

# Mould and die manufacturing: reduce operator intervention and increase machine productivity



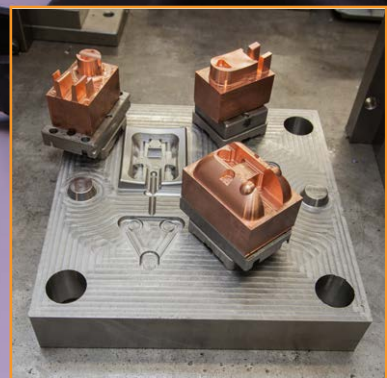
Reduce set-up time



Improve accuracy



Reduce operator error



# Overview

<b>Company information</b>	BK Tooling is a precision toolmaker specialising in the manufacture of high-quality plastic injection mould tools.	
	The company, based in Bishops Stortford (UK) was established over 30 years ago. Its main markets are the medical, leisure, industrial automotive and electrical sectors.	
<b>Products and services</b>	Mould design, moulding analysis, rapid tooling and production mould manufacture using a range of machining technologies, low-volume injection moulding.	
<b>Industry standards</b>	Kaizen	Six Sigma and standardisation
<b>Company objectives</b>	To work with customers to deliver mould tools and services that exceed expectations, achieving this through a combination of experience and the use of the latest manufacturing technology.	
	To serve industries that require low to medium volumes of injection mouldings and/or have concerns about their IP security.	

## Process

BK Tooling is focused on high-quality one-off manufacturing. Typically moulds produced are for research, development and prototype work.

Once the mould tool has been machined using XYZ high-speed machining centres, modification and rework may be required as part of the development process.

To re-set mould tools on the machine, it is vital that datum points can be accurately and quickly located prior to continuing the machining process.

## Challenges

### 1 Improve accuracy

To ensure accurate part setting and repositioning of highly complex mould tools for any subsequent machining work, which without probing could be limited to an accuracy of  $\pm 0.03$  mm.

### 2 Eliminate human error and reduce scrap

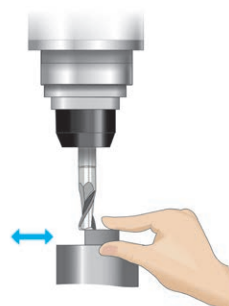
Maximise machine time by reducing the time required to reset mould tools. Without probing this could take many hours, depending on the complexity of the form.

### 3 Improve quality and efficiency

Reduce the amount of hand finishing required.

Manual and traditional setting methods are less accurate and can result in hours of non-productive time, and human error.

Tool setting with a slip gauge



Part setting with a dial gauge

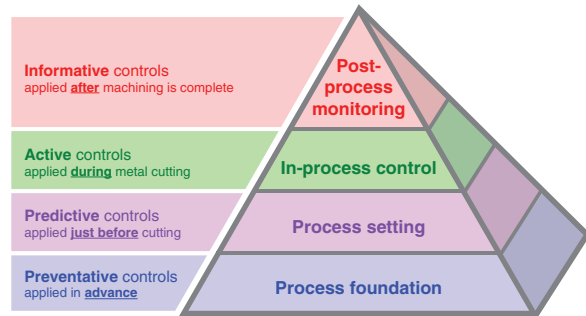


# Process considerations

Renishaw engineers considered key elements within BK Tooling's process and production stages of manufacturing using Renishaw's **Productive Process Pyramid™**. This framework is used to identify and control the variations that can occur at key stages of the machining process.

For more information, please visit the **When do I probe?** section of the Renishaw website:

[www.renishaw.com/whendoiprobe](http://www.renishaw.com/whendoiprobe)



**Productive Process Pyramid**

## Solutions

### Manufacturing process focus: **process setting**

Focusing on **process setting**, Renishaw engineers introduced measures to increase automation and eliminate manual intervention.

The introduction of automated on-machine part set-up using Renishaw probes enables BK Tooling to:

- **Ensure accurate setting and repositioning of highly complex mould tools for any subsequent machining work to an accuracy of  $\pm 0.01$  mm.**
- **Reduce the time required to re-set mould tools by many hours.**

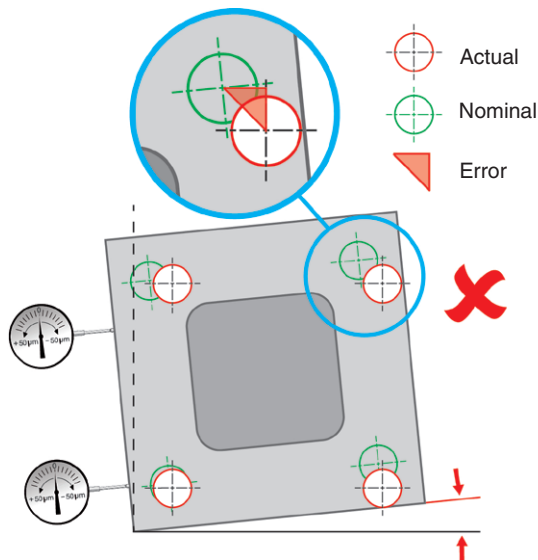
Automated on-machine tool setting has also delivered a significant improvement, enabling multiple tools with different forms and radii to accurately blend on the mould tool profile.

