: plastic tooling solutions

Dedicated tools for the design and manufacture of plastic injection moulds









shaping your world



Everything we do is driven by a desire to make your work more productive through the development of intuitive and specific software.



: the complete process...

moulding the future

The VISI suite of software is unique in that

it covers all aspects of the plastic injection process - from model analysis and flow simulation

through to 3D tool

design and manufacture.

Survival and competing in a global market may depend on a single competitive advantage or highly skilled knowledge built over many years.

Vero provide both, combining unique and dedicated applications for tool design and manufacture with a knowledgeable development team striving to keep Vero at the leading edge of technology.

03

Based on the industry standard Parasolid kernel, flexible solid and surface technology tools combine with intelligent geometry healing tools to provide the ideal platform for managing the most complex data. The extensive range of data translators ensures that users can work with data from almost any supplier. Very large files can be handled with ease and users working with complex designs will benefit from the simplicity with which their customer's CAD data can be manipulated.

Dedicated tools for the analysis and evaluation of model data prior to core and cavity creation ensure that any potential design issues are spotted early within the design process. Mould makers and moulders alike will benefit from using Vero's hybrid meshing technology for plastic injection simulation to achieve cost effective and reliable mould designs and the optimum moulding conditions.

Understanding how moulding conditions will affect the final component provides invaluable information to the tool designer. Before any tool design is started, preventative analysis can detect potential manufacturing issues; such as welding lines, air traps and best gate location etc, providing the maximum possible time frame for a corrective solution.

EDM electrode creation can be one of the most complex and time consuming projects for any mould maker. VISI Electrode is an automated module for the creation and management of electrodes and their holders, providing a step change in productivity. 3D tool design is made simple using a parametric tool structure that allows the designer to quickly construct a mould layout using libraries from leading suppliers. The repetitive tasks of the designer are greatly reduced by the use of intelligent standard components from over 35 different suppliers.

2D & 3D toolpaths can be created directly from the 3D model with automatic recognition of complex hole and pocket features. All toolpaths are tailored towards high speed machining and designed to minimise retracts, maintain a constant tool load, minimise any sudden direction change and automatically smooth the CNC code.

Many complex moulds contain cavity areas with small radii that can only be machined using small diameter tooling. 5 Axis toolpaths allow the programmer to approach from a different angle allowing the usage of shorter tools to increase rigidity and ultimately maintaining a more consistent and higher quality surface finish.

The underlying technology makes it easy to successfully program high speed machine tools using VISI.

: knowledge driven

automating the design process using applications based on extensive experience



Ever shortening lead times and the increase in global competition have had a dramatic impact on the tool making industry.







VISI Modelling is the foundation for all of the design tools. Using the industry standard Parasolid kernel, true hybrid solid and surface modelling provides a dynamic structure from where it is possible to work with either solid, surface, wireframe (or a combination of all three) without restrictions.

Solid modelling has become the fundamental cornerstone of design but is often limited to prismatic or basic geometry. Solid modelling commands include boolean technology such as unite, subtract, extrude, revolve, sweep, cavity, intersect and hollow.

Surfacing technology provides a different set of tools and techniques for more organic, free-form geometry creation. Surface modelling functions include ruled, lofted, drive, sweep, n-sided patch, drape, tangent, draft, revolved and piped surfaces. These modelling commands combined with advanced surface editing tools make it easy to heal imported geometry or construct the most complex 3D data.

An extensive range of data translators including Parasolid, Catia, UG, Pro-Engineer, Step, Acis, Iges, Solid Works, Solid Edge, Vda, Stl and DXF/DWG ensure that users can work with data from almost any supplier. The ability to skip corrupt records during the import process provides a platform from where even the most inconsistent data can be managed. Very large files can be handled with ease and companies working with complex designs will benefit from the simplicity with which their customer's CAD data can be manipulated.

Small gaps between surfaces on imported models can be automatically healed, preventing the time consuming process of rebuilding very small surface patches. Where surfaces are corrupt or missing VISI will automatically create the edge curve geometry making it easy to rebuild new faces using the comprehensive surfacing suite. To ensure the new surfaces are within tolerance, the new and the old surfaces can be compared to check for min/ max distance and curvature deviation. Closing a surface model to produce a solid body eliminates construction problems later in the design process and immediately brings the benefits of solid modelling to the user. The ability to seamlessly switch between solid and surface technology provides unlimited freedom.

