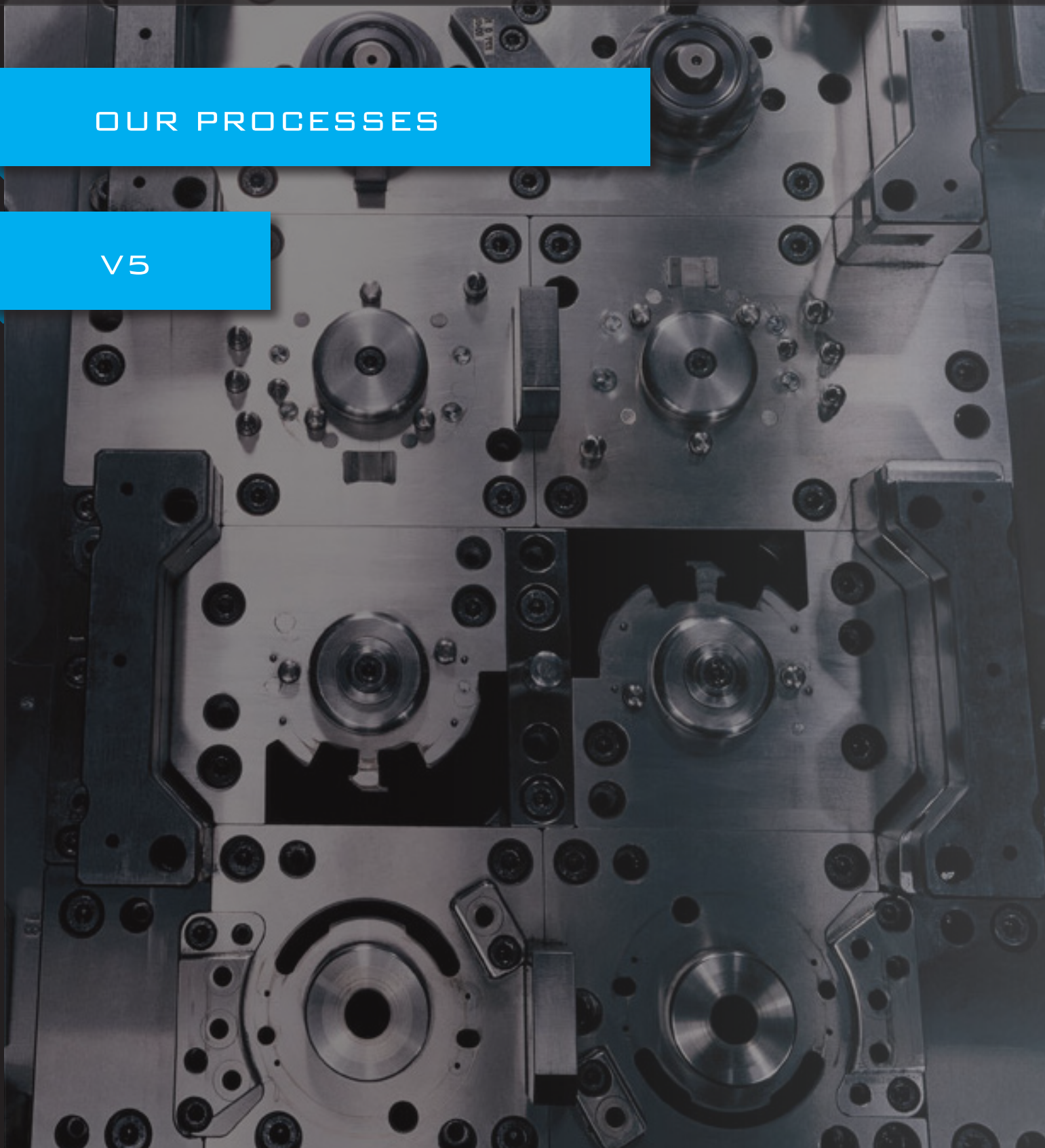
The Tool Hub

Our Processes

V5



OUR PEOPLE

The most important factor in delivering a world class toolmaking to our customers is unequivocally the quality of our staff.

