PRECISION IN PLASTICS

AUTOMOTIVE & INDUSTRY SPECIAL

JOURNAL 2010

Development | Precision Molds | Production

EDITORIAL

Dear Readers,

Since the earliest days of the automobile, GAUDLITZ has been one of the car industry's most active partners and suppliers. That is something we are immensely proud of. Such a company history is one that few firms can boast of.

Even if the last few years have been marked by negative headlines in the automotive industry, GAUDLITZ has remained true to, and never questioned the value of that history. In the future, the automotive division will play an even more significant role within GAUDLITZ locations worldwide than it has done in the past, despite the economic crisis.

Jens-René Lübben, Managing Director

Gerhard Schildbach, Director

Exhaust Control Valve (ECV)

To meet the requirements of a future, greener world, new technologies will have to be developed and cheaply put into practice.

GAUDLITZ was able to help to develop two complex components which lead to a **reduction in the nitrogen oxides** (NO_x) released by cars.

The solution to this particularly demanding task could be successfully carried out for a well-known automobile supplier some time ago and placed in production. A customer's requirement for a gearbox with a variable gear ratio initiated this design which envisaged, among other things, a **polyganol gearing.**

In order to meet this demand successfully while simultaneously providing the best quality possible, and based on our good experience in the past, we again turned to KISSsoft when developing the tooth design part.

Expertise in this field, the prompt creation of calculation tools for polygonal teeth as well as **corrosion and resistance calculations** meant the customers specifications were carried out according to the customer's specification sheet. The subsequent implementation was carried out at GAUDLITZ and took into account the plastics used.

In order to raise the gear tooth quality of the serial product to the required level, extra software specially designed for GAUDLITZ by Dontyne was used. This allows for the **interactive generation** of storage records for the production of new **gear tooth geometry** and tools. The quality of the assembly with regard to its gear components could be confirmed by non-destructive investigation after product life tests.

The injection molding of a magnet assembly with pins posed a further challenge. Consequently the exact positioning of the magnetic component is decisive for the functioning of the entire assembly. Measurement, form and location tolerances of the smallest degree were implemented.

The use of **temperature-resistant and lubricated high performance plastics** enabled the integration of parts close to the engine.

Note:

Due to legal stipulations, pollutant emissions released by combustion engines will have to be reduced over the course of the next few years.

For this exhaust gas recirculation (EGR) plays a central role in the reduction of emissions.

The ECV (Exhaust Control Valve) is a part of an engine management system for combustion engines. Electrically-actuated ECVs see to it that the fumes flow through an exhaust gas cooler or an exhaust gas cooler bypass.

This allows for a well-controlled exhaust gas recirculation at EGR rates that are simultaneously high. These components are already helping to fulfill the strict exhaust gas demands according to Euro 5 and 6.

Using tomorrow's measuring techniques more often today

With the introduction of industrial metromography at the start of 2007, GAUDLITZ entered a new world of measurement engineering.

Thanks to our customers' challenging requirements we have been able to develop wide-ranging skills and competencies in this area. This ranges from the measuring of sample parts to the **digitalisation** of components, and beyond that as well.

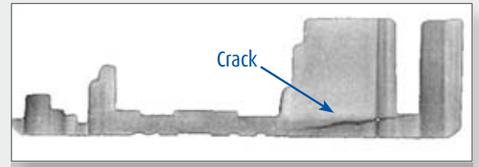
It is precisely in the area of automotive construction that many individual components are developed using simulation software. In this field we are able to call on optimum CAD data. Using metromography we can quickly carry out the **comparison** necessary between Model and CT data records for the entire internal and external **geometry.** Thanks to this, we at GAUDLITZ, in close contact with the Design, Tooling, Production and Competence departments, were immediately in a position to take the necessary corrective measures.

We are then in a position to make use of and assess the assembled data in all quality assurance areas. The highly-exact presentation provides our centre for competence with the entire range of possibilities in the area of analysis.