Model Analysis

VISI Analysis provides a suite of dedicated tools for the validation and preparation of model geometry. Finding potential problems at an early stage within the project will greatly simplify the task of the designer and generate huge time savings further into the design process.

VISI Analysis is an automated module for the preparation and validation of model data before starting the tool design. Dedicated options for the mould designer include the ability to check a new model revision for design changes. Any design change is highlighted using a colour graph to clearly represent the geometry deviation from the original model.

Automatic split line creation and parting face tools ensure that the designer can quickly analyse the model for mouldability before starting the core and cavity design.

Dynamic part splitting allows the user to represent the moulding process and animate any moving components within the moulding cycle.

: intelligent automation

plastic flow analysis > 3D tool design

Mathematical analysis and simulation of the flow of plastic material through the injection moulding process. A high level application which saves an enormous amount of time in the estimation of the mouldability of any component.

The creation of the parting and shut off faces are often one of the most time consuming and difficult tasks that any designer can face. Providing help by removing the laborious tasks will release the designer and fully utilise their experience and maximize their productivity. Using the traditional benefits of solid modelling and the unlimited flexibility provided by a surface modeller, core and cavity construction is made easy.

Keeping the model within the same product environment throughout the complete design cycle from design to manufacture guarantees data consistency and greatly smoothes the design process.

Plastic Flow Analysis

All areas of moulded component creation can benefit from the optimisation of the mould tool design and moulding process parameters. Part designers, mould makers and moulders will all benefit from using Vero's patented technology for injection simulation to achieve cost effective, reliable mould designs and the optimum moulding conditions. VISI Flow is a unique prediction tool, ideal for pre and post-production analysis and concurrent engineering of injection moulded plastic components.

Initially introduced to the injection simulation market over 25 years ago, VISI Flow presents a user friendly interface; combining short model preparation and calculation times with the powerful versatility of VISI Modelling and the undisputed result accuracy of Finite Element Analysis. VISI Flow provides the complete solution for partmould designers and plastic injection moulding technicians; from filling analysis, to warpage calculations and thermal optimisation analysis.

Pre-production analysis

Before any tool design is started, preventive analysis can detect potential manufacturing issues – such as welding lines, air traps, best gate location, etc, providing the maximum possible time frame for a corrective solution

Post-production analysis

When a component is already in production and not performing as expected, moulding simulations can help the operator better understand the conditions inside the mould cavity during the moulding cycle. This can help the operator judge the effectiveness of any corrective actions and help them produce the most effective improvements to the moulding results.

Concurrent engineering

Pre-production and post-production analyses can certainly be very helpful but they do not guarantee the complete optimisation of the part/ mould/moulding process. This is only made possible through an integrated CAD/CAM/CAE analysis.

An uninterrupted data exchange between the design and the analysis environment provides the ability to identify possible critical situations, set the most effective moulding parameters, optimise the runners and cooling layout and predict problems concerning any part of the plastic component creation process.









3D Tool Design

VISI Mould provides the complete mould tool design solution based on industry specific automation that guides the user through the mould development process.

VISI Mould optimizes the mould design process by guiding the user through the design sequence following a simple question and answer wizard. Dynamic operation previews provide the designer with a 'real time' view of how component changes will affect the tool design.

Total control over the tool definition is retained with the ability to update and modify any component at any time with the complete tool assembly adjusting to take into account the design changes.

Comprehensive libraries of standard components from leading suppliers and the ability to create user defined assemblies and tooling templates allow the user to produce a complete mould assembly in minutes as opposed to hours. Repetitive tasks are greatly reduced by the use of intelligent standard components from over 35 different catalogue suppliers. Libraries of mould bases and intelligent components accelerate the manufacture and documentation of a tool design with automatic view creation and accurate B.O.M. generation.

Cooling channels can be inserted in 3D with automatic alignment and graphical positioning. As the cooling channel is inserted it is possible to check for interference with the model. standard library components and other cooling channels. Any cooling circuit can be exported as a design template and re-used on a different tool design. If the bolster sizes are different, the cooling circuit can be automatically adapted to coincide with the new plate sizes. Water fittings are attached to the cooling channels to represent an accurate and complete solid model of the water cooling system.

A complete set of 2D detailed drawings can be generated directly from the solid tool assembly. This includes fully editable 2D and isometric section views, automatic plate dimensioning and hole-type position tables.

Individual details can be created from any component within the assembly and displayed as a mixture of 3D rendered and 2D drawings. Importantly, standard catalogue components will also have the correct detail representation within a section view.

