cirp

RESEARCH AND DEVELOPMENT

ADDITIVE MANUFACTURING

MODEL MAKING
AND MOULD DESIGN

RAPID TOOLING

cirp GmbH supports you throughout the entire product creation process „from the idea to the finished product!"

cirp GmbH, based in Heimsheim, Baden-Württemberg, is a leading service provider for prototype and small series manufacturing. Our activities centre around the key areas of research and development, additive manufacturing, model making and mould design as well as rapid tooling. cirp supports its customers from the first draft to the start of series production.

As a project partner, cirp offers complete service packages from the design and choosing the materials and technology to use through to the finished product. In the process, 25 years of experience with national and international industrial orders and research projects are incorporated into the development and production of your product. Precise component testing in our quality assurance function can also be used to identify discrepancies between the component and the CAD data and eliminate cases in which the tolerances are exceeded.

We work with our customers to develop tailored solutions that meet the highest standards. We work in the fields of development and design to create your CAD models, using the latest CAD/CAM systems, 3D scanning technologies and reverse engineering. With our pool of state-of-the-art machines we also offer a variety of different generative and machining procedures in the fields of additive manufacturing, model making and mould construction as well as rapid tooling for creating your plastic pieces and tools that can be applied to your models and prototypes as required: Making complicated finished pieces and complex component assemblies out of plastic is one of our strengths. We can also assist you with surface finishing and component assembly if necessary.

At cirp you receive the services of the whole process chain from a single source. We work with you to define the degree of detail.

RESEARCH & DEVELOPMENT
Over 25 years of experience

ADDITIVE MANUFACTURING
Prototypes and models made directly from the 3D data

MODEL MAKING
Rapid and precise reproduction of master patterns

RAPID TOOLING
Milled tooling inserts and near-series prototypes

Research

Innovations have always played a very important role at cirp, whether with respect to materials, additive methods or process chains. This is because we have been passionately involved in additive production almost since the beginning. Its importance in the fields of industry and politics, as well as for consumers, has provided a sharp boost to the variety and dynamism of this production family, particularly in recent years.

Digitisation, and the commercial "Internet of Things" referred to as "Industry 4.0" in particular, is becoming much more important for the production of prototypes and small-run series. Rather than simply keeping up with these developments, cirp is playing an active role in shaping them. We are achieving this in close partnership with our customers, suppliers and an extensive network of institutions and international research facilities that has been built up over the years. Joint projects are an important element of these research activities. As part of these projects, institutions work with SMEs or also selected large corporations to drive forward specific fields of innovation in a way that no partner could achieve alone. This research into selected, promising projects and compounds is subsidised by the government.

cirp is more involved than most in regional initiatives and invitations to tender from government ministries and the EU because we firmly believe that innovations are the only thing that can guarantee the satisfaction of our customers.

The dynamic changes in our industry are also changing the demands placed on our employees and their qualifications at a corresponding pace. Thanks to their active commitment to innovation, their knowledge and skills are constantly developing.

If there are some desires we are not yet able to satisfy, ask us anyway. It is possible that we are already working on the solution or that we will be able to achieve our goal by working with selected network partners.

Co-engineering

Whether it's detailed solutions or complex assemblies - cirp will support you through the entire product creation process:

"From the idea to the finished product!"

Even before the finished data is available (for example for the creation of a prototype or drawing) our design department can help you to advance your project by providing support with design, creating geometric data and producing production-compliant designs in the fields of both conventional and additive production. In the process, we apply our entire process-related expertise in the field of plastic processing to the design of the piece. Design challenges can be resolved by our experienced designers or you can work hand in hand with them on developing a design. Our company relies on the CATIA, SolidWorks and Cimatron development and design tools.

Our many years of experience with both additive manufacturing methods and injection moulding guarantees you the best possible design of your moulded products in order to be able to make use of all of the benefits and geometric freedoms, and avoid time-consuming and costly finishing work.

Our production know-how enables us to advise you on the selection of suitable materials and production methods, and to ensure that our series production-standard design is ideally suited to the method in question. cirp is a proponent of applying a systematic and methodical approach with the aim of making it

ASSEMBLIES DEVELOPMENT
Tailored design

easier to plan and verify the development of your products.

From the concept through to realisation and customer support, our project managers have all of the processes within a project under control and always work with communication and transparency according to your catalogue of requirements and the underlying specifications.

As a central link within a project, the project management function controls all of the necessary measures, secures the individual phases of the development process at the organizational level, and gives equal consideration to costs, quality and the time frame - always as a reliable and competent point of contact. It makes no difference whether you engage us to develop individual components or extensive assemblies.