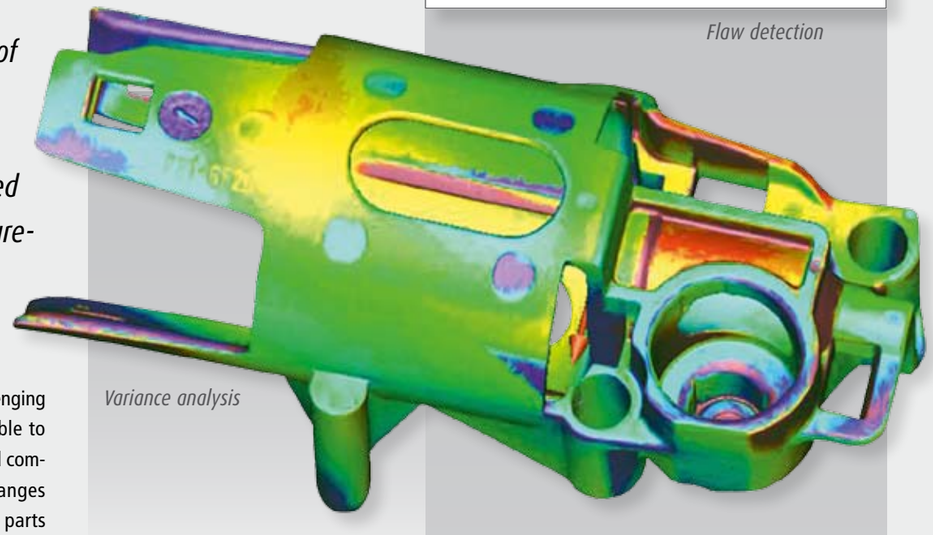
Non-destructively, we are able to carry out assembly checks, **flaw analysis,** material testing as well as porosity and damage analysis of complex components.

In this area Metrotom gives us unbeatable advantages timewise and a far higher degree of validity in comparison to destructive procedures. The measurements are speedy and efficient but highly precise at the same time.

Due to the fact that we, in the field of metromography, are also active in the **services sector,** we would of course like to be the first contact partner for our customers.

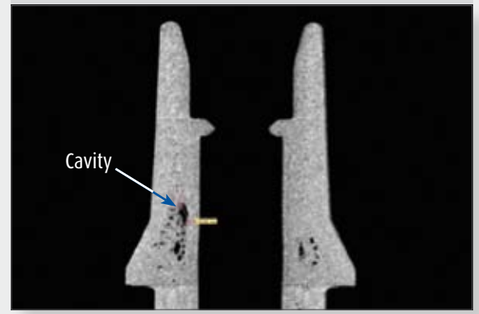


Flaw detection



Variance analysis

Tool correction



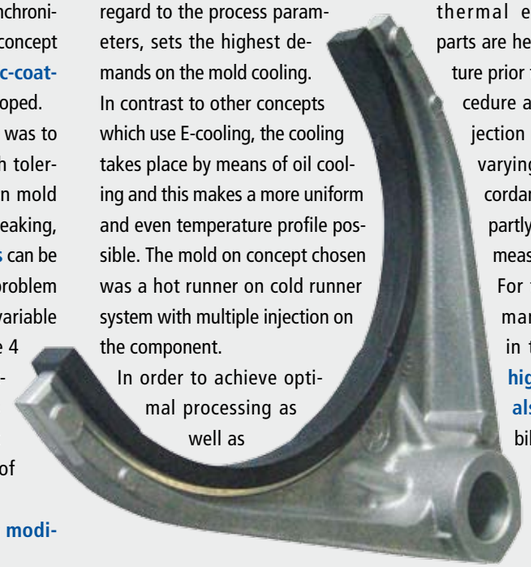
Flaw detection

Improved efficiency thanks to thermosetting plastics

For over 70 years GAUDLITZ has been engaged in the development, processing and production of ambitious **thermosetting plastic parts.**
Newly-developed thermostetting plastics with enhanced basic properties are currently being employed at GAUDLITZ, use of which can be made in many areas of the automotive industry as well as in x-ray technology and electrical engineering.
Modified melamine-phenol resin molding compounds facilitate extensive usage, among other things, in the area of **steering and brake technology** as well as in **automatic gear housing.**
In addition, this material is also suitable for parts using oil and petrol. It is intended for use in parts that produce exhaust gases as well as in compressors and vacuum pumps.
The requirement profile with regard to **heat and chemical resistance** as well as dimensional stability when coping with high dynamic loads suggests the use of the light and highly-resistant thermoplastics. Due to their very low shrinkage, parts with low distortion and with narrow component tolerances can be produced in a controlled process. The direct bolting together of components without stabilising bushes is possible as it is hardly possible to detect any shrinkage behaviour. Even **complex parts** with large differences in wall thickness can be produced from thermoplastics. The injection molding of metals is as possible as the **multi-component injection molding** of thermosetting plastics.
Seen from a technical point of view this modern material presents an alternative to the high temperature thermoplastics and to metal materials such as aluminium or parts made of dye cast zinc (there is often no need for reworking).
Today, GAUDLITZ produces parts for oil, petrol and vacuum pumps. Brake and friction clutch parts as well as switch housing and valve components in injection molding are produced. Compression molding is also becoming more important.
GAUDLITZ is on call for all its customers during the **entire process chain,** from product development, material construction and the planning of reworking to component assembly.