Although we're proud of our products, services, and technology, nothing matches the pride we have in our staff.
We learned long ago that we're really in the business of building relationships. For that reason, we put a premium on hiring only the most qualified individuals to serve on our team.

DETAILED AND YET WITH A VIEW OF THE WHOLE

At The Tool Hub, we pride ourselves in being world class designers and manufacturers of moulds for the Plastic Injection Mould industries, producing best in class and most complicated tooling for complex parts.
We specialize in medical, automotive interior, exterior and black functional parts while also establishing our 2-shot design process and build capability as one of the world's best, as molders look to reduce in house costs and secondary operations.

The Tool Hub also offers full product design and up front feasibility studies.

OUR VIEW

At The Tool Hub (TTH) we work with strict standards and clear routines.
We believe that the first step towards excellence is to remove unclarity and doubts.
Our philosophy is very much based on the teachings of Deming, and we are strong believers in constant gradual improvement.

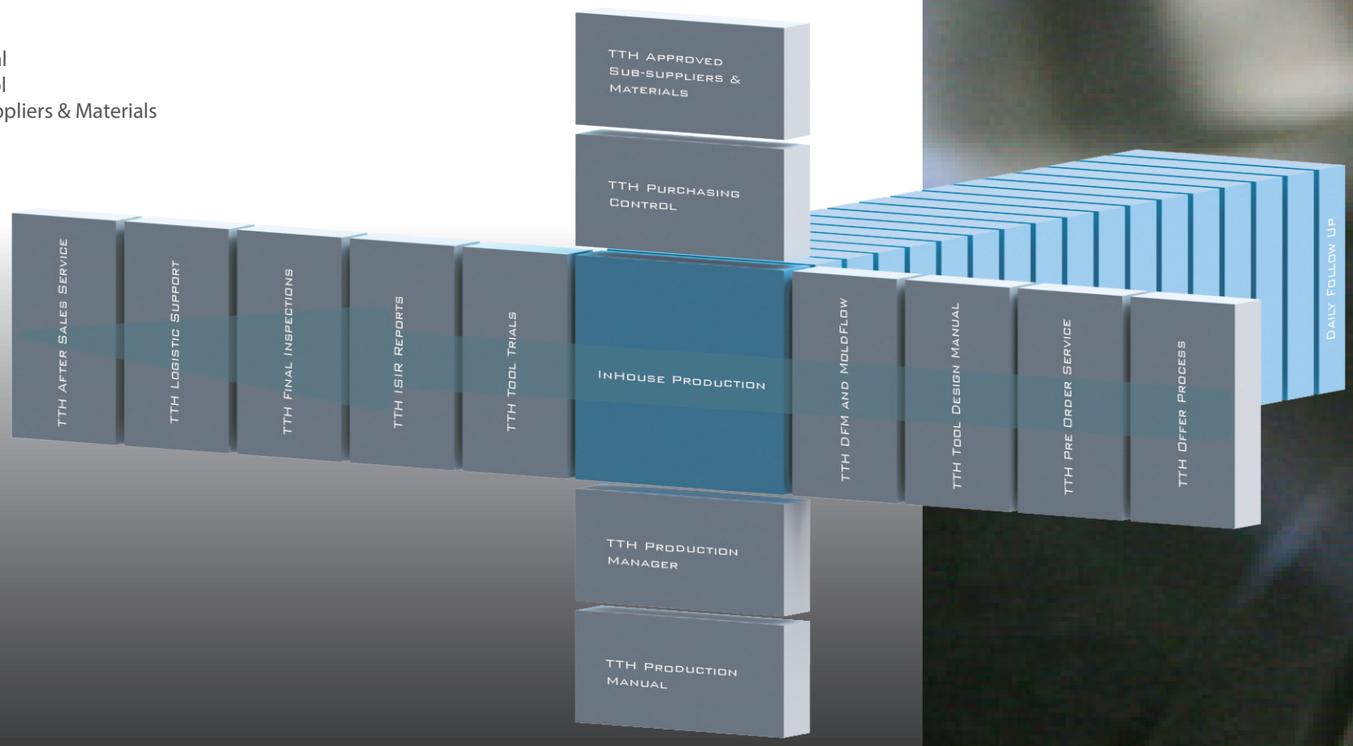
Create a constant purpose toward improvement.
Don't just do the same things better – find better things to do.
Predict and prepare for future challenges, and always have the goal of getting better.
Improve constantly and forever.

