The Tool Hub

Medical Toolmaking

V2

DETAILED AND YET WITH A VIEW OF THE WHOLE

The Tool Hub stands for competence in mould and tool making.

We have many years of experience in the industry and work with a wide range of clients from Oral Healthcare, Medical Devices, Pharmaceutical and Automotive sectors.

Our investment in the latest CAD and Design software, I.T. infrastructure, and commitment to staff training positions us at the forefront of our industry..

SERVO DRIVEN TOOL MOVEMENT

Power - Speed - Precision

For medical unscrewing applications The Tool Hub recommends high precision servos.

Compared with traditional hydraulic and pneumatic mold actuation systems, servos offer improved cleanliness, higher precision, and more consistent control, as well as added functionality and energy savings.

By leveraging effective software programming on the servo controller, molders gain greater process flexibility with the ability to significantly and rapidly change molding sequences.

PERFECT MULTI-CAVITY BALANCE

At The Tool Hub we have acces to 5 axis EDM and CNC equipment
This makes sure that all gates in our multi cavity tooling are always made exactly the same.
This is the key to our well known perfectly balanced tools.

First step is to check the physical size of each gate through a dimensional report.

Gates should always be made by using multiple rough and fine electrodes to ensure that the electrode wear will not cause any imbalance.
We suggest never to spark more than 4 cavities with the same rough electrode, and to then follow up with a fine electrode.

EDM steps:

- Rough spark all gates with minimum 1 electrode per 4 gates.
- Check electrodes for wear.
- Fine spark all gates with 1 fine electrode and check for electrode wear.
- If wear is within acceptable limit the gates are done.
- If the wear is outside of the acceptable limit go over all gates again in the opposite direction with a new fine electrode.
- Repeat the process until wear is acceptable.

Verification steps:

- Set the holding pressure to zero.
- Set the holding time to zero.
- Set the screw recovery delay time to about a value close to an estimated holding time.
- Set the cooling time to a value such that you know that the part will be cool enough to eject.
- Set your injection speed to the value obtained from the Viscosity Curve study.
- (Viscosity = Peak Injection Pressure x Fill Time x Screw Intensification Ratio)
- With the rest of the settings the same as you had in the viscosity study, start molding.
- Only by adjusting the transfer position, mold parts that are just short. If there is a visible cavity imbalance, then the 'biggest' part should be just short.
- Make three such shots and take the average weight of each cavity and plot a graph

QUICK LEAD-TIMES

When it comes to production times we are very hard to beat.
We have access to modern high speed machining and 4 teams of highly skilled fitting engineers.

Example.

6 tools in fully hardened Stavax steel for a medical customer in the UK:

Design: 3 days
Manufacturing: 2.5 weeks
Trials: 2 days (Split lines and sizes whare approved at T1)

All done and ready to ship in 3 weeks.

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 ensures 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 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 for making 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.

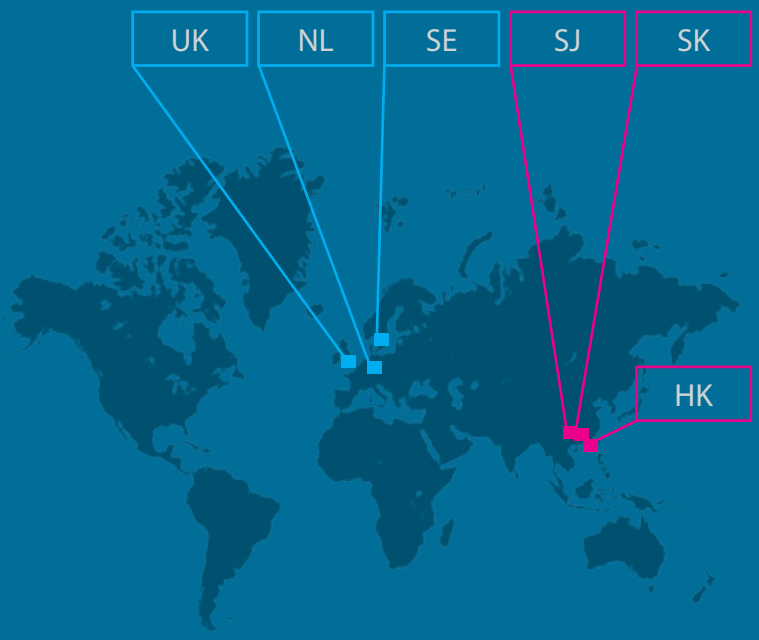
TTH FINAL INSPECTIONS

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.

