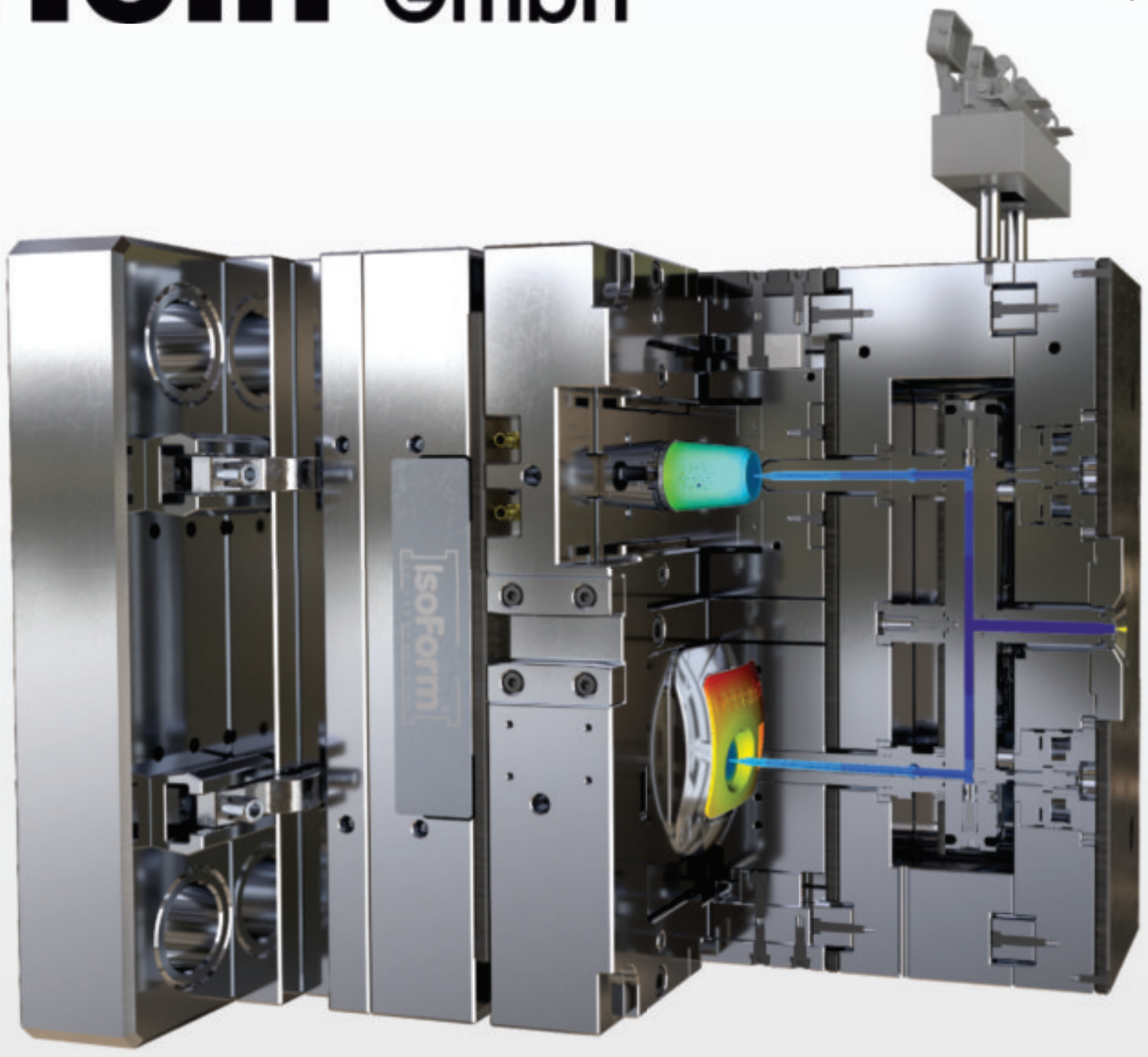
Your product developer

Konstruktionsbüro Hein GmbH

Kb-Hein.de



page 5

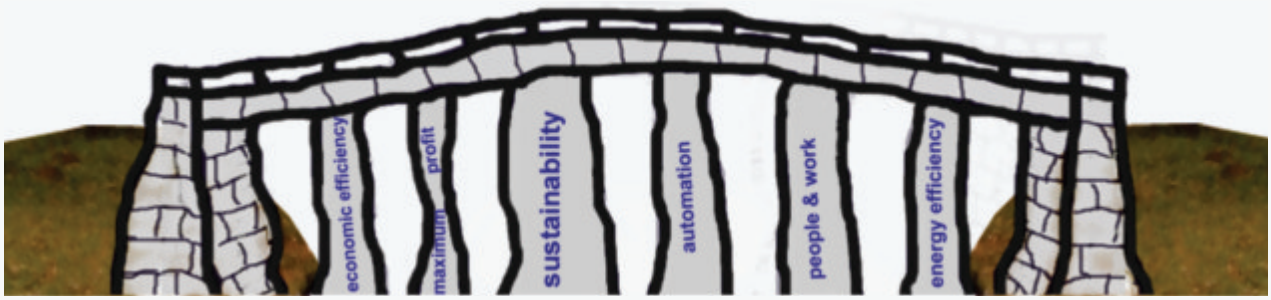
VORKON

Das simulierte Vorkonzept mit Bauteilanalyse

Product Development
Parts Optimisation
Injection Moulding
Simulation
Simulation of Warpage
Shrinkage Data
FEM Analysis
Mould Design
Temperature Regulation
Visualisation
IsoForm® / HeiNo®

Statement: **Bridges to the future**

Regarding road traffic we have gotten used to many construction sites, accidents, dilapidated bridges and other obstacles, and we have accepted them as a sort of necessary evil. The same applies to many avoidable problems in production which often result from previous "economy" measures or accepted customs ("We have always done things this way."). Every subdiscipline (injection moulding machines, temperature control units, software etc.) presents innovations within its field, but overall concepts with proofs of energy efficiency and sustainablity are missing.



More than 80% of the industry acknowledges a scarcity of skilled workers and more than 70% think that the biggest challenges are cost and time pressure. Currently, increased demands regarding quality and process reliability of tools and moulds frequently cannot be met. At the same time, projects with and from plastics need to be conducted in narrow timeframes.

This leads us to a solution called "automation". It has formerly been rated to make jobs redundant but today has to be considered a means to the economy's survival. Due to an increasing scarcity of skilled workers we need to worry if automation has not started, yet.

In schools, it is already an issue but at workplaces "sustainability" is not being sufficiently considered. However, this is of utmost importance if we don't want to repeat past mistakes regarding **environmental pollutants** and **damage to the climate**.

With everything we know today, it does no longer make sense to burn the precious fossil resource oil through the chimney or the exhaust or produce environmentally unfriendly products on its base. We rather need to use it for manufacturing light-weight, sustainable and **energy-efficient** parts.

Beside a few shining examples for **innovation, future-oriented developments** with **sustainable products** and **sustainable production** do not yet prevail.