OUR CORNER STONE PROCESSES

We understand the importance of adding value to our customers.
Our way of doing so is by ensuring that we offer full support from beginning to end in each project.

Our corner stone services are:

- TTH Offer Process
- TTH Pre Order Service
- TTH Tool Design Manual
- TTH DFM and Mold Flow
- TTH Tool Trials
- TTH ISIR Reports
- TTH Final Inspections
- TTH Logistic Support
- TTH After Sales Service
- TTH Production Manual
- TTH Purchasing Control
- TTH Approved Sub-suppliers & Materials



IMPROVE CONSTANTLY AND FOREVER

TTH OFFER PROCESS

A clear and well structured offer is a good start to any project and already at this stage it is important to remove any unclarity.
At TTH we work together with our customer to fully understand their needs and standard requirements before looking at tool layouts and costs.
In case our customer does not yet have a fully developed standard we help to build one using our standards TTH 1 and TTH 2.

Our steps include:

- Setting up a clear tool standard including all cost drivers
- Setting required tool life
- Discussing part requirements, tolerances and surfaces
- Deciding on insert material from our list of approved materials and sub suppliers
- Setting feed and feed positions
- Creating an initial tool layout
- Calculating costs based on the above information

Our prices are then clearly communicated in our offer template for tooling and if required part production costs.
If requested our sales engineers are available for pre and post offer meetings. This might be especially useful in case of large or complex projects.

Always included in our standard package:

TTH DFM reports	TTH Tool debugging
TTH Mold Flow reports	TTH Final inspection
TTH Tool trials	TTH ISIR reports

We pride ourselves on consistently creating offers with a very high value at a reasonable cost. This is achieved by making sure that all requirements are clear, and that production is efficiently run.

TTH PRE ORDER SERVICE

Before you place an order with TTH you have the option to call to a meeting with one of our sales engineers. This can be done over phone/skype or in person and is normally the best way to have a structured project start up and to clearly go through all milestones and requirements. Here we will ask you more questions to get the details we need to run a successful project.

We will discuss your material choice, selected production machine etc.

Material and Shrink rates	Process Parameters
Machine Selection	Deadlines
Critical Dimentions	Sample Requirements

TTH TOOL DESIGN MANUAL

At The Tool Hub we work with constant improvement in everything we do, but in order to do so we must make sure that we have a solid foundation to stand on. One of those foundations is our Tool Design Manual.
This document guides the design of each tool that we build to ensure that we have a consistant way to create well functioning and highly efficient tools.
The manual consists of 70 points on the general assembly and 45 points on production drawings covering everything from moldbase to cooling to ejection and gate design.

All verified with a checklist for each tool.

TTH DFM AND MOLD FLOW

Design for Manufacturing

To ensure that we always have a functional solution before we take the tool design to far, we use a step by step Design for Manufacturing (DFM) process. Here our design team take a deeper look in to the design of both plastic parts and tool components to minimize problems during tool design, but also to save overall project costs.

Our standard steps are:

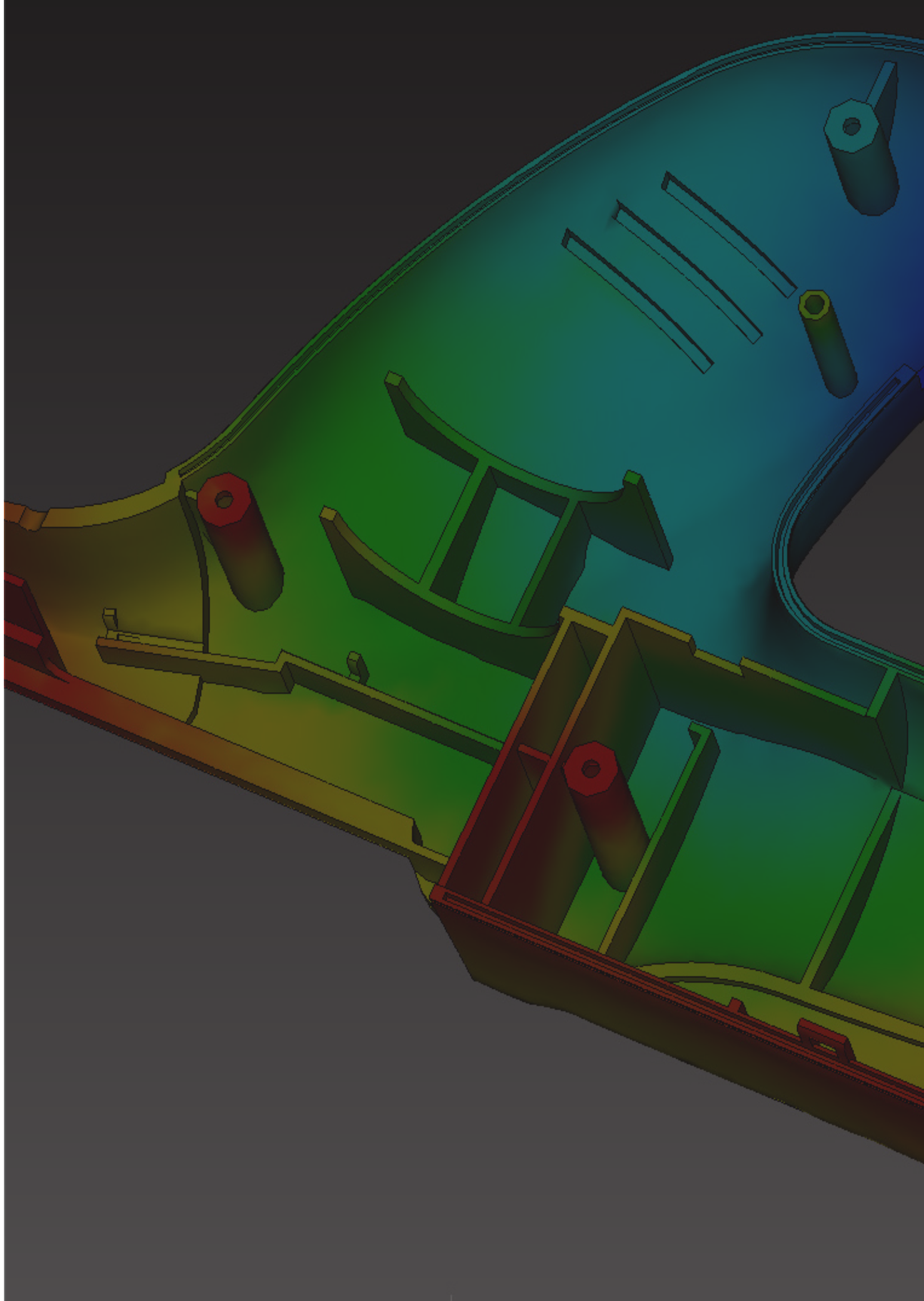
- Mold Specification
- Surface Finishing
- Parting Line Design
- Draft Angle Analysis
- Undercut Features
- Slider & Lifter Design
- Sub-insert Design
- Ejector Design
- Engraving Details & Locations
- Gate Type, Location & Size
- Mold Layout

←Feedback on part design
Learnings for tool design→

Mold Flow

We have a very strict method for making MoldFlow analysis on all of our projects.
Our services operates the full suite of Moldflow CAE programs to identify injection molding defects and remedies advice using Moldflow simulation on the smallest medical device to the largest car instrument panel quickly and efficiently. Our included consulting service provides you with practical solutions to most injection molding problems and can help you with for example the below issues:

- Optimum Cooling for Cycle Time Savings.
- Optimum Gate Position for Minimum Machine Size
- Position Weld Line Where You Want Them.
- Eliminate Gas Traps, Sink Marks & Burning
- Minimize Clamp Force Requirements
- Even Part Shrinkage
- Gas Injection Simulation
- Reduced Warpage at Fast Cycles



TTH TOOL TRIALS

For us a tool trial is so much more than just making parts. This is where our engineers can verify all of our good design practices and make sure that our tools do not only produce good parts, but that they function reliably and with the highest possible efficiency.