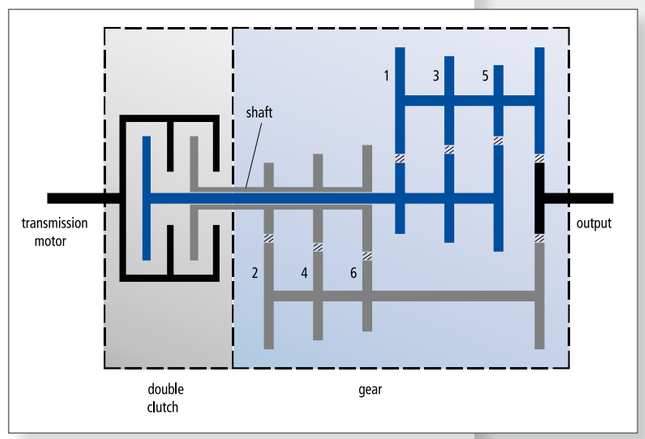
GAUDLITZ produces gear shift forks for a dual clutch transmission

Working in cooperation with the largest independent producer of synchronization systems in the world, a concept for the manufacturing of **plastic-coated gearshift forks** was developed.
In this case the real challenge was to process metal parts with high tolerance variations in an injection mold process in which, generally-speaking, only **low tolerance variations** can be trapped. The solution to the problem was achieved by means of a variable valve. The presentation of the 4 versions could be implemented by interchangeable inserts in two basic forms, a fact that contributed to a minimizing of the cost of the overall project.
The plastic material used is a **modified peek** thermoplastic which, with regard to the process parameters, sets the highest demands on the mold cooling.
In contrast to other concepts which use E-cooling, the cooling takes place by means of oil cooling and this makes a more uniform and even temperature profile possible. The mold on concept chosen was a hot runner on cold runner system with multiple injection on the component.
In order to achieve optimal processing as well as compensation for instances of thermal expansion, the metal parts are heated to process temperature prior to the injection mold procedure and transferred to the injection mold. During production varying dimensions are, in accordance with the testing plan, partly controlled by means of a measuring device.
For this project GAUDLITZ's many years of experience in the field of **processing high temperature materials** coupled with the capabilities of our own tool shop proved to be the key to success.



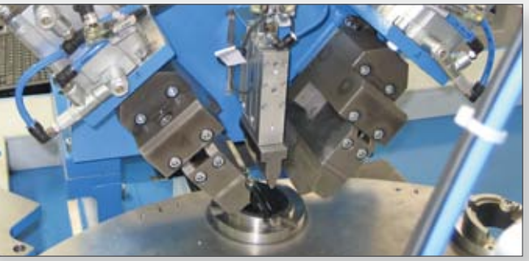
Gear change without traction interruption

A dual clutch transmission is an automated manual transmission which, by means of two clutches, makes a completely automatic gear change possible. Usually operated in a fully automatic mode, many also have the ability to allow the driver to manually shift gears (paddle shift / lever), even if still carried out by the transmission's approved electro-hydraulics. A dual clutch transmission eliminates the torque converter as used in conventional epicyclic-geared automatic transmissions. Shifts can be accomplished without interrupting traction by applying the engine's torque to one clutch at the same time as it is being disconnected from the other clutch. As the diagram on the right shows a dual clutch transmission consists of two automated transmission sub-gearboxes each of which possesses a clutch. It utilises two separate clutches for odd (in blue) and even (in grey) gear sets.