A change in the solid model will result in a modification to the 2D view along with any fully associative dimensions. Parts list table items and their respective balloon references can be added to the drawing using dedicated assembly management tools.

Automatic milling and drilling cycles can be produced directly from the 3D model using VISI MFR.

Streamlining the design process by removing the laborious tasks and helping the designer with intelligent decisions will generate huge cost savings.

Like all modules within VISI, VISI Mould is a completely integrated solution; all the functions of VISI Modelling and VISI Analysis are available at any stage of the design process. : electrode design

dedicated electrode design

Even the most experienced electrode designer will benefit from the combination of knowledge based automation and user interaction provided by VISI Electrode. The combination of solid and surface technology will provide a step change in productivity.

EDM electrode creation can be one of the most complex and time consuming projects for any mould or die maker.

VISI Electrode is an automated module for the creation and management of electrodes and their holders. Comprehensive holder design, simulation and collision checking ensures that the electrode will operate right first time.

After identifying the areas which need to be manufactured with an electrode, enclosing the area with a 2D or 3D boundary provides a quick and simple way to arrive at the required electrode geometry. Graphical face selection is also available to permit easy extraction of the more complex areas.

Understanding that VISI Electrode is a tool to compliment the experience of electrode designers, VISI combines automation with the ability to manually construct geometry and apply it to the electrode. This technology combination provides the user with the freedom to edit the design and ensures that it will always be possible to complete the electrode design. An intuitive interface guides the user through the creation of the electrode nose. An option is available for adding an extension height with either a vertical or tangential extension. For open-sided electrodes, multiple extrusion directions are available for side extension.

The electrode base and stock are interactively added to the electrode. Electrode name, material, burning operation type, identification marks, edge chamfers, position and rotation can all be applied.

Holders can be constructed manually by applying width, depth or height, or by simply selecting from an extensive library. Where access for the electrode is limited by neighbouring surfaces, the holder can be offset from the centre of the electrode to provide enough clearance for the EDM machine to operate. Dynamic animation and collision checking ensure that the complete electrode does not violate the part geometry.

VISI Electrode provides the operator with a tool to manage the work

piece, electrode, multiple electrode positions, vertical, horizontal and angled simulation, collision checking, HTML and EPX output. To ensure compatibility with other CAD/CAM systems, each electrode can be automatically exported relative to the correct workplane using a neutral data format such as IGES, STEP or STL.

Once the electrode has been designed, it can be machined directly (without any unnecessary data transfer) using VISI Machining. A datum for machining and positioning the electrode is automatically created to ensure continuity throughout the entire manufacturing process.

Machining templates containing tooling, tool path operations, feeds, speeds, depth of cut, etc, can all be stored for re-use on similar electrode families. Applying them to a new electrode will automatically create a new set of toolpaths using the same settings, greatly reducing programming time and using company standards which have already been proven on a previous job.







: design > manufacture

intelligent toolpath creation

VISI creates intelligent toolpaths on the most complex 3D parts. Dedicated high speed milling techniques and built-in smoothing algorithms create highly efficient NC code. Intelligent toolpaths will reduce cycle times on your machine, improve productivity and continuously produce high quality components.



: 2D, 3D & 5 Axis

toolpath generation directly from the 3D model



Vero have been providing world class CAD/CAM solutions since 1988 and VISI Machining offers all you need to increase productivity, maximise cutting capacity and reduce delivery times.

Mould machining is not necessarily about cycle time. It is how to achieve the highest possible surface quality and reduce EDM and manual finishing time.

Using VISI Machining it is possible to machine directly from the 3D model or from 2D construction data. A combination of intelligent toolpath automation, user-defined cycle templates and powerful editing tools ensure the operator is always in control.

A highly graphical interface guides the user through machining parameters, cutting conditions and holders for selected tooling providing a practical and intuitive CAM solution.

Automatic feature recognition detects complex holes and pocket features directly from the solid model. Extraction of diameters and depths from the model makes it easy to enter drilling parameters and eliminate the possibility of MDI errors.

For every standard component added to the tool design, CAM feature data is applied to the model for feature recognition. If any inclined features are detected, a new datum is created for each setup and automatically filtered against the physical machine limits.

If a non standard feature is found, it is possible to force the system to use a particular machining process or existing cycle, providing an open and configurable system for automatic plate machining.

Cutter radius compensation capability provides practical CNC code for use on the shop floor. When the cutter cannot machine tight internal radii, the system will automatically create residual stock geometry (defined by the previous tool) and enable re-machining with a smaller diameter tool.