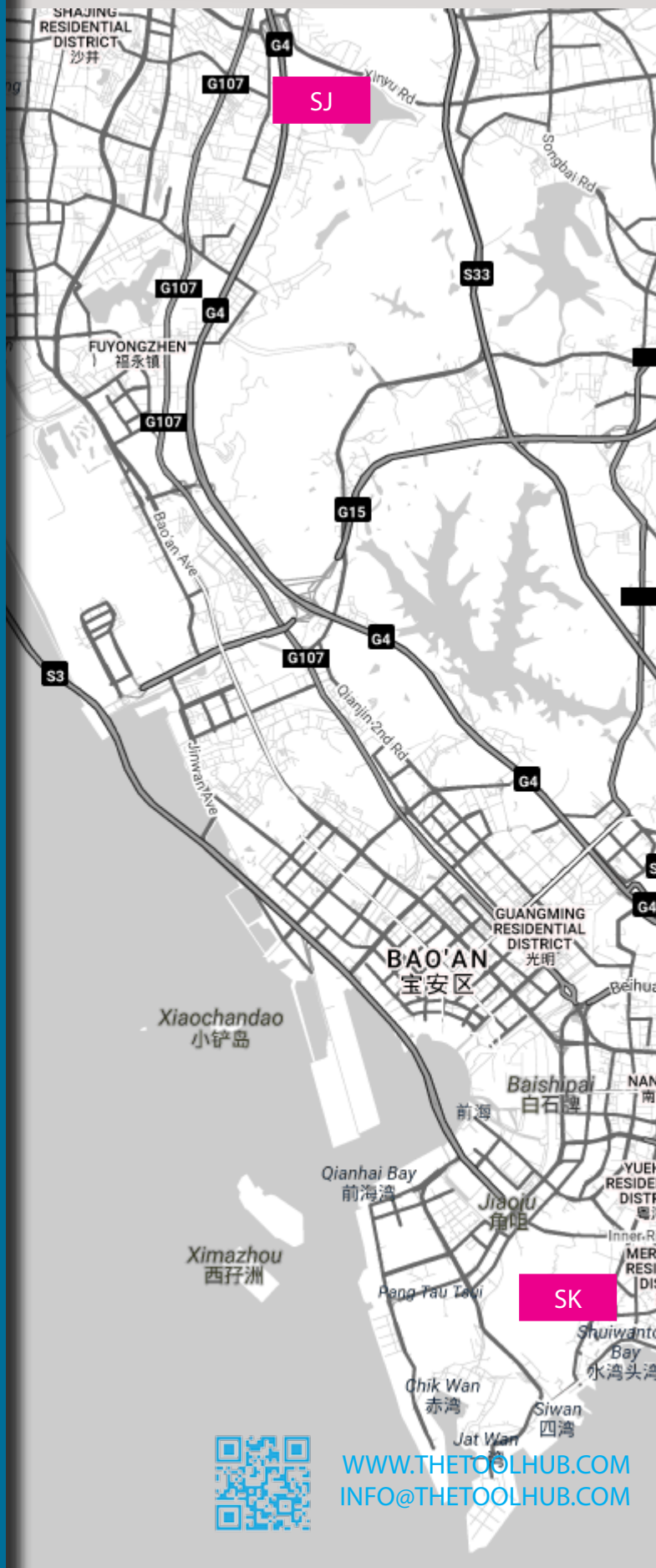
Our production managers have many years of experience in leading production roles and are highly skilled in practical toolmaking and tool design.



GLOBAL REACH
LOCAL PRESENCE

Customer Service Centres
UK, NL, SE

Production Centres
Shenzhen Shajing, Shenzhen Shekou



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