

Good Design

It's in our nature. acad group.



The whole development process from just one source



Our Strategy for Success

Creative designs, intelligent execution, certification, assessment, and optimization – these are the steps in a typical product development cycle. But there can be problems along the way: missing information, communication issues, and capacity problems, all of which require a high control effort.

Engineering and prototyping work together hand in hand in the acad group to execute the sub-processes that play a key role in completing a project efficiently and effectively.

Competence and Innovation: Developing the Future

All employees of the acad group possess distinguished training and qualifications and excel in their fields by offering outstanding commitment, a high level of expertise in problem-solving and absolute reliability.

The wide spectrum of services we offer, including consulting services, makes us a competent partner for both national and international customers.

Our group offers all aspects of project development, prototyping, and tooling from just one source. The wide range of services we offer allows us to deliver designs, prototypes, engineering, and drafts at a high level of proficiency. We also offer the partial results and evaluations you need for continued development, product assessment, and product certification.



acad. **engineering**

Systemic product development
Driven by evolution

acad. **prototyping**

Express Injection molding –
rapid molding
Driven by improvement

acad. **systems**

Innovative housing solutions –
development & small series
Time to market

acad engineering

Product Development for Automotive Interiors

Driven by Evolution

Do you want to gain a competitive advantage in your industry through unconventional solutions? We can offer you competent consulting, support, and focus in guiding your project to a successful conclusion. We prioritize systematic product management.

Shortest Development Lead Times

We take over responsibility for all services involved in the product development process up until your product is ready for market. Our development processes are quick, cost-effective, and fully attuned to the needs of our customers and their products.

Beispiele unserer Arbeit:

- Product development for automotive interiors
- FEM calculation
- Tolerance analysis
- Moldflow analysis
- Project and quality management
- In-house prototyping
- Drafting

Know-how in der Konstruktion

We value good design. We recognized the importance of CAD / CAM early on, and have continuously trained our employees in new developments in the field to keep them up to date. We develop engineering solutions to satisfy customer needs with all major CAD systems (and have been since we worked with CATIA in 1986!). Our specialty is engineering free-form surfaces and developing complex plastic components which incorporate diverse functionality.

We develop drafts for plastic products and help OEMs and their vendors navigate the production process.

The wide range of services we offer includes prototyping and sample building from drafts and initial patterns.



Secondary Air Injection Check Valve Housing

HANSA Development Project

Design Task

Our design task was to duplicate an existing secondary air injection check valve housing made of machined brass in an injection molded plastic version. The plastic version was to be an inexpensive and lighter alternative to the brass valve, while retaining full functionality.

Challenge

Our challenge was to incorporate the existing mounting components and fittings without changing them.

We also needed to design the existing threaded connectors on the plug and mixing unit as well as other fasteners so they could be made of plastic.

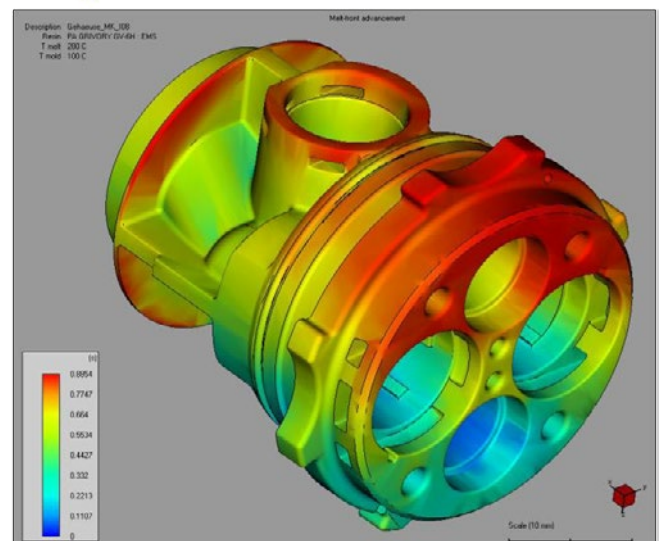
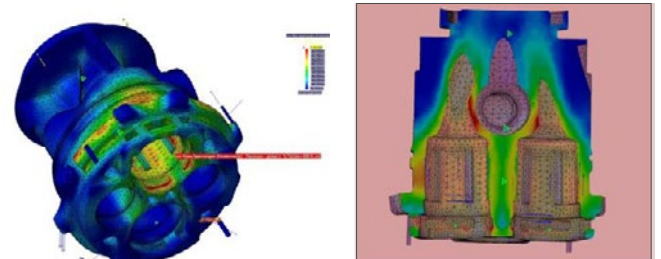
We were able to provide an initial 3D design in just a short time by carefully screening ideas and drafts.