The system will automatically avoid user defined clamps and fixtures during machining operations. Obstacle management ensures collision avoidance, and helps to reduce the cycle time on the machine by eliminating unnecessary Z retract moves. Optimisation of the toolpath ensures the shortest distance for tool travel and reduces cycle times offering maximum productivity.

Intelligent 3D toolpaths can be created for the most complex parts with toolpaths tailored towards high speed machining and designed to minimise the number of retracts, maintain a constant tool load, minimise any sudden direction change and automatically smooth the CNC code.

The underlying technology makes it easy to successfully program high speed machine tools using VISI.

Adaptive clearance toolpaths allow the tool to rough the part in a unique way - by roughing out from bottom to top. The principle behind this method is to machine large steps utilizing the full flute length of the tool with a small stepover and then machine the intermediate levels back up the part. The tool remains on the part as much as possible and the toolpath automatically switches to a trochoidal type motion when necessary. This ensures there are never any full width cuts guaranteeing a constant tool load. Tool wear is spread evenly across the cutting surfaces and the centre of force is half-way up the tool, reducing deflection and the potential for vibration.

Using adaptive toolpaths, the cycle automatically adjusts for efficient and safe machining; improving cutting conditions and allowing higher machining speeds to be maintained.

The result is savings of up to 40% in actual cutting time.

High-speed finishing requires the same fundamentals as high-speed roughing consistent tool loading, lighter cuts, minimising any sudden direction changes, optimising NC code and reducing stress on the machine tool. Many of the strategies can improve the productivity of older CNC's with dramatically reduced air cutting time and both roughing and finishing toolpaths with smoothing arcs to help maintain a continuous machine tool motion.

Finish machining strategies are largely defined by the part shape. Traditional toolpaths such as ISO-machining, Raster, Waterline, Radial, Spiral, Offset and Curve machining are supported by intelligent combination routines that automatically adapt the toolpath to suit the geometrical form. This strategy allows steep areas to be machined using a Z waterline method and shallow areas to be machined using 3D constant stepover. This strategy operates as a one stop finishing routine including a helical option which creates a single continuous toolpath for steep areas with no lift off - eliminating witness lines and greatly improving surface finish.

Small features on a part will usually require rest machining with a smaller tool to completely finish the detail. Rest machining will reliably detect areas left by previous tools, so that they can be re-machined. For very fine details, this process can be repeated as many times as required to make it possible to successfully machine with very small cutters. The toolpath can work from the outside to the centre or from the centre to the outside providing a smooth and flowing toolpath and minimising the number of retract movements, helping to eliminate shock loading on the tool and keep feedrates as high as possible.

All toolpaths are gouge checked against neighbouring surfaces to eliminate the possibility of a tool collision. In addition, small smoothing radii are automatically added to internal corners, stopping the tool from dwelling in the internal corners, which can cause the tool to pull into the job creating an unexpected gouge, which would not be detected by toolpath verification.

To maximise the deployment of the software, VISI uses multi-threading technology to allow multiple operations to be calculated at the same time and batch processing to allow jobs to be queued for unattended calculation, out of normal working hours. To further speed up the preparation of programs, individual operations can be post processed separately, so that machining can start on roughing operations while finishing operations are still being calculated. Many complex moulds contain deep cavity areas and small radii which need to be machined with small diameter tools. Generally this would involve the use of tool extensions or longer tools, which would increase the risk of deflection and provide a poor surface finish. By approaching this from a different angle, the head can be lowered and the collision detection will automatically tilt the tool and holder away from the work piece. The major advantage of this strategy is the use of shorter tools which will increase tool rigidity, reducing vibration and deflection. As a result, a constant chip load and higher cutting speed can be achieved which will ultimately increase tool life and produce a higher quality surface finish. In more shallow areas, larger bull nose cutters can be used with a small lag angle. The major advantage of this approach is a lower number of toolpath passes which also reduces machining time and improves surface finish.

An extensive library of postprocessors is available to suit most machine tools and all postprocessors are fully configurable to suit individual requirements.

Configurable set-up sheets are automatically generated as either HTML or XLS files; including information regarding datum position, tooling, cycle times and the entire cutting envelope limits.



: wire edm

a cut above the rest







Wire EDM technology is an integral part of the mould design process as more moulds are being designed to have fewer, but more complicated inserts that are wire-cut.