The processing engineers are trained in all of our methods.

TTH Tool Trial Procedure

A 16 point trial routine that sees to that our tools run reliably and can produce visually good parts. We look at process windows using production material data, balance and gate freeze.

Part Inspection

Using our online reporting system we make on the spot part inspections after each trial.
We look for possible part defects, record them and set up corrective actions in processing and in the tool. To ensure that we work systematically with our process fault finding we are guided by the Plastyfine software package.

Tool Debugging Audit

44 points that are run through during the trial of complex tools where the processing is extra critical. Here we are scientifically setting up the process using a step by step method.
This normally cures surface defects found in our normal trials.

Pressure Drop Analysis

Here we look at pressure drops during stages of injection to ensure that we do not see any sudden changes and that we have a smooth curve through the following points:

- Nozzle
- Sprue
- Primary Runner
- Secondary Runner
- Through Gate
- 50% Part Fill

These are then plotted in to a graph and the delta pressure for each filling stage is identified.

Shear Thinning Analysis

The reason to make this analysis is to make sure that we are actually able to inject material fast enough to get maximal shear thinning and therefore much lower tool pressures.
We have to find the spot on the viscosity curve where the relative viscosity Vs shear rate is levelling off. If we cannot achieve an acceptable curve the feed system needs to be looked at.

Dry Run

4 hour dry run and inspection to ensure that there is no abnormal wear on moving parts.

TTH ISIR REPORTS

Parts that are within tolerance is one of the most important deliveries in a tooling or part production project. Our way of reporting part size is in the form of an Initial Sample Inspection Report (ISIR).
We use our own formats, and to make sure we are taking accurate measurements we have access to the latest equipment in the industry including CNC driven Coordinate-measuring machines with probes from Reinshaw.

TTH FINAL INSPECTIONS

One of the tasks that fall on our production manager is to do During Production Inspections (DUPRO) and Final Inspections.
Our 48 point final inspections are built on 3 things:

TTH Tool Desing Manual
TTH Production Manual
TTH Tool TS (Technical Specification)

We use our online reporting system to follow a tool through its inspection stages and make sure that we catch and follow up all deviations.
Our aim is to never find deviations this late and therefore we have also implemented inline inspections or as we call them DUPROs.

Our production managers have many years of experience in leading production roles and are highly skilled in practical toolmaking and tool design.

TTH LOGISTICS SUPPORT

We have many years of experience in import and export, so full support is available in both directions.
Our Logistics staff constantly help our customers importing plastic material for trials both through our forwarding partner in Hong Kong, and directly in to China.
When we have finalized tools and plastic parts we give our customers multiple delivery options and INCO terms to choose from:

EXW Ex Works
"Ex Works" means that the seller delivers when it places the goods at the disposal of the buyer at the seller's premises or at another named place (i.e.,works, factory, warehouse, etc.). The seller does not need to load the goods on any collecting vehicle, nor does it need to clear the goods for export, where such clearance is applicable.

DDP Delivered Duty Paid
"Delivered Duty Paid" means that the seller delivers the goods when the goods are placed at the disposal of the buyer, cleared for import on the arriving means of transport ready for unloading at the named place of destination. The seller bears all the costs and risks involved in bringing the goods to the place of destination and has an obligation to clear the goods not only for export but also for import, to pay any duty for both export and import and to carry out all customs formalities.

FOB Free On Board
"Free On Board" means that the seller delivers the goods on board the vessel nominated by the buyer at the named port of shipment or procures the goods already so delivered. The risk of loss of or damage to the goods passes when the goods are on board the vessel, and the buyer bears all costs from that moment onwards.