We then guided this design through five development stages using the FEM method and parallel filling analysis in moldflow until we obtained a well-engineered prototype.



Developmental Stage

acad manufactured the prototype in a test production run of about 600 pieces made of different high strength injection molding materials. The prototypes were tested under extreme conditions, exposed to high temperatures and pulses of pressure up to 60 bar, and then tested in field trials. The knowledge we gained through testing helped us redevelop the product in a targeted manner until it was ready for serial production.



Daimler W222 S-Class

Rear Middle Armrest for F.S. Fehrer Automotive GmbH

Objective

Our objective was to develop an innovative and attractively designed rear middle armrest with a rear-seat pass through opening. We also needed to take new customer requirements and current governmental regulations into account. The armrest needed to fold up and have both a locking mechanism to fix it in its folded position as well as a stop to hold it in an open position. The customer required the middle armrest to fold down with a soft opening mechanism. Passengers were to be able to access the trunk or refrigerator when the middle armrest was folded down. The customer also required the armrest to be equipped with two cup holders, various storage compartments (normal storage for cell phones and control panels), integrated communication interfaces, a headrest with electronic height adjustment and a decorative panel (various wood grain patterns). We also needed to design the armrest to comply with applicable ECE guidelines and load specifications for various conditions. Another major challenge was to optimize both cost and weight for the component.



Process

Development was divided into five stages. We needed to create new proposals at each step of the process for optimizing use of space. We used FEM calculations at each stage of the CAD process to review and optimize load-bearing components. Designing the class A surfaces (design specifications) was a highly demanding process which required continual evaluation of feasibility, redesign, and application. We used functional models and models of available space at every step of the design process. Finally, we used all available information to design an initial prototype conforming to customer goals.



Seat Armrest SAL Smart for F.S. Fehrer Automotive GmbH

Objective

Our task was to create a well-designed, manually folding armrest at the lowest cost and with the smallest number of components possible. The armrest needed to be adjustable to any height and needed to take up only a limited amount of space while standing up to high demand and possible misuse. The armrest also needed to be designed to be interchangeable with other vehicle models.



Process

Even at the conceptual design stage, it was clear that we could not fulfill the customer's need for a component which would stand up to misuse if we used steel inserts, primarily because of the limited space available. Instead, we decided to replicate the plastic supports using long glass fiber compounds instead.

We analyzed an initial 3D data set using an FEM calculation. Then we used CAD to evaluate our options for optimizing the product. After further FEM analyses and improvements to our CAD design, we built a functional model and assessed its performance. We then evaluated the knowledge we gained from this step and used it to create a prototype conforming to customer goals.



Porsche E2 Cayenne MIKO

for csi entwicklungstechnik GmbH



acad engineering was contracted by CSI entwicklungstechnik GmbH in Neckarsulm to develop components for the middle console of the Porsche Cayenne.

Our task included conceptualizing and developing production-ready 3D models for finished functional prototypes and then for the pre-production phase. We worked on components of the middle console including the armrest, the ashtray, the Tiptronic, the cup holder, and the storage compartment.

Our goal was to take customer needs into account as well as avoid components which made squeaking or creaking noises while conforming to current ECE guidelines.