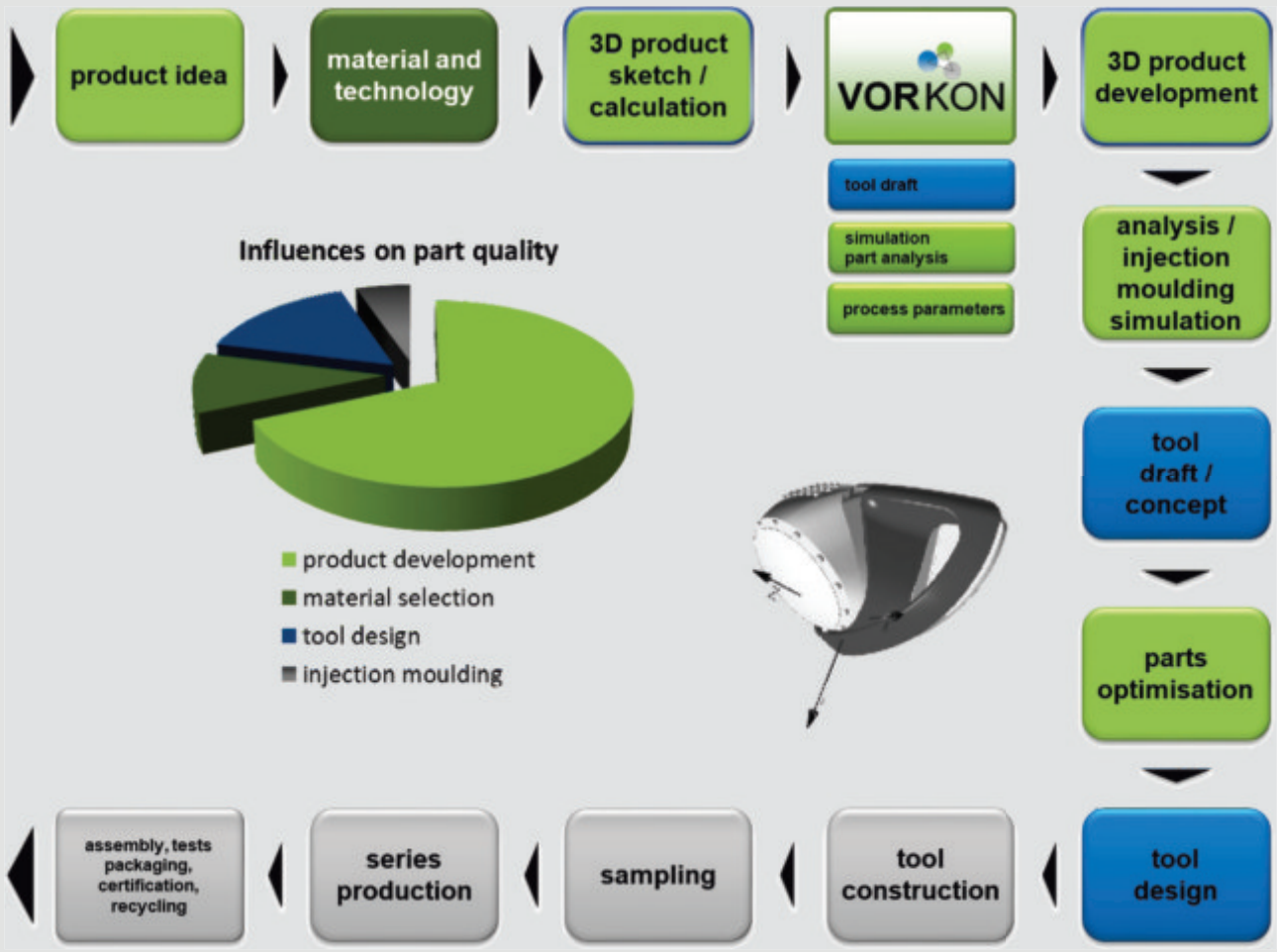
Imagine that the first benchmark for company targets was sustainability and maximum profit came only in second. This could mean that developments may be planned in the long run again and the "return on investment“ is no longer limited to a less than a year - at such short notice an economically efficient rerouting simply isn't possible. In addition, a new line of thinking could mean that people and companies living and promoting verifiable sustainability will be the ones to win recognition and to inspire the industry.

Europe has the chance to lead the way in this context!

Contents

From idea to manufactured plastic part

A maximum influence on the **part quality** is possible during **product development.** It is then the decisions for setting the right course are taken: You might invest slightly more money at the beginning, e.g. for **simulation** and **optimisation,** but you will benefit many times over in the course of the project.



YOUR GOALS = OUR GOALS

- ✓ high **part quality**
- ✓ high **process reliability**
- ✓ high **rentability**
- ✓ high **customer satisfaction**
- ✓ high **sustainability**
- ✓ high **degree of innovation**
- ✓ high **degree of automation**

headlight (WWS GmbH)

VORKON - The simulated PRE-concept

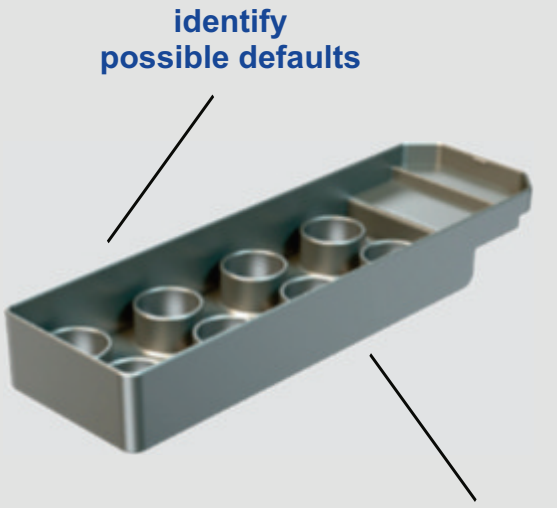
At an early stage of product development and/or for a first calculation, VORKON provides important details and pre-concepts within a few days. This results in a competitive advantage for quotations thanks to increased information and many benefits for the course of the project.

VORKON may form the basis for a subsequent elaborate simulation incl. parts optimisation and the costs of a max. of 1000 € may partially be considered.

Requirements:
- 3D data of the part
- exact material name
- details on prerequisites or considerations
- sample parts, no. of cavities, tool draft, technology to be used, if applicable

OUR OFFER

- **details** regarding filling behaviour, fibre orientation, reasonable wall thicknesses, weld lines, air traps, hot spots, undercuts, potential for optimisation
- **first simplified concepts** for injection, filling, ejection, separation



tool design
product development
tool construction and production
VORKON
The simulated PRE-concept with part analysis

YOUR BENEFIT

- ✓ detect **potential for optimisation** early on
- ✓ avoid **part defects** early on
- ✓ **calculate** quotations and projects more accurately
- ✓ make **processes** more efficient

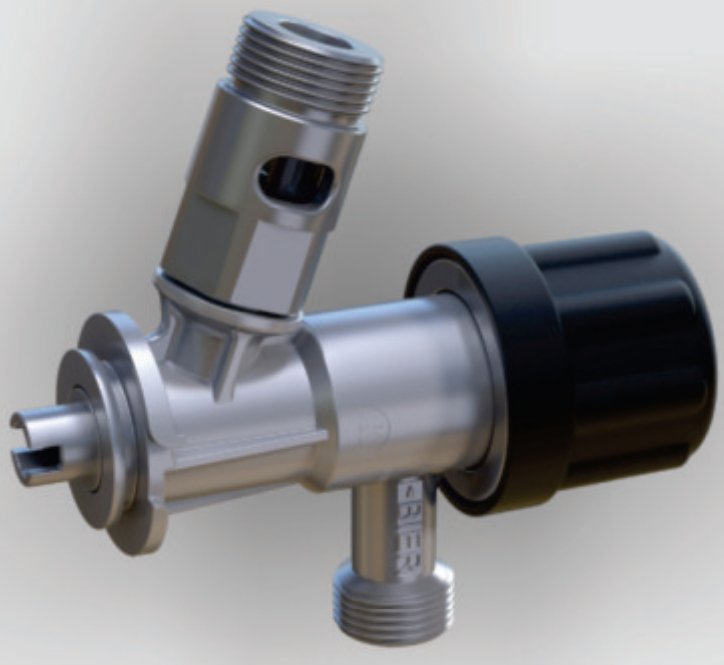
Product development

OUR OFFER

- **design**
- **product development**
- **parts optimisation**
- **injection moulding simulation**
- **FEM analysis**
- **FMEA**
- **prototyping**
- **material selection** (e.g. metal substit.)

In product development, we will assist you with our entire range of services, consulting and training with regard to **innovative ideas, choice of materials** (incl. metal substitution), procedures and technologies up to the **implementation of a production ensuring process reliability**.

The properties of the workpiece will be designed optimally according to your specifications using **FEM analysis** and **injection moulding simulation**. Product development for plastic parts is done **plastics-oriented with mean tolerances, draft angles and optimum wall thicknesses**. An FMEA may be used to critically analyse and verify developments.



BeerTpol (CleanLine Schankanlagenservice GmbH - metal substitution)

Nighteye
(IF Design Award Winner 2000)

YOUR BENEFIT

- ✓ reduced **costs for tool making**
- ✓ reduced **cycle times**
- ✓ improved **part quality**
- ✓ reduced **project time**
- ✓ reduce possible **defects**
- ✓ experiences from **medical engineering, electronics, automotive, aerospace, sports, agriculture** etc.

applications from medical engineering

Product development

Tasks that today are frequently done during tool design or production planning will need to be transferred to product development in the future in order to be able to avoid additional costs during tool construction and to identify and prevent possible difficulties for injection moulding early on.

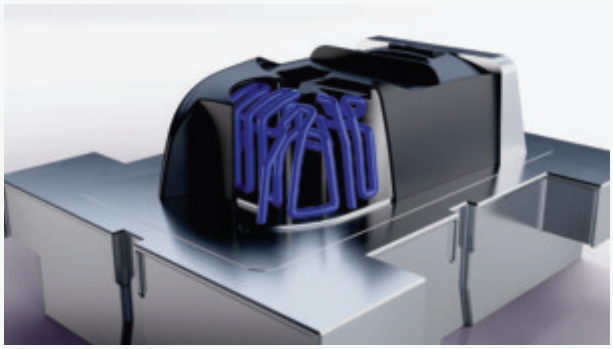
These tasks include, for example, parts optimisation and the first draft tool concepts.