Vero provide an intuitive environment for the comprehensive programming of all wire EDM machine tools supporting an extensive list of wire EDM machines from leading machine tool manufacturers; including JOB and Script for Agie, CMD and CT Expert for Charmilles, Brother, Fanuc, Hitachi, Makino, Ona, Sodick, Seibu and Mitsubishi. The advanced postprocessors aren't just limited to the use of generic G and M codes; special posts are easily configured to suit different machine models and configurations.

Wire EDM is extremely accurate and enables the machine to cut internal corners with very small corner radii based on the wire diameter and spark gap. It becomes easy to cut square apertures without the need of splitting the mould or producing accurate pin holes in a plate after heat treatment.

Strategies for all types of EDM machining are supported including 2-axis, 2-axis with taper and full 4 axis machining with geometry synchronisation. Support for unmanned or overnight machining is possible by leaving the slugs attached while all of the preliminary cuts are taken. Numerous strategies are available to cut the part; for instance, taking all of the rough cuts before finishing, in which case all rough cuts are taken while leaving the tags attached, then the tags are removed, and finally the trim cuts are taken. Alternatively, take the rough and finish cuts while leaving the tag in place and then removing the tag and skimming this area.

With apertures that decrease in size, slug management is more complex. Complete 'no-core' pocket destruction cycles and full 3D simulation guarantee valid slug removal. Additional support for cam and gear profile generation is delivered to DIN/ISO and AGMA standards.

The completed wire path can be simulated using rendered solid model graphics, including fixtures and target parts. Any collisions that are detected are highlighted both on the model and via on-screen messages. As slugs become detached by cuts, the simulation advises the programmer that this is the case and graphically removes the part, emulating the exact cutting process on the machine tool. Toolpath verification tests whether the completed part is removable from the component and also provides the capability of part comparison. By comparing the target model and cut part, any potential rest material or gouge issues are automatically highlighted.

By using the complete solution from Vero, not only will programming time be minimised, but also the cut-path will be far more efficient, saving further time on the machine tool. Add in the comprehensive simulation and proofing tools and you have a system that not only streamlines day-to-day production, but also reduces costly errors and eradicates the need for dry-runs, giving you a competitive advantage.

: global presence

a network of over 70 partners in 40 countries

The VISI suite of CAD/CAM software is written and developed by Vero Software; part of Vero Software PIc, a UK based public company launched on the London AIM Stock Exchange in 1998

Vero Software Plc comprises of ten companies in England, Italy, the United States, Japan, China, Canada and France.

The company creates, owns and distributes software for aiding the design and manufacturing process in specific sectors of the industry. The specific sectors include the design and manufacture of plastic injection moulds, sheet metal stamping dies, progressive dies and others.

The company firmly believes that step gains in productivity can be made by building as much knowledge of specific design and machining processes within it's software as possible. This philosophy of productivity through specialisation has led to new applications in the design of mould tools and progressive dies.

Since 1988 Vero have been providing innovative and specialised solutions for the engineering industry through a network of over seventy partners in more than forty countries.

VISI is used by the world's most advanced toolmakers, as well as

leading aerospace, automotive, packaging and medical companies to give a clear competitive advantage in today's tough business environment. Continual software development is core to the philosophy at Vero; we have an extensive development team striving constantly to keep VISI at the leading edge of software capability.

Vero works in partnership with its customers – for the long term. Understanding the demands of their business and providing practical and innovative solutions. We listen to our customers' requirements and build answers into the software to meet their expectations now and for the future.

With thousands of licenses of VISI in use world wide, and double digit growth year on year, Vero Software is one of the world's leading CAD/CAM developers.

VISI has modules for specific applications. Choose the ones to suit your individual business, yet have the room for growth. Better still, all the modules are totally integrated and work in just one environment with one easy to learn interface.

Service & Support

Vero has a support network of engineers who understand your business through experience.

VISI is a comprehensive suite of software in one environment with one interface. Invite our engineers to look at your business to see how VISI can improve your productivity, quality and performance.

The company now has more than 6,000 users registered for its annual maintenance services and supplies products to more than 40 countries through its wholly owned subsidiaries and competence centres.

We will guide you through the modules and recommend the most appropriate combination of software, training and services that suits your needs.







Vero Software Plc

Hadley House Bayshill Road Cheltenham Gloucestershire GL50 3AW United Kingdom tel. +44 (0) 1242 542090 fax. +44 (0) 1242 542099 email. info@vero.co.uk web. www.vero-software.com