We evaluated the high-demand class A surfaces (design specifications) for feasibility and usefulness for the respective components. We used these class A surfaces to create an initial draft for the components in question, followed by a functional model. Our main

challenge was to design padding and upholstery material ready for production, and to develop a crash-resistant locking mechanism for an armrest which was foldable and adjustable in length. We also needed to take into account possible misuse of the components as well as to design a pneumatic opening lid with all associated kinematic components.

After evaluating our first functional model, the next step was to revise it using optimized class A surfaces for pre-production. We needed to take some conceptual changes into account, including modifications to reduce squeaking.

We were then able to successfully deliver a pre-production model to our customer and finally to production suppliers.



Daimler Cupholder MFA for F.S. Fehrer Automotive GmbH

Objective

Our goal in developing this Daimler cup holder was to be able to install the finished product in all Daimler platforms and to keep the number of components as well as the price low while fulfilling all customer requirements. These included creating a cup holder able to secure containers of all sizes – from small energy drink cans to 2 liter bottles.

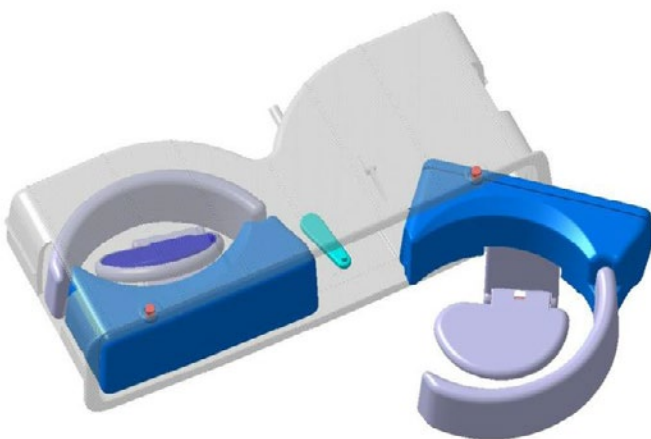
Development

In the first development phase, we examined different drafts of cup holders for the middle armrest, determined how much space was available for installation, and created a rough 3D representation of the variations using available data.

After multiple optimization phases and building several functional models, Daimler made the final selection.

In the following validation phase, acad prototyping GmbH built injection molded prototypes which we could subject to wear, thermal, noise, and abuse tests. We used the results of these tests as the basis for further phases of development and optimization.

After an exhaustive development process, the parts went into serial production and are currently available on A and B class models.



Ideas you can touch – Injection moulded prototypes

Driven by Improvement

You can't just envision progress; you have set it in motion. Prototypes are the ideal way to achieve product approval and safeguard the development process through extensive testing. Prototypes also help you recognize where you need further development. The processes available for manufacturing a prototype will depend on how far along it is in the process of development and the security measures required. If you need a prototype which is rigid enough and stable enough to be a series product and want to test the capabilities of the injection molding process, original production materials and injection molding technology will be your best option.

Prototypes for Product Development

acad prototyping creates cost-effective injection molded plastic prototypes quickly out of original production materials which deliver all the results required to safeguard, evaluate, or redevelop the product or the manufacturing technology. Our plastic components are the result of a unique combined development, tooling, and manufacturing process which offers our customers a high level of quality while saving them time and expense.

What we offer

Our customers benefit from short lead times, inexpensive tooling costs, and the ability to easily change their designs. We can create initial drafts of individual components or whole assemblies within just 1-3 weeks. These can be used to prepare comprehensive evaluations of warping, sink marks, dimensions, and

tolerances as well as basic functioning, rigidity, and stability. We can also create even small, low-volume production runs of 50 to 500 pieces inexpensively by offering low tooling costs even for highly complex components. Since our tools are easy to change and we coordinate the process directly with the customer, we can make modifications within just a few days. This procedure, combined with our ability to easily modify geometrics and trial conditions, allows us to redevelop products along with tooling and to reduce the risks involved in changing production tooling.