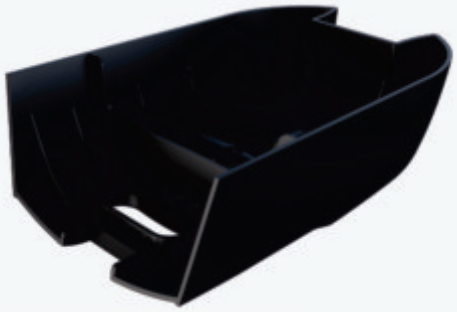
The product developer thus becomes the decisive co-ordinator for sustainable planning and definitely needs to enhance his or her knowledge at short notice.

The aforementioned course of action also forms the optimum basis for automation.

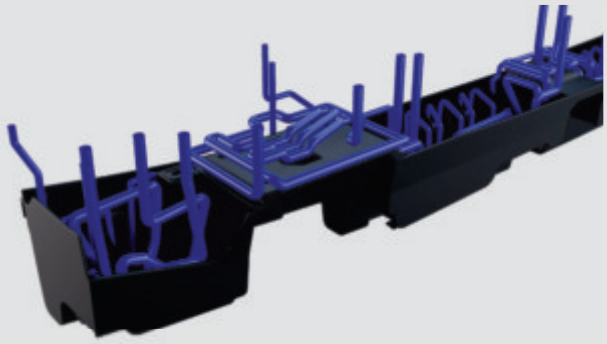
OUR OFFER

- sustainable **product development**
- early **pre-concepts**
- **material consultancy**
- **parts optimisation**
- **tool concept**
- **geometry reconstruction** from scanned data





part: housing vacuum cleaner



part: bumper

housing with ventilation slots for testing the removal of heat

SLM prototype for increased strength

PROTOTYPING

- ✓ prototype construction or test series at nearby **pilot plant**
- ✓ sophisticated prototypes for **testing the functionalities** and for further fine-tuning
- ✓ list of properties and **parameters for strength (e-modulus) for each material** on demand

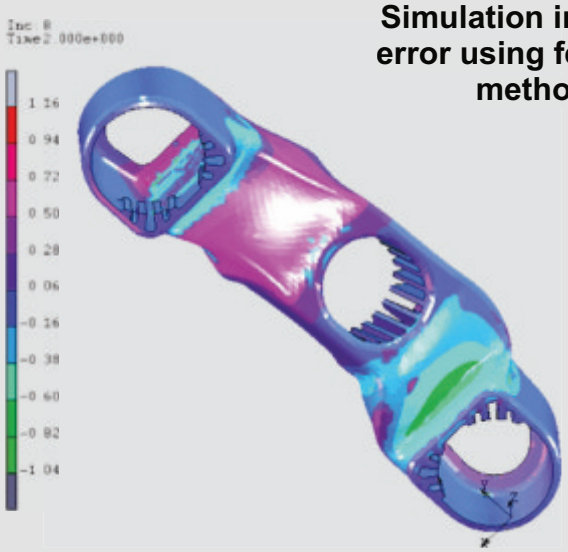
FEM analysis for strength - acoustics - dynamics

OUR OFFER

- for almost **any material** (e.g. metal, glass, plastics)
- analysing **sealing behaviour, acoustics, thermal insulation, dynamic deformation, strength, unwinding behaviour**

stress-strain curve

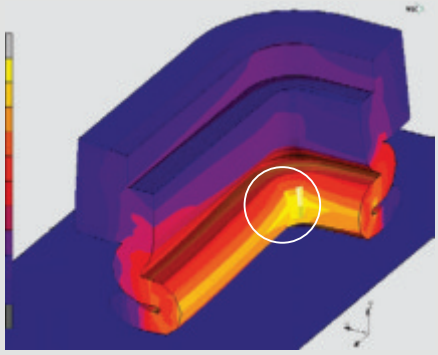
Simulation instead of trial-and-error using fem (finite elements methode) analysis



In this example, an increase (> 50 %) of load capacity of an oscillatory element after part optimisation was verified with FEM.

YOUR BENEFIT

- ✓ **parts characteristics** can already be analysed before part is actually being manufactured
- ✓ **collision observations** are ensured using **work movement**
- ✓ verification using **computer tomography** possible



membrane seal for printed circuit board: functionality of sealing verified with fem

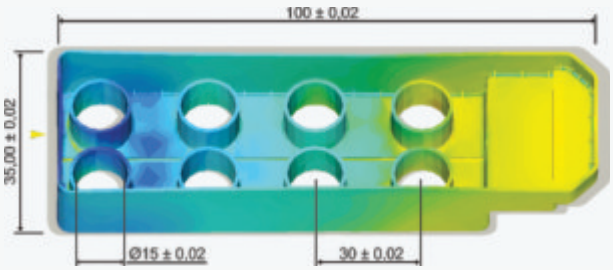
Determine product shrinkage

"Is your production rolling or are you still rolling the dice?"
SHRINKAGE EXPERT METHOD

OUR OFFER

- **methodical measurement of shrinkage**
- references for more accurate **shrinkage and warpage forecasts**
- data for your **simulation system**
- support with setting up your **specific database for shrinkage and warpage**

The effects of fibre orientation will also be determined by measurement in the injected test geometries. The results may be used as a reference for shrinkage determination or for simulation purposes.



volume shrinkage (grey)

supply of material

production of test geometries

6 wall thicknesses
2 injection points
for anisotropic materials

measurement

your data set

course of action

volume contraction of non-reinforced polypropylene (PP) can be up to 20%

YOUR BENEFIT

- ✓ **determine shrinkage** at a high precision
- ✓ **determine shrinkage allowance** for your tool
- ✓ establish company-specific **databases** for shrinkage and warpage

Injection moulding simulation ACTUAL state

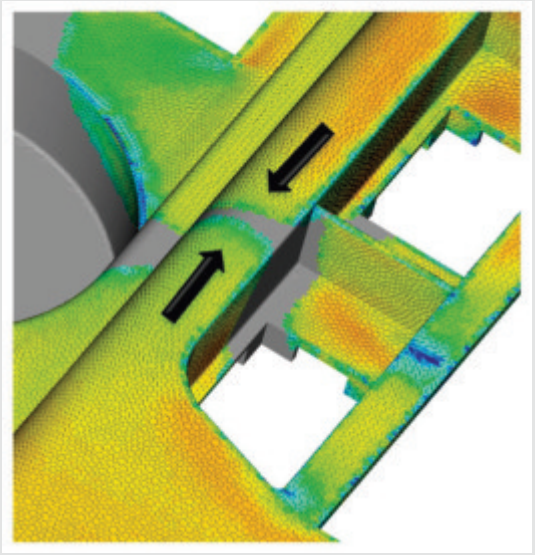
WE SIMULATE

- **filling**
- **shrinkage and warpage**
- **tool temperature regulation**
- **feed situation**
- **packing pressure profile**
- **thermoplastics / silicone / 2C**
- **process parameters**
- definition of different **media and materials**
- **inserts / overmoulding**

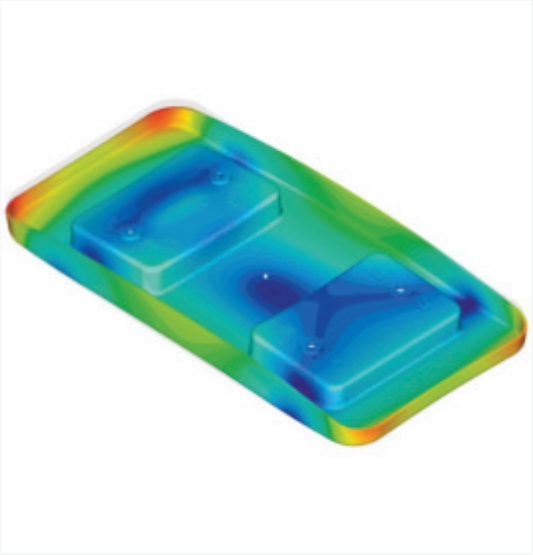
An injection moulding simulation shows filling and cooling (thermoplastics) or cross-linking (silicone / rubber) while including the influence of the tool (e.g. temperature regulation and feed situation) – before the tool has actually been designed.

Qualified simulation and expert interpretation of results allow for recognising possible defects of the moulded part and/or of the mould tool at an early stage thus providing the basis for parts optimisation.

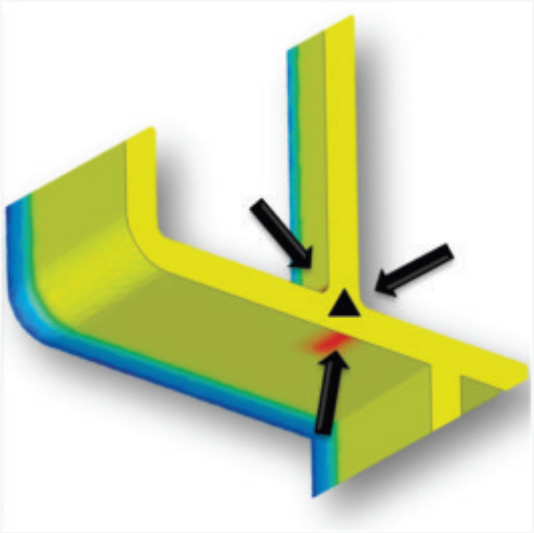
Our additional report analyses individual results in more detail.