Our goal is to always work with you and apply our own expertise to deliver a result that convinces you in every respect.

3D digitisation

3D digitisation is the process of recording the data of physical objects, and is an established design tool. Optical 3D digitisation using the ATOS Core system offered by the company GOM allows us to make digital models of small or large objects, regardless of whether their geometry is simple or complex.

The scanning system's mobility means that we can do this at your premises instead of in-house. Your objects are scanned without being touched, which means that the "original" is not harmed in any way. You can choose to receive the output data either as a pure point cloud or as a fully polygonised frame, depending on what you want to use it for.

DEVIATION ANALYSIS
Actual/target deviation between element scan and CAD

We can also use suitable software to assist you with the further processing of the high-precision digital data, for example with respect to quality controls involving target/actual comparisons or preparations for reverse engineering. We are here to provide competent and active assistance in any situation, whether it's solving and processing complex measurement technology and quality assurance tasks, creating and completing your 3D digital archives and libraries, or preparing data for production.

Reverse engineering

Reverse engineering is the translation of previously digitised components or design objects into a digital CAD model that can be manipulated and processed. The main aim of reverse engineering objects is to create a 3D model with the exact same geometry as the original piece. Our company uses this process if the digital 3D model itself or its descriptions and drawings are not available, and the corresponding adjustment or design-related improvement of the data is desired. Reverse engineering usually starts with the 3D digitisation of the existing geometry as described above.

cirp can assist you in the field of reverse engineering using the Geomagic® Design X, SolidWorks and Rhino software. This allows a range of different requirements to be realised, ranging from parametric reconstruction to free-form surface reverse engineering.

You can work with our experienced modellers and designers to individually determine the mode of reconstruction. Whether it's as a pure parametric reconstruction, traditional surface reverse engineering or a combination of the two - a hybrid model consisting of surfaces and regular geometries.

We are always up to challenges such as defective or worn components as well as transparent or reflective surfaces.

»Additive manufacturing«
Top-quality models and prototypes straight from the CAD data ...

ADDITIVE MANUFACTURING

Our **»additive manufacturing«** service, which uses the generative processes of stereolithography (SLA), digital light processing (DLP), PolyJet and laser sintering, rapidly delivers high-quality models, prototypes and end products directly from the CAD data. This can be used to produce unit volumes ranging from one all the way up to a small-run series. We also offer various different post-processing procedures to optimise the optical and functional properties of the parts produced by additive manufacturing for their intended applications. The delivery period for additive manufacturing is just a few working days.