An Overview of Advantages for the Customer:

- High level of protection during product development
- Reduction of risk involved in changing production tooling
- Quick availability of prototype components in original rigidity / stability
- Low costs for tooling and revisions
- Representation of alternative geometries from one tool
- Optimization of gating



Rapid Molding System – RMS

Tooling Technology Based on Development

Technical Information

Prototype tools are made of aluminum unless a material with a higher tensile strength is required. We use loose components in the tool to demold undercuts, some of which we manipulate manually. We have shifted many functions performed by the mass production mould to our base molding system. We use it to pick up loose components and do not have to exert extra effort tempering and setting mold inserts. Our base molding system offers us a certain degree of freedom in manufacturing, which we use to implement smart tooling concepts. By separating an operation which would be complicated to complete in one step into multiple operations which are easy to mill, we are usually able to avoid producing EDM electrodes. This is how we are able to use the least expensive manufacturing processes to fulfill your demands for quality components. Our combination of manufacturing processes is tailored specifically to your requirements.

That's how acad prototyping is able to achieve the optimal balance of quality, production time, and cost!

We manufacture injection molded components on modified injection molding machines designed for our component prototyping process. We use the installed runnerless molding system to manufacture components significantly slower than in series production. However, we are able to modify tooling and execute changes immediately. We can even offer components with alternative geometrics using interchangeable inserts or customizable cores. Our company can conduct trials using different gate points as well as represent the limits of component geometry based on the manufacturing technology.

The only production parameters we are not able to exactly replicate are cycle time and cooling time. This does not lead to deviations in the absolute size of component tolerances, although it may lead to differences in statistical distribution. This is an optimal process for creating limiting samples at low production volume.

What We Don't Offer

- Fulfillment of processing and certification, product documentation and delivery specifications: our standard documentation only treats our specific services.
- Supplier audits, tours of our production facility and disclosure of our manufacturing procedures: our core processes are certified in accordance with ISO 9001. We are legally compelled to comply with non-disclosure agreements and to protect industrial secrets.
- Certification of manufacturing feasibility before being awarded a contract: we cannot provide any guarantee of expected characteristics. We will, of course, optimize processing parameters.
- Finishes which comply with OEM requirements: we can, however, offer various standard finishes



Trunk Pass Through Support



Product Information

Category:	Component
Component size:	350 x 240 x 30 mm
Material:	ABS
Customer requirements:	Functional trials, installation tests, stability (crash), wear test
Manufacturing system:	RMS 350
Complexity:	4 slide directions
Notes:	The component was needed in the original material to secure the pass-through assembly because it contained a locking unit.
Quantity produced:	Approx. 350 pieces
Tooling time:	15 business days



Pass-Through Locking Unit



Product Information

Category:	Assembly
Component size:	max. 170 x 105 x 35 mm
Material:	PA6GF30, ABS
Customer requirements:	Functional trials, installation tests, stability (crash), wear test
Manufacturing system:	RMS 150, RMS 90
Complexity:	Large assembly with Bowden cables, springs, and snap-in hooks in cast aluminium. 10 tools and 1 sheet metal insertion tool
Notes:	Housing with insertion molded inlay sheet. The assembly was delivered fully assembled. Aligning and procuring components like Bowden cables, springs, sheet metal, and cast aluminium components as well as final assembly was included in the scope of the contract.
Quantity produced:	250 sets
Tooling time:	25 business days



Secondary Air Injection Check Valve Housing HANSA VAROX



Product Information

Category:	Component with insert
Component size:	Ø 70mm, height 75mm
Material:	PA66 long glass fiber compound, Grivory and alternative materials
Customer requirements:	Functional trials, field tests
Manufacturing system:	RMS 150
Complexity:	7 slide directions
Notes:	This secondary air injection check valve housing originated from an in-house development contract including prototype tooling for all plastic components (6 prototype injection molding tools). This difficult to demold component with threaded brass ring inserts was produced out of various materials for hydrostatic testing.
Quantity produced:	400 pieces
Tooling time:	8 business days