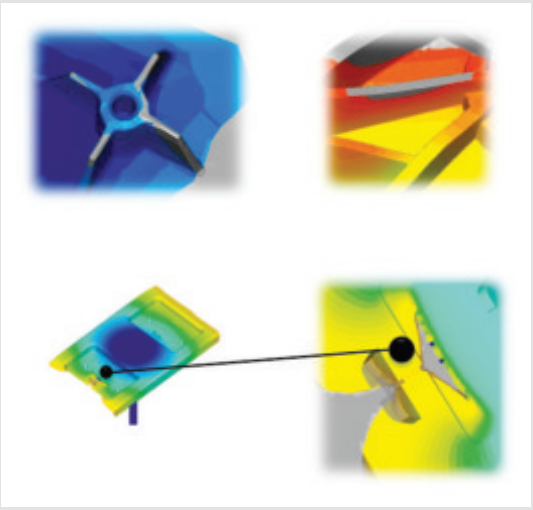
weld lines in visible and functional areas



shrinkage and warpage

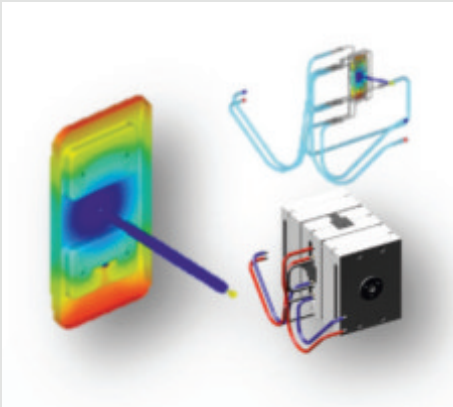


vacuoles due to high wall thicknesses



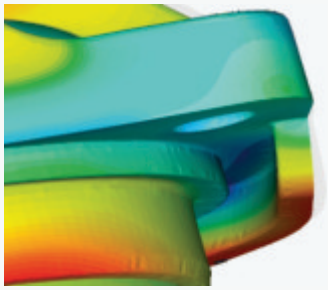
burn marks and ventilation

Simulation - potential for optimisation

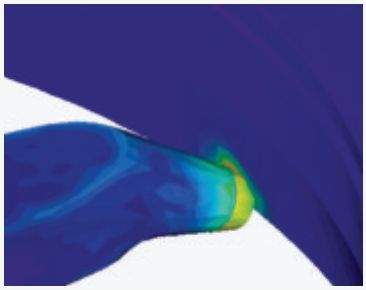


WE ANALYSE

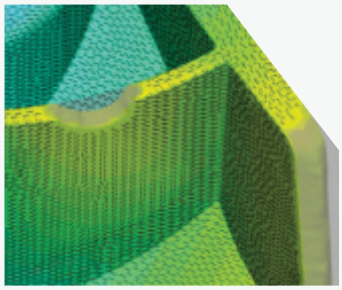
- ✓ **warpage**
- ✓ **cycle time**
- ✓ **clamping force**
- ✓ **part defects** such as **weld lines** and **trapped air**
- ✓ **injection pressure on core(s)**
- ✓ identifiable **potential for optimisation**
- ✓ **planning and calculation**



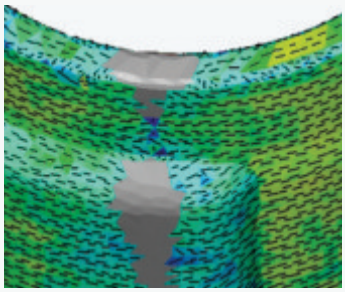
warpage



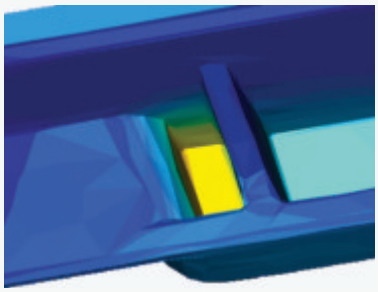
shear



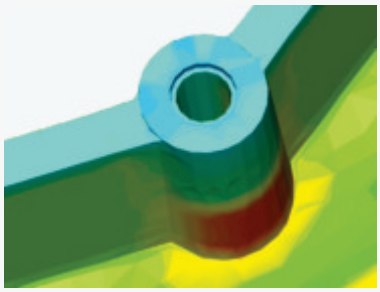
ventilation



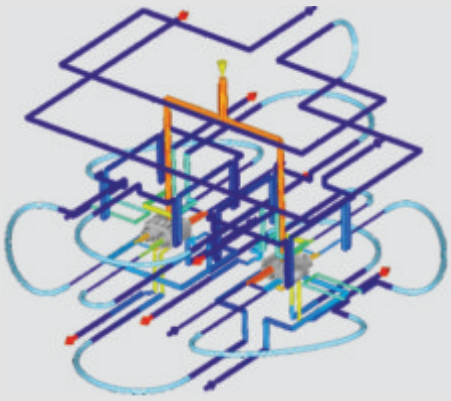
weld lines



hot spots



sink marks



Our additional report analyses individual results in more detail.

Parts optimisation

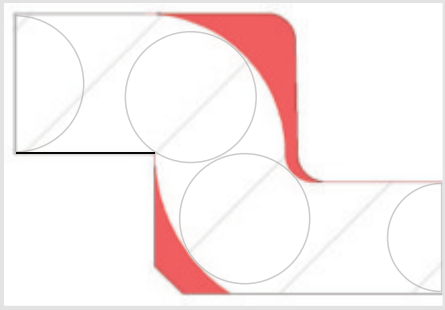
OUR OFFER

- **process optimisation**
- optimisation of **geometry, material, flow behaviour, feed, packing pressure** etc.
- **temperature regulation close to the contour**
- separate **inserts** against hot spots
- separations/modules for **ventilation**
- **negative correction**
- alternative **production technologies**

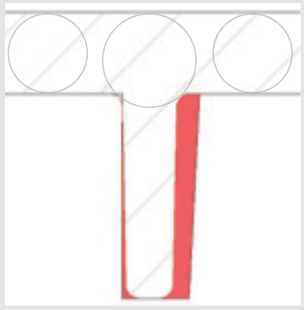
On the basis of the results from the injection moulding simulation of the ACTUAL state, the part can now be optimised.

Using sectional views and illustrations we devise suggestions for parts optimisation, feed gate design and temperature regulation. Those will then be implemented in different ways and verified using further simulations or FEM analysis.

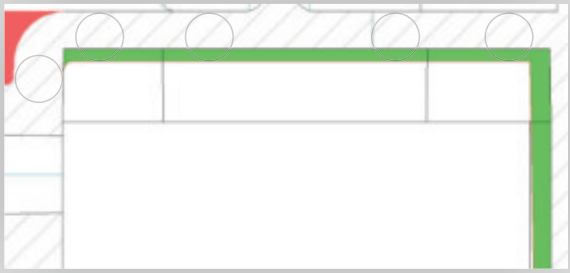
Qualified optimisation will result in quality products!



optimising wall thickness relations



optimising relation fin to cover thickness



optimisation using filling aids

optimisation by reducing material in corners

YOUR BENEFIT

- ✓ **reduced cycle time**
- ✓ **better part quality**
- ✓ **faster project cycle**
- ✓ **larger process window**
- ✓ **reduced warpage, improved compensation of shrinkage and wall thickness relations**
- ✓ **fewer part defects**

results simulation - overview

Simulation of optimisation

The results from parts optimisation will be verified using further simulations or FEM analysis.

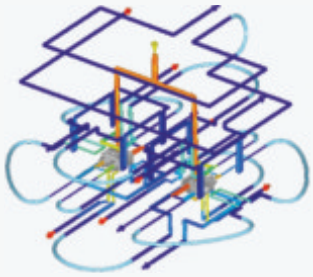
There may also be a calculated negative correction or a determined allowance for components reinforced with glass fibres. Using the Shrinkage Expert Method an early negative correction becomes possible.

Thus, the best possible result for the part's geometry may be obtained.

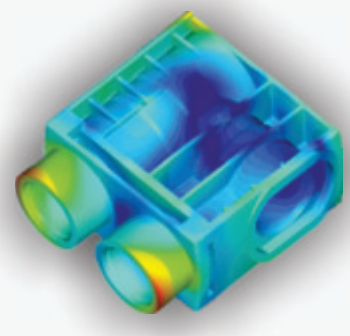
At this point, all parameters regarding feeding, temperature regulation, heating times (e.g. for rubber) and separations are available and tool design can be done very quickly and on a solid basis.

