  
Technology, Free State

PDTS is hosted by Central University of Technology, Free State

## CONTACT US

Patrick Miya

**Email:** [hmiya@cut.ac.za](mailto:hmiya@cut.ac.za)

**Tel:** 051 507 3663

Francois Kuys

**Email:** [fkuy@cut.ac.za](mailto:fkuy@cut.ac.za)

**Tel:** 051 507 3592

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