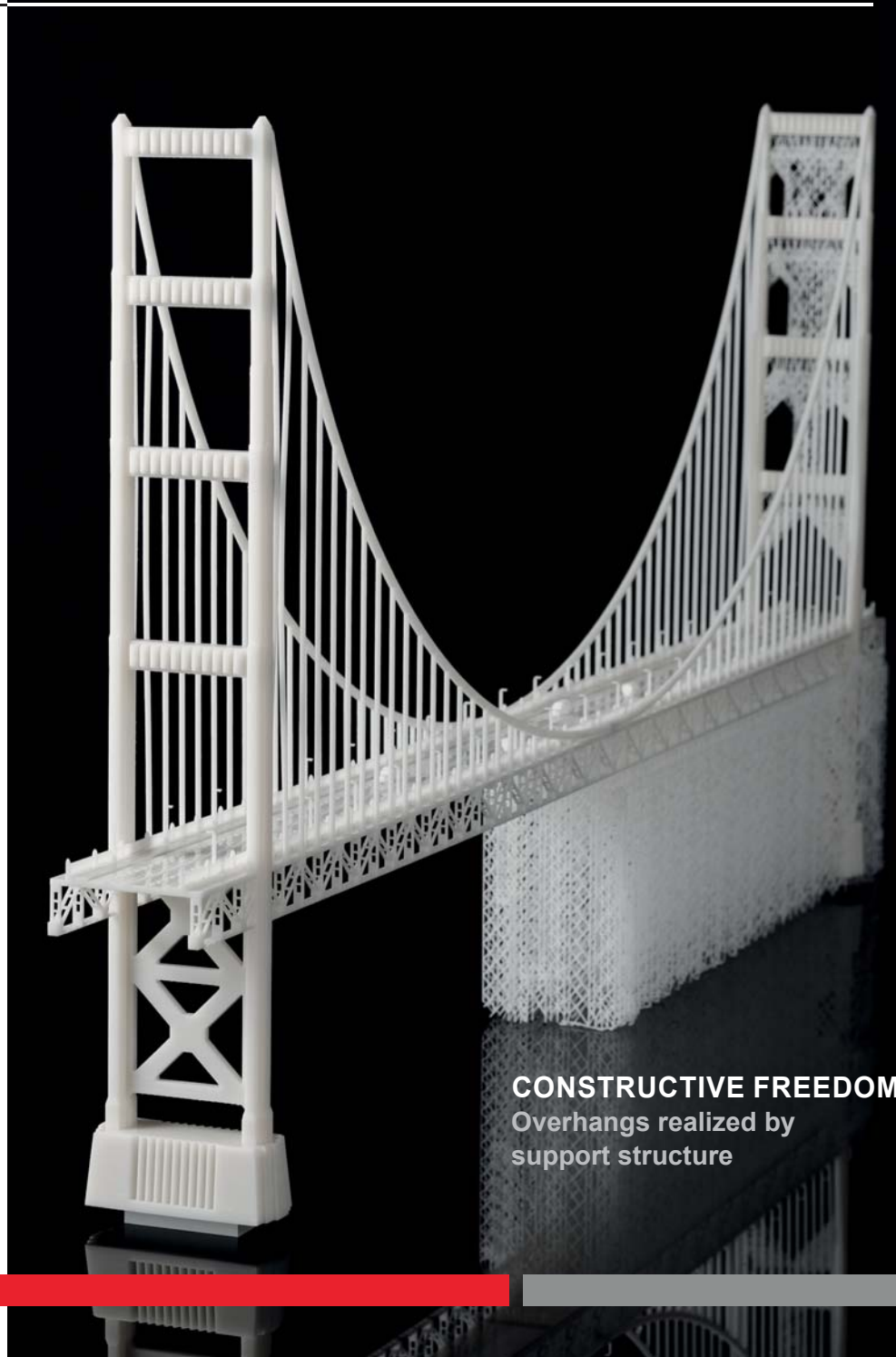
Stereolithography

Our stereolithography procedure allows you to quickly produce high-precision, accurate parts with any geometry, with intricate structures and smooth surfaces. The process uses a liquid resin that is hardened in layers using a UV laser beam. Depending on the requirements, we can work with robust, flexible, transparent or water-resistant materials. We also offer a number of downstream processes in order to be able to verify certain properties of the finished product as early as the prototype phase. The portfolio includes surface finishing procedures such as sanding, polishing, dyeing, painting, printing and overall assembly. The components are particularly suitable for form, fit and function prototypes, assemblies with snap links, casings, spotlights and lenses, flow and visualisation models, electronic and electrical devices, and medical models.

Fused deposition modelling

Our extensive FDM machinery allows us to produce items with edges up to one metre long. In addition to many standard plastics (ABS, PP), this additive manufacturing process is also suitable for materials with special properties such as conductive PLA, PETG or flame-retardant ABS.

TRANSPARENT PIECES
Surface finishing by means of sanding and polishing



CONSTRUCTIVE FREEDOM
Overhangs realized by support structure

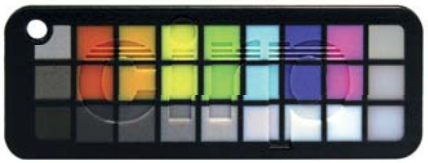
PolyJet

With our PolyJet process you can quickly produce high-precision, extremely accurate components with smooth, durable surfaces. With PolyJet technology, droplets of particularly fine liquid photpolymer are applied to a construction platform using printing heads and fully hardened using UV rays. This allows any combination of rigid, flexible, transparent or translucent materials to be used in a single printing process. We can also produce photo-realistic using more than 360,000 different colours.

Multi-material printing allows you to recreate the optical, haptic and functional properties of a wide range of final products as closely as possible. Post-processing and assembly work is reduced to a minimum.

The components are particularly suitable as grips, handles, seals, handles, pulling mechanisms, rubber linings, functional prototypes with vibration dampers, anatomy models, dental and orthodontic models, hearing aids and multi-coloured design models.

MULTI MATERIAL PRINTING
360.000 colours can be realized in one printing process



Selective laser sintering

Selective laser sintering can be used to quickly create complex and durable pieces that can be assessed not only in terms of their geometric form but also their functionality, and display similar mechanical properties to the series-manufactured product. A laser is used to produce localised fusing in layers of polyamide powder.

Mechanical components such as hinges, undercuts, hollow pieces with spatial grid structures and interior functional elements can easily be integrated. Various different filled and unfilled polyamides and thermoplastic polyurethane can be used as materials. The surface of SLS pieces can be refined by sanding, infiltration, dyeing, painting and printing.

We can also help you incorporate thread inserts and with the overall assembly of your components. The components work particularly well as functioning prototypes and series-produced parts.