OUR OFFER

- **simulation of results from parts optimisation**
- **calculated negative correction,** if applicable
- **determined allowance for parts reinforced with glass fibres**
- **compilation of tool concepts as a basis for the simulation**



simulation incl. temperature regulation

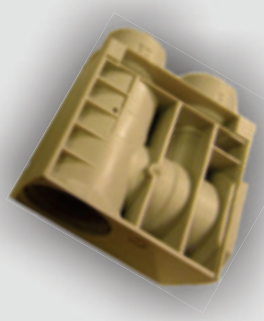


project "housing":
warpage considerably reduced **after** optimisation

After optimisation, the following results could be obtained in co-operation with the customer:

warpage reduced by 71 %
weight reduced by 15 %
cycle time reduced by 70 %

optimised 3D part



part from series

pictures by Festo GmbH & Co. KG

YOUR BENEFIT

- ✓ high **process reliability**
- ✓ improved **part quality**
- ✓ avoiding **revisions**
- ✓ optimum preparation of **tool design**
- ✓ when implementing results into **IsoForm® tool design good parts** frequently **at first sample run**

Tool temperature regulation

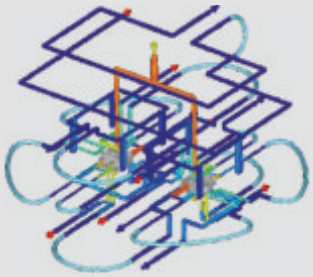
OUR OFFER

- **simulation of regulation**
- **design of temperature regulation**
- **close-to-the-contour, cycle-dependent** and/or **variothermic temperature regulation**
- different media: **air, water** (up to 220°C), **oil, coolant** (CO_2) etc.
- **HeiNo® redirection elements**

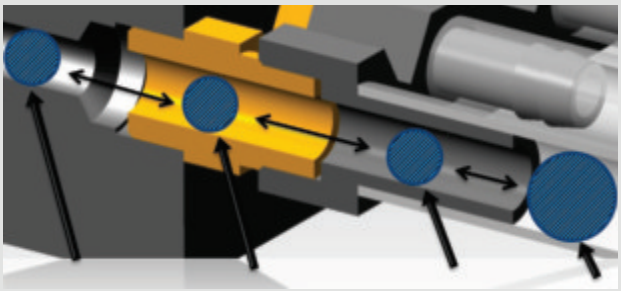
For obtaining a good part quality, any plastic material needs its own determined mould wall surface temperature that should be attained homogeneously or individually and cycle-dependent.

In an injection moulding simulation, the temperature regulation is already being dimensioned before the tool itself has been designed. The simulation informs about the heat exchange on the tool's surfaces and about its influences on the product during injection moulding.

The temperature regulation system is designed close to the contour or cycle-dependently using either drilling, laser melting, vacuum brazing or special materials. Holes for temperature regulation should always be round and connected for forced circulation.



simulate temperatures for optimum design



holes + connecting nipples + coupling + tube: homogeneous round sections are important!

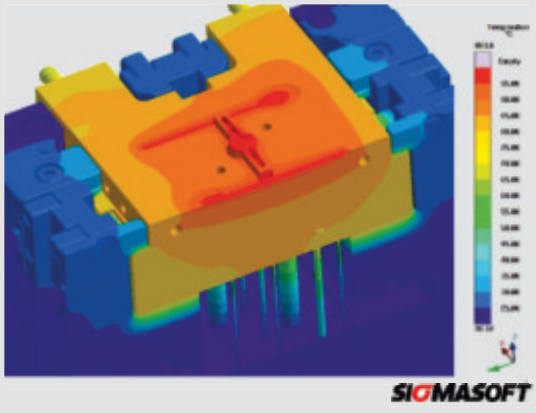
top view assembly

HeiNo® redirection element ensures round section of holes for temperature regulation.

animation with media flow

YOUR BENEFIT

- ✓ **reduced cycle time**
- ✓ **high surface quality**
- ✓ **less wear at the tool**
- ✓ **process-reliable production**
- ✓ **high quality of moulded part**



temperature regulated close to the contour with exchangeable IsoForm® tool

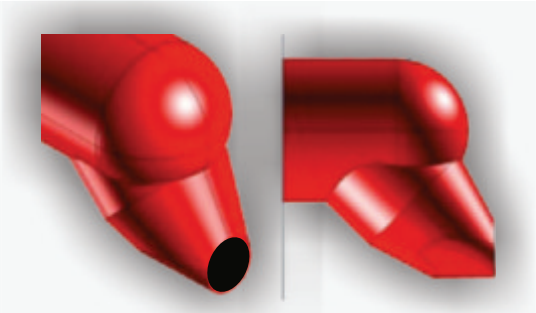
Concepts for feeding and ventilation

Depending on the material, feeding needs to be designed for low pressure and shear, with controlled shear, dead runner, balancing etc. in order to ensure a process-reliable production without part defects. Frequently, the formation of streaks, vacuoles or air traps and an inadequate surface structure of the part are pre-determined at this point.

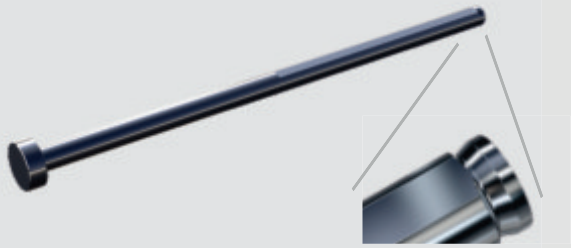
For the past couple of years, new additives in plastic materials have called for comprehensive ventilation in injection moulding tools. HeiNo® geometries for ventilation feature a comprehensive ventilation of the mould inside of as well as around the cavity. This improves the quality of weld lines and allows for a controlled ventilation of both the part and the feed area.

OUR OFFER

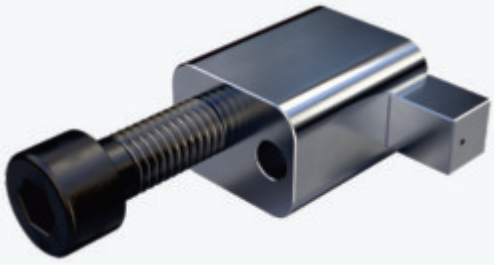
- **feed area design**
- **temperature regulation of gate**
- **low or controlled shear, dead runner, flow speed reduction etc. on demand**
- **comprehensive and controlled ventilation inside of as well as around the cavity**



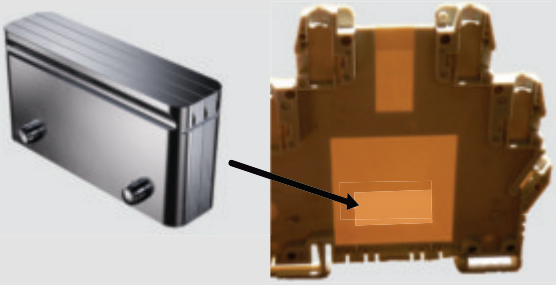
HeiNo® tunnel gate for low shear



HeiNo® ventilated ejector



HeiNo® tunnel gate with overflow ventilation



HeiNo® ventilation insert

HeiNo® tunnel gate
with flow reduction and ventilated ejector

YOUR BENEFIT

- ✓ high **part quality**
- ✓ reduced **cycle time**
- ✓ maximum **packing effect**
- ✓ less **part defects**
- ✓ lower **energy demand**
- ✓ **process-reliable production**
- ✓ **customised**

Focus: Avoiding weld lines

OUR OFFER

- **mould flow simulation** for identifying weld lines
- **definition** of overflow area (for re-orientation of glass fibres, if applicable)
- specification for **optimum installation** of HeiNo® overflow ventilation insert

The protected HeiNo® overflow ventilation insert improves the quality of weld lines and allows for a controlled ventilation of the part area thanks to special ventilated HeiNo® ejectors.

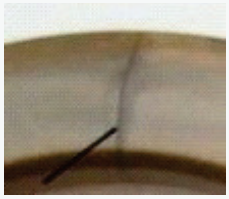
The intense ventilation takes effect up to the end of filling and also guarantees the discharge of substrates preceding the flow front. The overflow area will ideally be defined using an injection moulding simulation in order to obtain a good weld line quality and resilience by re-orienting the glass fibre in the weld line. The weld line should close by definition before the overflow cavity of the overflow ventilation insert is filled. The filled overflow cavity will then be separated and removed like a tunnel gate.