Plastic Parts
Importing plastic products and samples from China is far from complicated or expensive.

The CPC (Commodity Code) number describes what the goods will be used for in the EU.
Most samples are duty and Vat free, however goods that are being tested are usually classified as only VAT free.

It is therefore important that we know if your parts will be used for testing or if they are only samples to judge production quality.

	Duty	Vat
Samples	No	No
Samples for testing	Yes	No
Production parts	Yes	Yes

Importing from outside the EU is subject to a third country duty of 6.50 %.
The CPC code for plastic products is: 3926909790

TTH PRODUCTION MANUAL

The correct tool design takes us a long way towards a successful project but it needs to be combined with efficient safe and standardized production methods.
Our production managers have gathered years of best practice and put togehter a comprehensive production manual detailing exactly how our tools are to be manufactured.

This includes all machining steps, fitting, testing, marking and packaging.
From beginning to end.
These are verified in both our DUPROs and Final Inspections.

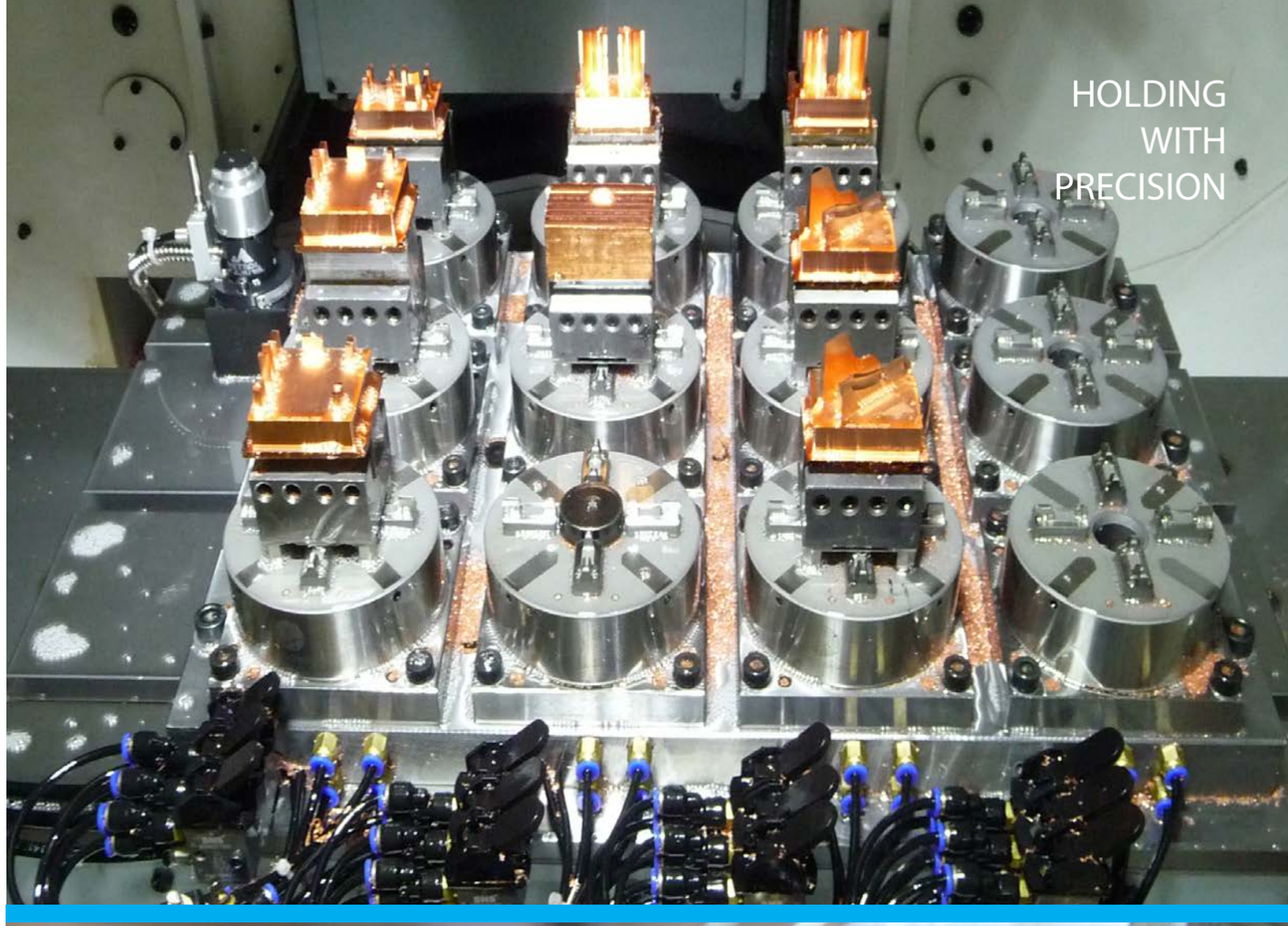
TTH APPROVED SUB SUPPLIERS AND MATERIALS