© Design by Frank Kleemann

MATERIAL POLYAMIDE
Elastic, strong and thermally resistant

»Model making and mould design«
Models and prototypes fit for testing ...

MODEL MAKING AND MOULD DESIGN

Using their expertise and the polyurethane moulding process, our trained modeling experts will translate your ideas into testing models and prototypes. We offer various post-processing methods to optimize the visual and functional characteristics of the additive manufactured components depending on its particular application. The post-processing of prototypes is done manually. Our offer includes surface finishing techniques such as grinding, polishing, coloring, coating, metal coating, labeling as well as manual fitting and assembly of the components. The specific details are determined together with the client.

Our polyutethane moulding process offers a fast and cost-effective reproduction of primary models. First, the primary model is moulded in silicon and afterwards it is cast with polyurethane resin.

Model making facilities

There are various possibilities to choose from for the post-processing of prototypes:

- Coloring in water using dissolved pigments (SLA and SLS)
- 2K Surface preparation for painting with spray putty and fillers in different colors
- 2K painting on different surfaces (structured, matt or high gloss)
- Exact colour mix with RAL tomes using a Standox mix machine
- Varnishing
- Clear lacquering
- Manual polishing of painted surfaces and transparent SLA/Polyjet components
- Assembly using various techniques

HAND IN HAND
With precision throughout the entire process chain

© FAZUA GmbH

DUPLICATION
Prototypes of 20-25 castings per silicon tool

© Christian Baumann

SURFACE FINISHING
Finish and lacquer - all from a single source

© Schroeder Valves GmbH Co. KG

ASSEMBLY
Demonstration model from the production to mounting

»Rapid tooling«
Because we have
what it takes ...

RAPID TOOLING

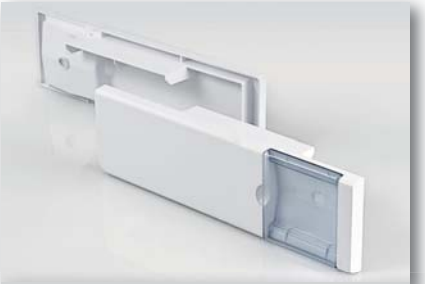
As part of our **»rapid tooling«** services, we prepare milled tooling inserts (usually from aluminium) for injection moulding. Our injection moulding machines process all commonly used thermoplastic injection moulding materials. The process can be used to prepare prototypes, preproduction series and small-run series using original materials. The delivery times and costs are much lower than for conventional series production tools.

Small-series production

We are happy to support your series start-up if your series production tools will not be available on time. By optimising our processes and thanks to consistent internal standardisation, we can offer short throughput times at attractive costs. We usually work with standardised aluminium tooling inserts reproduced internally using one of our injection moulding machines. This allows us to react quickly and flexibly. In addition to helping you produce your prototypes or series products, the team at cirp will provide assistance with putting together your component assemblies if necessary.

Mechanical processing

We use Cimatron CAM systems for mould design and NC programming. Mechanical processing is carried out at one of our 5-axle or 3-axle CNC machine centres. The maximum processing volume is 1050 x 550 x 450 millimetres. In addition to applications for injection moulds, we also produce milled parts made from steel and aluminium. The use of small tool diameters means the downstream process of erosion can often be left out. The surface of the cavity is milled to a high resolution. The surface can be adapted to your requirements based on the DIN VDI 3400 standard with a brush finish, gloss finish or a grain using a jet or erosion process.



PROTOTYPES
Test-quality pieces made using series-production materials

BIT BY BIT
Rapid reproduction of both dlicate and large components

TWO-PART PIECES
Combinations of hard and soft materials possible

SMALL-RUN SERIES
Electronic devices can be assembled

Injection moulding

Finely detailed or large components with a maximum shot weight of 1700 grams can be produced within a short lead time using all common series production materials (thermoplastics). We make components in all colours from hard and soft plastics, including two-part components that can also consist of a combination of hard and soft plastics, as shown in the image on the left. We will assemble multiple parts and supplied components on request. Typical batch sizes for manual extraction range from 20 to 1000 units, or 1000 to 10,000 units for automated tools with sliders. Improved-cycle series production tools can be made from steel on request.

Quality assurance

We attach great value to transparent processes and the professional processing of orders. Thorough quality assurance checks are carried out throughout the entire process in order to safeguard this high standard. There is also our CNC-controlled 3D measurement machine. The results of this monitoring are documented, evaluated and used to improve the process even further. The latest equipment and software allow us to professionally measure and monitor shape and positional tolerance as well as to provide high-quality 3D measurement.

Surface quality that can be achieved after milling the cavity using HSC

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