HeiNo® tunnel gate with overflow ventilation insert

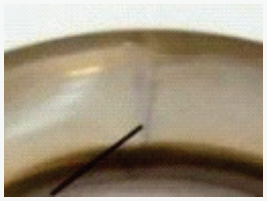
against weld lines

against Diesel effect

parts optimisation thanks to overflow ventilation



BEFORE
without
overflow ventilation insert



AFTER
with
overflow ventilation insert

YOUR BENEFIT

- ✓ **controlled ventilation** of part and feed gate areas
- ✓ high **weld line quality**
- ✓ increased **resilience**
- ✓ comprehensive **ventilation**

animation of HeiNo® overflow ventilation

Mould design

We also offer tool design for the following special technologies:

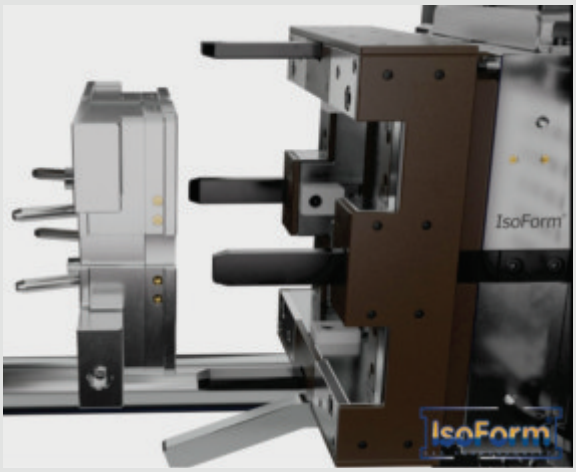
- multi-component
- sandwich
- foaming
- tandem solutions
- collapsible cores
- unscrewing solutions
- transfer moulding
- gas: injection, cooling, counter-pressure, external gas moulding
- film back injection moulding

OUR OFFER

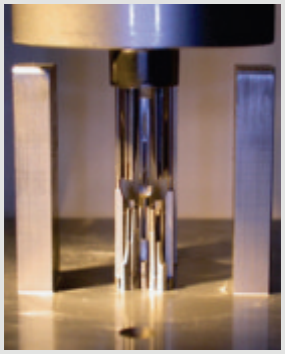
- **injection moulding tools** for thermoplastics
- **hot press tools** for thermosets
- **pressure moulding tools** for zinc and aluminium
- **elastomer moulds** for rubber and silicones
- **special tools** for hybrid applications

pictures by
Rohde und Grahl /
MBS UG

IsoForm® tool
for rubber processing



IsoForm® exchangeable tool



Historic project: tool "contact socket" -
no burrs on the inside despite filigree separations

YOUR BENEFIT

- ✓ **state of the art**
- ✓ long **tool life**
- ✓ **process reliability**
- ✓ optimum **ventilation** (e.g. using vacuum forming)
- ✓ high **precision**

Standard elements for mould tools IsoForm®

OUR OFFER

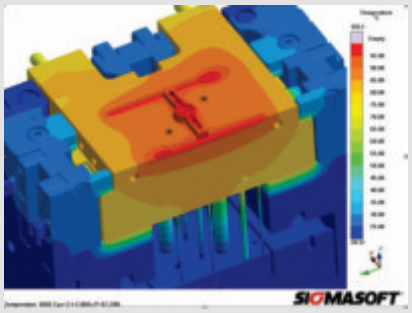
- **thermal separation**
- **consistent hub-centring**
- **innovative ejection frame**
- **can be combined with almost any application and system**
- **tool change systems**

Developed using the **TRIZ method**, the isolated tool concept IsoForm®, together with HeiNo® standard elements for gates, ventilation and temperature ventilation, forms the basis for a holistic approach to tool design with the subsequent advantages for process reliability and efficiency with regard to quality, costs, time and energy requirements.

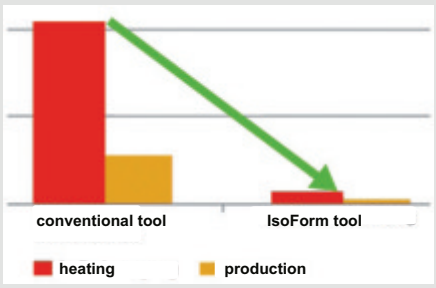
IsoForm® and HeiNo® standard elements are distributed by Nonnenmann GmbH.

NONNENMANN

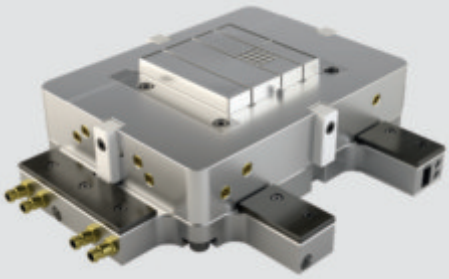
Please order our "IsoForm®" and "HeiNo®" brochures or get current information from ***Kb-Hein.de***



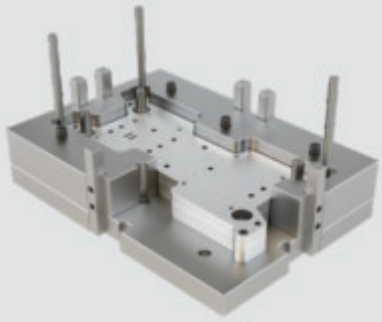
IsoForm®: only heating mould inserts



reduce energy costs with IsoForm®



IsoForm® mould insert



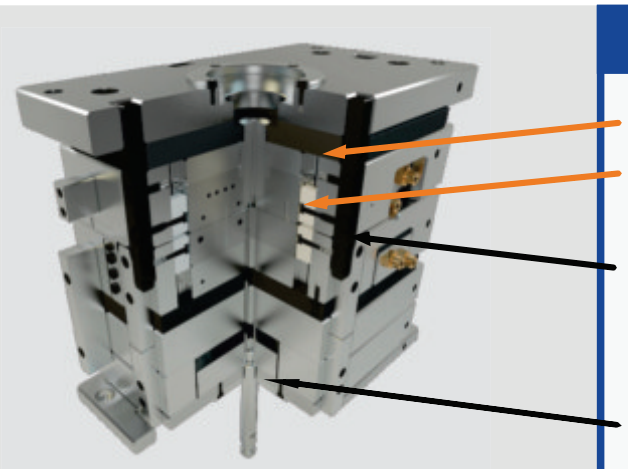
IsoForm® ejection frame

YOUR BENEFIT

- ✓ high **process reliability and energy efficiency**
- ✓ for **any kind of temperature regulation**
- ✓ high **precision due to hub-centring**
- ✓ reduced **deflexion**
- ✓ reduced **follow-up costs**
- ✓ perfect for **automation, change of inserts and tools**

further information on IsoForm® in our IsoForm® brochure

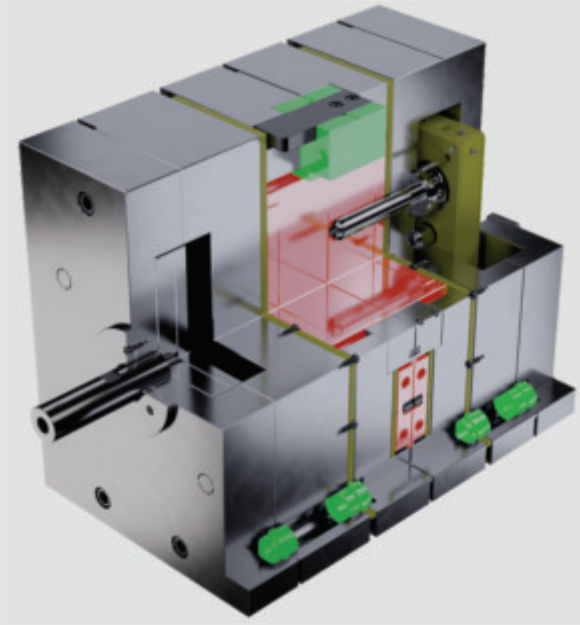
What is an IsoForm® tool?



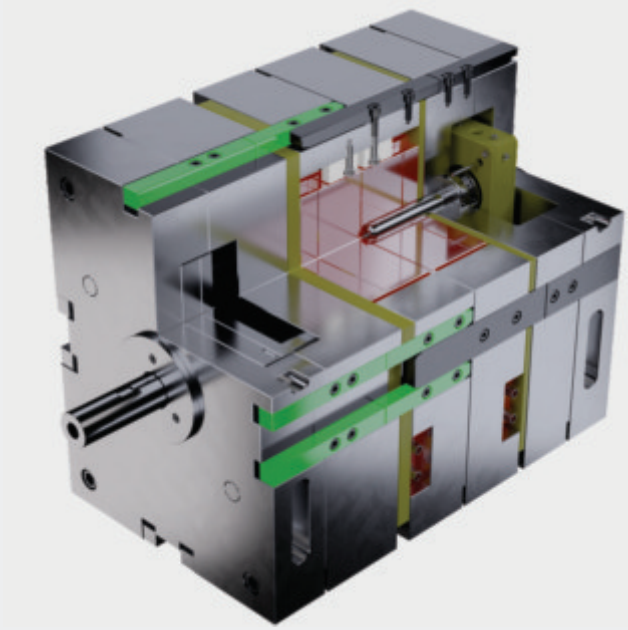
IsoForm® tool (section)