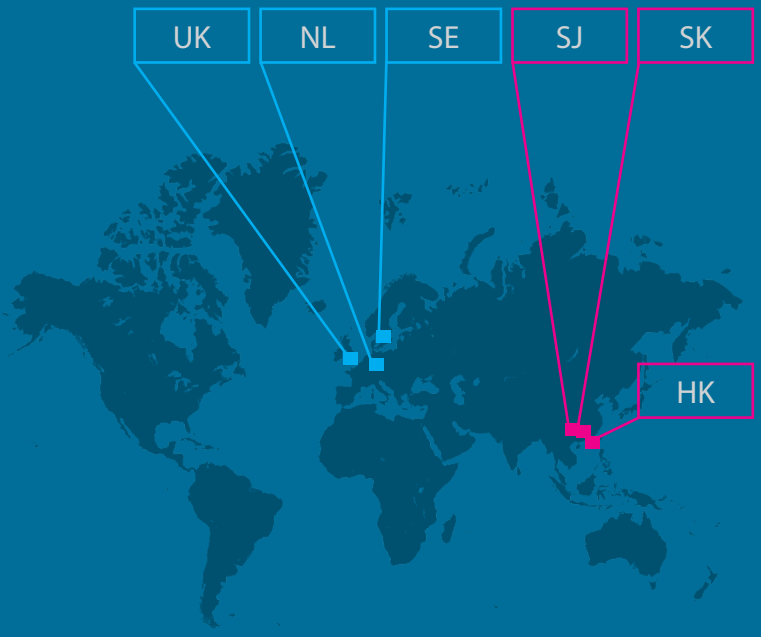
In our industry a tool is never better than its components.
It is therefore crucial that we work with a small number of approved sub suppliers for ancillary equipment and materials.
We have a list of constantly monitored suppliers and material that needs to be used, and any deviations must be clearly stated and approved.

ANCILLARY STANDARDS

On top of our design and manufacturing manuals there are always customer preferences and choices. This is covered by using 3 different tool standards. The Tool Hub: 1, 2, and Custom.

Item	Item Name	The Tool Hub 1	The Tool Hub 2	The Tool Hub Custom
1	Bolster	LKM	LKM with HASCO / DME sizes	
2	Bolster steel	LKM S50C	LKM S50C	
3	Movable plate material	LKM S50C	Chinese DIN2311	
4	Fixed plate material	LKM S50C	Chinese DIN2311	
5	Cavity Insert material	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)
6	Core Insert material	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)	According to RFQ Our Approved are: Assab/Uddeholm Grodiz Buderus Bohler Thyssen Daido LKM (IMPORTED STEEL)
7	Leader pillar	LKM Pillar	LKM Pillar	
8	Leader Bushing	LKM Steel Bushing	LKM Steel Bushing	
9	Side locks	NO	LKM Side Locks	
10	Ejection guide pillars	LKM Pillar	LKM Pillar	
11	Ejection guide Bushing	LKM Bushing	LKM Self Lubricating Bushing	
12	Ejector pins	HASCO/DME/Meusburger Eqv.	HASCO/DME/Meusburger original	
13	Insulation plate	According to RFQ	According to RFQ	
14	Cycle counter	Progressive components	Progressive components	
15	Cooling connectors	HASCO/DME/Meusburger size	HASCO/DME/Meusburger original	
16	Hydraulic cylinders	Local brand	Merkle	
17	Hydraulic connectors	SMS/Misumi Outside thread	Parker/Cejn/Staubli Quick Connector	
18	Micro switches	Crouzet	Crouzet	
19	MoldFlow	Yes	Yes	
18	DFM	Yes	Yes	