Schematic diagram of a dual clutch transmission motor

Bending Measurement Engineering for Throttle Valve Distortion



For an international automobile supplier GAUDLITZ makes **throttle valves** for E-gas-systems with integrated metal inserts. There is a profiled metal insert in the throttle valve. The throttle valve is made of a highly firm and temperature-resistant plastic. As well as the high demands placed on the plastic part, additional close tolerances have to be adhered to in the **subsequent bending process.**

For this purpose a concept was put into practice which in addition to the bending of the metal tabs also includes a measuring and control device. Readings with an **accuracy of 0.01 mm** could be depicted. Together with the air-conditioned environment the stringent demands concerning component quality are implemented.

Parts which do not conform to specifications are recognized and securely removed. By means of a broad sensor package, malfunctioning is ruled out. By **saving information of relevance** for quality purposes these tests can be made available.

The modular station allows for the recording of different valve types and diameters. Thus it is possible, at very little expense, to produce various product types at the plant.

As a result of its technical expertise and modern production equipment, GAUDLITZ makes the production of valuable plastic parts and components possible and is ready to meet all future challenges.

Internationally close to our customers

Being close to you is something we consider very important. Therefore, in addition to our main plant in Coburg we have invested in further production plants in **China** (Wuxi) and the **Czech Republic.**

However a company is not just a place where parts are produced but a living social system consisting of employees who **provide all pieces of vital information** for you.

Eight sales managers from a variety of countries worldwide are on duty for you in order to meet your **demands and customer wishes.** Each person works independently but market development is centrally-controlled from Coburg.

ECU Control Housing for active chassis control (CDC)

At the GAUDLITZ Dačice plant in the Czech Republic a new set of **Gear Housing parts,** is currently being developed alongside the more well-known precision parts.

The various types were designed both from a functional and production point of view in close cooperation with GAUDLITZ's development partner Intensa.

In the case of these products trusted processes such as the injection of metals are used as are **stamping, bending, optical and electrical testing technologies.**

The delivery shipment includes the plastic boxes as well as GAUDLITZ's new aluminium covers, made using metal stamping technology, which for the purposes of wet room application are furnished with 2K silicone seals in order to achieve the **required degree of impermeability. (IP 69)** After the assembly of the technology at the customer's location, the covers are screwed to the gearing and protect the technology from dampness and mechanical influences. Alongside the dispersing-process silicone seals used in previous projects, GAUDLITZ is looking into **silicone seals molded** directly in order to make even more complex sealing systems possible.

In the case of the ECU box for the bogie damping, the challenge in question involved designing connecting technology compatible with the **47-pin connector** which could be integrated into the project-specific, completed ECU housing.

The problem was solved by the modular injection molding of the connecter strip which is then separated and bent and finally injected into the gear housing. This **modular connector strip** can also be used later for other gear housing geometries. The gear housing made of PBT-GF30 is screwed to the aluminium cover. With the silicone dry seal the required watertight level (IP 69) and the hydrocooling and immersion tests requirements are met. The testing of the connecter strip is carried out along with the standard dimensional tests by means of a 100 % high-velocity test and a 100 % camera test, during which the connecter positions are captured.

The control boxes present GAUDLITZ with a new set of parts in which **precision injection molding** is linked to other processes. The high demand for this product shows that we are active in a market sector which will be vitally important in the future.

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Focus: Trade Fair 2010

Chinaplas® 2010 国际橡塑展

In 2010, GAUDLITZ will, for the first time ever, have an exhibition at the Chinaplas Trade Fair in Shanghai.

In keeping with the „GAUDLITZ goes global" motto, our subsidiary in Wuxi will be present for the first time ever at the **ChinaPlas Trade Fair,** which takes place in Shanghai **in April 2010.** Our production plant in Wuxi will be represented at China's most famous Plastics Trade Fair by a team made up of Chinese colleagues supported by two German representatives from Coburg. We use this platform to present ourselves as a **competent partner** in the sector and to gain new customers, thus enabling us **further penetrade the Chinese market.**

It would be a great pleasure for us to be able to welcome you at the Gienkee Joint Stand No. W1E21.

K 2010

GAUDLITZ will also be present at the **K Trade Fair** in Düsseldorf in **October 2010** in order to put its wide range of competencies in the plastics industry on display.

We hope to conduct constructive discussions and to make new business contacts in the course of this trade fair. We can be found at **Stand 5A22 in Hall 5.**

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