This has been a vital step in reducing the amount of hand-finishing required.

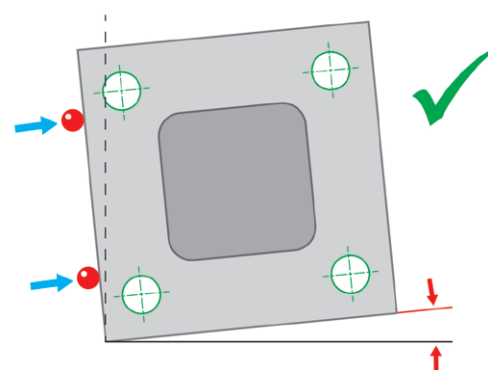


The images above show a Renishaw Primo Radio Part Setter (left) in use on an XYZ high-speed vertical machining centre whilst setting a 3D mould. The Primo Radio 3D Tool Setter (right) is used to automatically set tool lengths and diameters.

### 1. Manual component setting




### 2. Automated component setting



## Results



These charts provide a typical illustration for this industry application where tool setting and probing has been introduced.

**Reduced component setting time\*** and cost

	Without probing	With probing	Saving/reduction	
	Time (each)	60 mins	3 mins	
	Time (annual) (twice per week)	100 hours	5 hours	95% 57 min
	Machine time cost per hour US\$	100	100	95% 95 hours
	Total setting time cost US\$	10,000	500	- 9,500

\* The example above is based on setting up a mould tool for secondary machining

## Improved accuracy and repeatability

Without probing	With probing
	
Human error can introduce inconsistencies and inaccuracies	Automation eliminates human error
±0.03 mm	±0.005 mm

## Summary

Process controls applied to mould and die machining through the use of Renishaw probing systems have significantly reduced both component setting and tool setting times for BK Tooling. In addition to the improvements to its efficiency, the company and its customers benefit from increased confidence in precision and quality.

Through a combination of experience and use of the latest technology, BK Tooling has gained wide recognition as a highly competent partner in a challenging and demanding industry sector.

**Renishaw probes applied to mould and die machining have helped BK Tooling to:**

- **Eliminate uncertainty and variation associated with manual methods**
- **Improve accuracy, repeatability and quality**
- **Introduce other in-process controls in addition to process setting**

## Contact

To find out how you could benefit from our process control solutions, contact us today – find your local office at [www.renishaw.com/contacts](http://www.renishaw.com/contacts)

## Customer comment

// When we first used a Renishaw probe, some 20 years ago, we didn't recognise the value of it. Now we realise that it is a vital piece of equipment. There would be no argument; any CNC machine tools that we buy have to be equipped with probing. We can't understand why some companies, particularly toolmakers, still try to operate without it. //



**BK Tooling (United Kingdom)**

## Best practice

Productive Process Patterns™ from Renishaw provide guidance on best practice and the implementation of a wide range of probing solutions.

For more information regarding job set-up and other applications, visit [www.renishaw.com/processcontrol](http://www.renishaw.com/processcontrol)



## About Renishaw

Renishaw is an established world leader in engineering technologies, with a strong history of innovation in product development and manufacturing. Since its formation in 1973, the company has supplied leading-edge products that increase process productivity, improve product quality and deliver cost-effective automation solutions.

A worldwide network of subsidiary companies and distributors provides exceptional service and support for its customers.

### Products include:

- Additive manufacturing and vacuum casting technologies for design, prototyping, and production applications
- Dental CAD/CAM scanning systems and supply of dental structures
- Encoder systems for high-accuracy linear, angle and rotary position feedback
- Fixturing for CMMs (co-ordinate measuring machines) and gauging systems
- Gauging systems for comparative measurement of machined parts
- High-speed laser measurement and surveying systems for use in extreme environments
- Laser and ballbar systems for performance measurement and calibration of machines
- Medical devices for neurosurgical applications
- Probe systems and software for job set-up, tool setting and inspection on CNC machine tools
- Raman spectroscopy systems for non-destructive material analysis
- Sensor systems and software for measurement on CMMs
- Styli for CMM and machine tool probe applications

For worldwide contact details, visit [www.renishaw.com/contact](http://www.renishaw.com/contact)