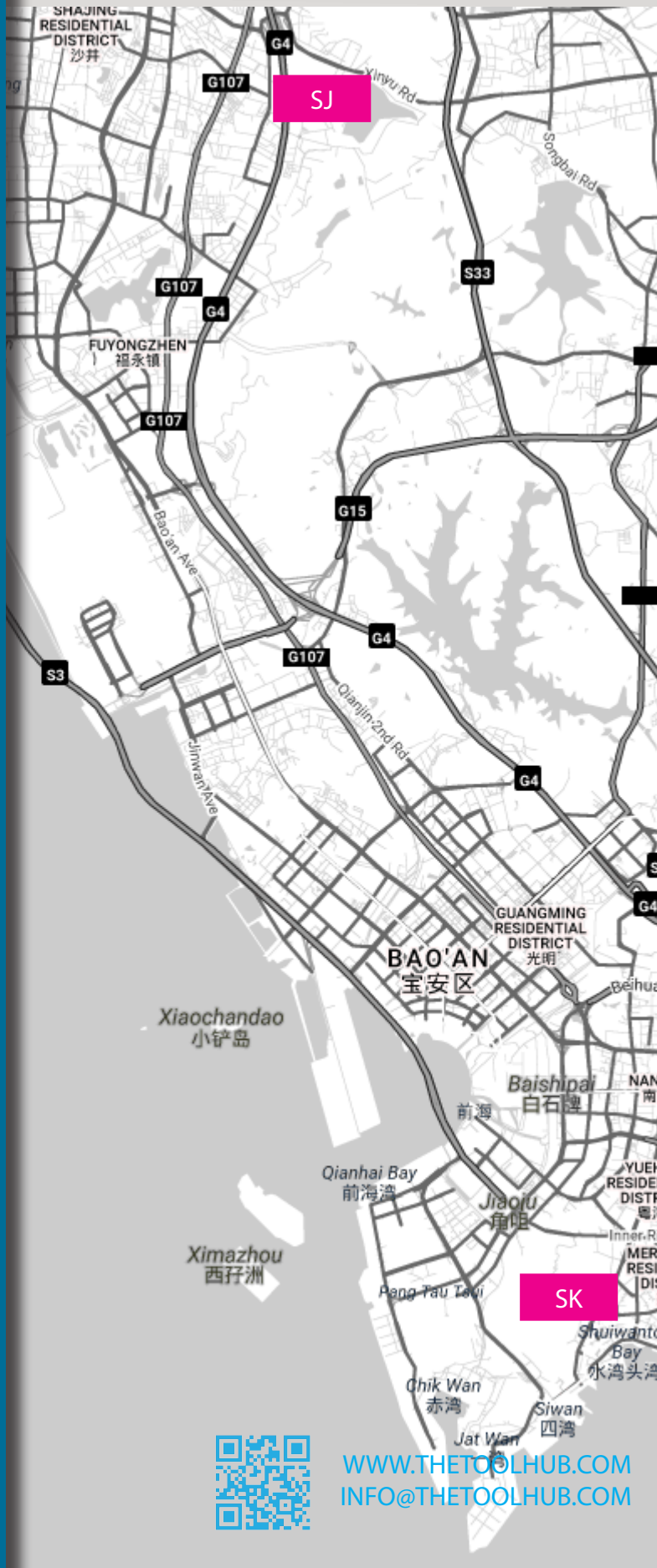




GLOBAL REACH
LOCAL PRESENCE

Customer Service Centres
UK, NL, SE

Production Centres
Shenzhen Shajing, Shenzhen Shekou



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