FEATURES

- **consistent isolation of the contour-forming area**
- **consistent hub-centring of all inserts, mould plates and mould halves with regards to one another**
- **maximum support thanks to ejection frame**



IsoForm® **BASIC**



IsoForm® **PREMIUM**

IsoForm® BASIC

- **cost-optimised standard**
- includes basic isolation and centering
- may be upgraded with **ceramic centring elements** at any time
- costs comparable to conventional mould units

IsoForm® PREMIUM

- **optimum solution for all advantages**
- **highest degree of isolation**
- consistent **hub-centring**
- **ceramic centring elements**

Gas injection GIT - WIT water injection

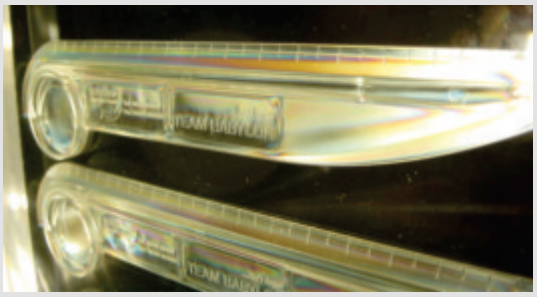
Gas injection - GIT

- ✓ controlled **packing pressure**
- ✓ **tension-free and low-distortion part**
- ✓ for **different wall thicknesses** within the part
- ✓ better **cooling effect**
- ✓ low **closing pressure**
- ✓ **reliable process at high quality**

With the aid of cross-sections the gas is guided to the relevant areas where it compensates volume contraction.

Thus, the gas assumes the role of the packing pressure at a constant level for the entire workpiece.

Polarisation films on the overhead projector (see upper picture at the centre left) expose the lower potential for tensions in the workpiece with GIT.



low tension in GIT part

gas injection technology

Partner project GRIFF (companies Stieler und Hein): In this special WIT process, the part is partially filled with water which is then pressed, at high pressure, into the blind hole that has been formed. The water is then extracted well-controlled from the part in order that the part leaves the tool almost dry.

Water injection - WIT

- ✓ **short cycle times** for appropriate geometries
  (only round geometries, such as pipes for the passage of media, can be manufactured with relatively constant wall thickness)
- ✓ With mass clusters, a shrinkage of the volume cannot be compensated as easily as when gas injection is used .

For water injection, the excellent thermal conductivity of water is used to achieve a favourable cycle. Different procedures such as partial filling or auxiliary cavities can be applied.

The picture on the right depicts the small inlet and outlet orifice for water injection with a blind hole.

The picture at the centre-right of this page shows the homogeneous wall thicknesses that are produced.

Images and animations based on 3D data

You would like to present your ideas, design visions or concepts to your supervisors, customers or colleagues at an early stage - using photo-realistic images of the product, the production process or the mould tool?

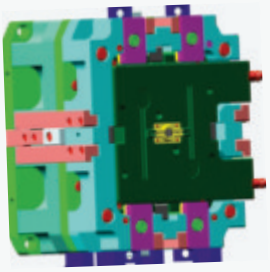
Using rendering we turn your 3D data into realistic images and animation which visualise parts, tools and prototypes.

According to your specifications the functionality of your product or the injection moulding process may be shown as film clips - before the part has been produced or the tool has been manufactured.

OUR OFFER

- realistic **product** and/or **tool visualisation** using **rendered images**
- **part demonstration** before start of series production
- **animations** of product functionalities and/or production processes

CAD drawing



realistic image

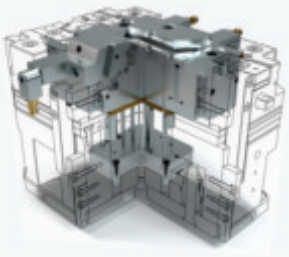
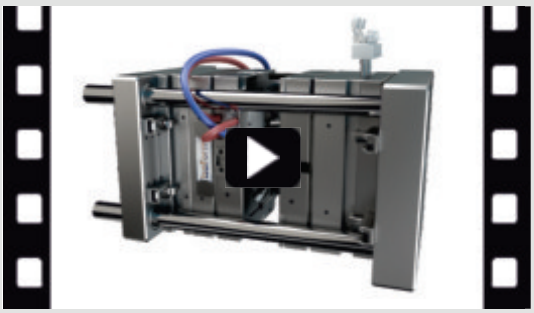
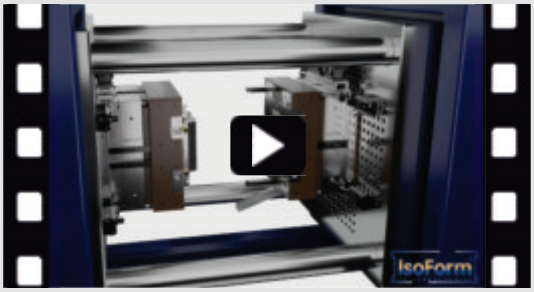


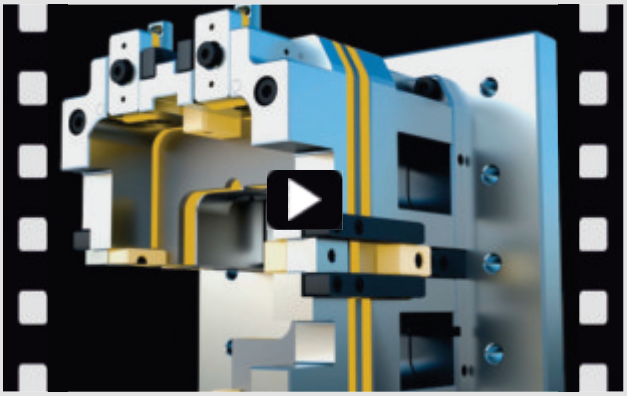
illustration of individual components



animation visualising the ejection process



animation exchangeable tool



animation isolation

YOUR BENEFIT

- ✓ photo-realistic demonstrations for **presentations** (up to 4K)
- ✓ vivid **documentation** of the progress of a project
- ✓ early animations of **functionalities** or **processes** to help decision making

Fair co-operations / strong partners

Co-operation projects

- IsoForm® projects **"espresso cup", "HeiNo® redirection element"** and **"cover"**
- project **"Shrinkage Expert Method":** co-operation project for methodically measured shrinkage with Simcon kunststofftechnische Software und KB Hein (see p. 9)

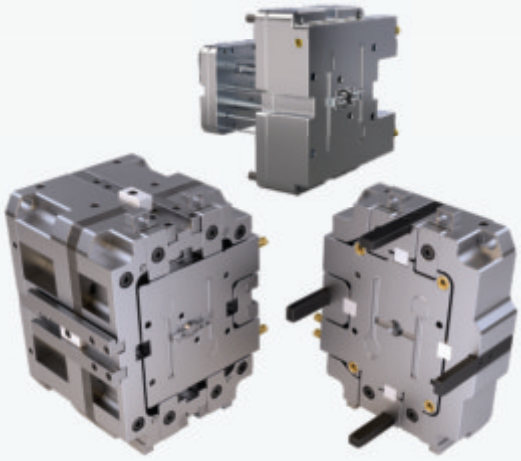
"Thanks to our long and close co-operation with Konstruktionsbüro Hein we are always able to identify difficult areas on the most different parts quickly and flexibly and to then come up with suggestions for optimisation together.

This means that we can always offer competent solutions to our end-customer that will result in an improved final product."

(Benedikt Ostermann, Josef Mawick Kunststoff- Spritzgusswerk GmbH & Co. KG)

Partners "espresso cup": Konstruktionsbüro Hein, Nonnenmann, BARLOG plastics, Günther Heiss-kanaltechnik, Simcon, Werkzeugbau Wollenburg and Wittmann Battenfeld

Partners "redirection element": Konstruktionsbüro Hein, Nonnenmann, Sigma Engineering and Wittmann Battenfeld



technology partners

- prototype construction or test series at nearby **pilot plant**
- **tool testing,** e. g. with **Wittmann Battenfeld**
- **co-operation** with research institutes and universities

Training courses

Our courses and training programmes are always **adapted specifically** to the participants' requirements (company course).

According to our motto "From idea to series production" in plastics technology we are able to establish a training concept that meets your needs.

Frequently, trainings are held at our customers' premises in order to integrate current projects and difficulties easily into the training process.

In co-operation with the German expert associations WIP Kunststoffe e.V. and SKZ (Peine) we also offer trainings and workshops in the fields of product development, injection moulding, tool design, parts optimisation etc .

OUR OFFER

- **project training**
- **injection moulding for its users** (basics, product development, tool design and construction)
- **special processes**
- **training "part failure"**
- **expert lectures**

What are you dealing with?

Wissens- und Innovations-Netzwerk Polymertechnik

www.wip-kunststoffe.de

YOUR BENEFIT

- ✓ **close to practice** (examples from over 30 years of KB Hein)
- ✓ **project-oriented / inhouse**
- ✓ **with regard to the participants** (e.g. for product developers, design engineers, toolmakers, injection moulders, heads of production, business people)
- ✓ **co-operation with partners**

Your task ... our solutions

OUR OFFER

- **interpretation of defects**
- **implementation of parts optimisation**
- **drafting of constructive solutions**
- **verification of solutions using simulations**
- **trouble shooting**
- **CT** for **reducing sample runs**

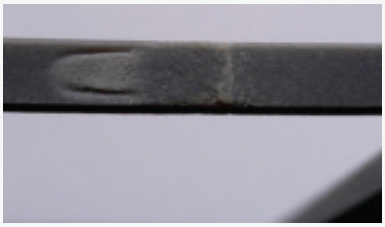
We interpret defects and work out constructive solutions in order to eliminate them.

Our injection moulding simulations ensure that problems with ventilation won't arise or we devise new solutions for ventilation together with our customer.

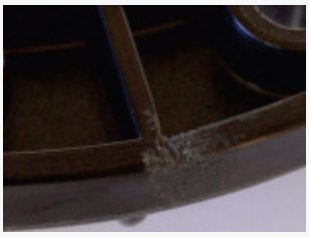
When the part fails we optimise the part using fem analysis and injection moulding simulation. By subsequently developing constructive modifications of the part and optimisations of the tool (e.g. for the gate) we find ways to ensure that the part meets the requirements in the future.

Make use of our experience for problem solving!

Part defects that can be avoided



weld line



ventilation

streaks

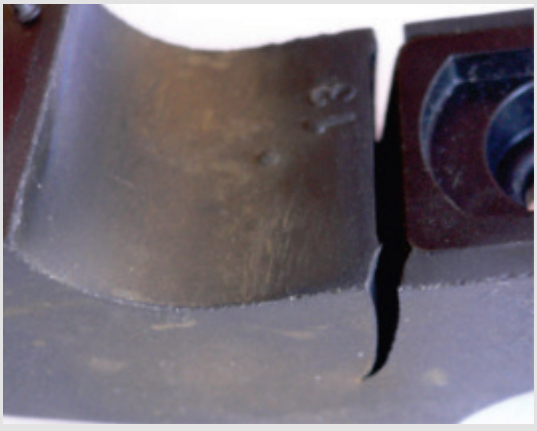
rib relation

sink marks

warpage

YOUR BENEFIT

- ✓ **suggestions for optimisation** verified by simulation and fem analysis
- ✓ **elimination of part defects**
- ✓ **fewer sample runs**
- ✓ **avoiding potential sources of defects** in the future



part failure

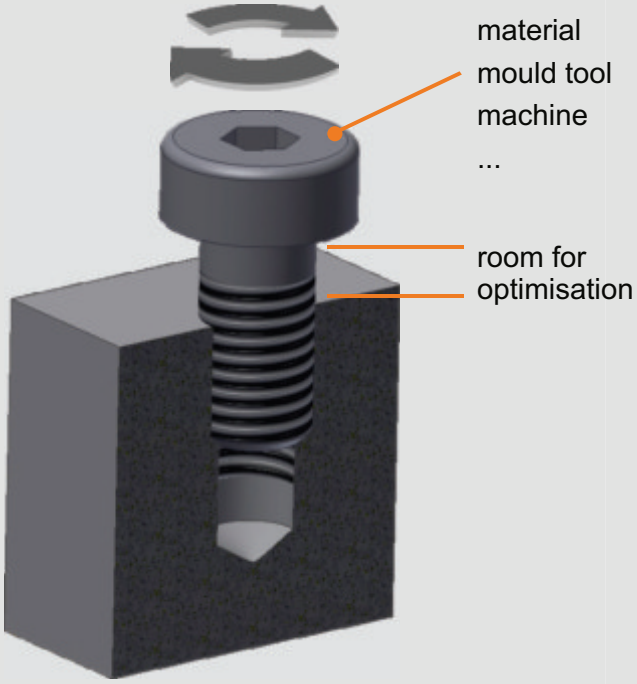
We optimise your process (on site)

If potential for optimisation detected at an early stage is used, e. g. to improve wall thickness relations, weld lines, air traps and temperature regulation, the process capability will be increased while cycle time and maintenance effort will be reduced.

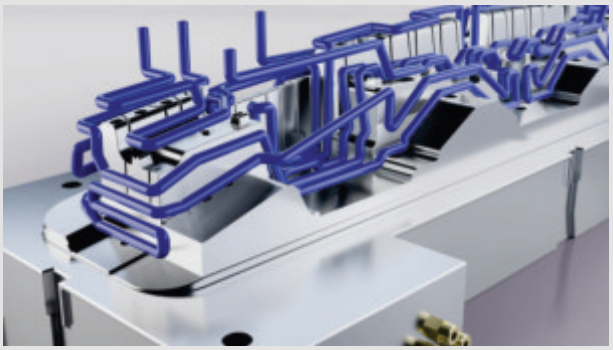
Together with you and your team we will devise sustainable measures for optimisation.

OUR OFFER

- **competence - expert on site**
- **process check on site**
- **evaluation and suggestions**
- **optimisation on site**
- **project training**



Which of the screws may be adjusted?



simulation with temperature regulation

YOUR BENEFIT

- ✓ reduced project time and lower costs if optimisation has started early
- ✓ increased **process reliability**
- ✓ improved **effect of temperature regulation**
- ✓ increased **part quality**

TOOLING

Standard Elements. Reconsidering mold ventilation, gate design, and temperature regulation will lead to a production without unnecessary maintenance or cleaning breaks and thus to considerable savings regarding production time and energy.

Let Off Some Air!

RUDOLF HEIN
VOLKER BONNEMANN

No Process Safety without Qualified Ventilation

TECHNICAL ESSAYS

Determine shrinkage data to the expert method

1/ "Is your production rolling or are you still rolling the dice?"

Shrinkage needs to be determined during product development

Methodical measurement allows for establishing shrinkage databases

2/ The SHRINKAGE EXPERT METHOD

October 2017 Product Gallery with innovations presented at Fakuma

ETMM THE WEBSITE

TOPICS MARKETS SUPPLIERS EVENTS USED MACHINES

21st Hein Technology Day

Energy efficient faster process

Faster process at cons
and reduced energy in

R. Hein

1 Introduction

2 Are products and mould tools ready for automation?

2.1 Product development

2.3 Tool construction today and tomorrow

5.2 IsoForm tool change systems

5.3 Implementation with IsoForm tools

Partner for solutions

**We are a team of specialists with professional backgrounds in practice.
As a family-owned company, we have been striving for innovations,
challenges and fair co-operation since 1986.**

Homepage:	**Kb-Hein.de**
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E-mail technology workshop:	**tt@KB-Hein.de**
Data exchange	**ftp server (access data via e-mail)**
How to reach us:	**Kb-Hein.de/english/contact/**

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Marschstraße 25
D - 31535 Neustadt
(near Hannover)

Phone: **+ 49 (0) 50 32 / 63 15 1**

Fax: **+ 49 (0) 50 32 / 63 11 6**

We are looking forward to seeing you

Technology Workshop for:

Product development
Mould Design
Production

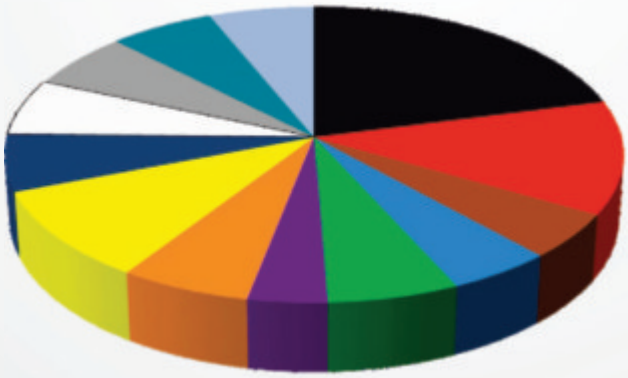
location:
Brandboxx Hannover
30855 Langenhagen
GERMANY

>90 exhibitors **15** expert lectures **500+** participants

The 20th edition of the ... renowned event for professionals in the plastics and tool and mould-making industry, the Hein Technology day, did not disappoint. The event attracted 550 visitors on 19 February. The various presentations on a diverse range of topics including hot runners, materials, injection moulding, design, additive manufacturing and many more completed the program.

ETMM 2016-03-02

structure of exhibitors



- standard elements
- hot runner
- temperature regulation
- injection moulding machines
- universities / institutions / fairs
- surface / coating
- CT / measuring / sensors
- additive manufacturing / prototypes
- materials / additives / filler material
- tool construction / injection moulders
- software / services
- cleaning / maintenance
- machines / devices

Konstruktionsbüro Hein GmbH

Kb-Hein.de