2 Component Gear Shift



Product Information

Category:	Component, 2 pieces
Component size:	approx. 105 x 50 x 45 mm
Material:	PA6 and TPE
Customer requirements:	Functional trials, installation tests, preproduction series
Manufacturing system:	RMS 150
Complexity:	6 slide directions, 2 inner sliders and forced demolding
Notes:	The geometrics needed to be checked for a solid seal during the insert molding process.
Quantity produced:	450 pieces
Tooling time:	10 business days



Headrest with Airscarf DC R171



Product Information

Category:	Assembly
Component size:	max. 180 x 160 x 70 mm
Material:	PP white, ABS, TPE
Customer requirements:	Upholstery trials, functional trials, crash test
Manufacturing system:	RMS 90, RMS 150
Complexity:	4 single cavity molds (Insertion, boot attachment, rosette, blind plug)
Notes:	This assembly originated from an in-house development contract including prototype tooling for all plastic components. This required a two-step prototype tooling process. Step 2 is pictured with integrated Airscarf, as it was installed in the Daimler Chrysler SLK.
Quantity produced:	approx. 250 sets
Tooling time:	22 business days



acad systems

Innovative Housing Solutions – Development and Manufacturing of Small Series

Time to Market

We can help you bring your idea to market quickly, even with a low production volume. acad systems GmbH develops innovative housing solutions to make this possible, cooperating with electronics and Firmware developers, and manufactures small series of up to 2,000 pieces. We also procure all vendor components, secure validation and evaluation, and support you in converting your idea to high-volume production.

Housing Development

Are you looking for the right housing to fulfill your individual demands for sealing, collision protection, temperature, chemical resistance, and EMV protection? Do you need a housing that also looks great and is comfortable to use? You may be disappointed with standard housings available on the market, or find custom designs non cost-effective, especially if you need low-volume production.

acad systems can create effective and efficient housing solutions tailored to your needs. Our 5 phase development process allows us to systematically safeguard every step of development. You will analyze each individual phase after it's completed to determine when and how you wish to proceed in the next phase, which minimizes your investment and development risks.

Manufacturing Small Series

Do you have a developed product idea just waiting to go on the market? Would you like to run field tests on your product with a small series of prototypes? Do you want to produce less than 2,000 pieces of your product?

Our specialized express-injection molding system allows us to create unique special orders of plastic components up to 2,000

pieces and to adjust production to meet your budget, intended operating conditions, and target customer base. We procure all necessary components and materials in a budget-conscious manner. We assemble groups of components and evaluate them according to your requirements.

Production Tooling

Have you already had a successful product launch and predict increasing sales of over 2,000 pieces? Has your product been received well by the market?

Then acad systems can offer you not only targeted consulting and advising, but also competent production level injection molding services and high quality production tooling on time.

Overview of Our Business Concept

- Development of innovative housing solutions, especially in the medical field
- Integration of embedded systems through close cooperation with software and hardware development from our collaborating partner Reputation-Engineering
- Exclusive small series productions, especially in the medical field, of up to 2,000 units
- Inexpensive in-house manufacturing of plastic components
- Procurement of production tooling in Asia incl. Professional project and quality management

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Nemos®

Development and Manufacturing for cerbomed GmbH

acad systems GmbH manufactured a small series of plastic covers and electrical plugs for the ear electrodes of the transcutaneous vagus nerve stimulator NEMOS®.

acad systems assumed full responsibility for all phases of development, from draft to serial production, in collaboration with the customer and the electronics supplier. The main development challenge was integrating the display along with electronic components, electrical plug connections and control panels into a limited amount of space without restricting the device's ease of operation.

How Does NEMOS® Work?

Nemos® by cerbomed is used to treat drug-resistant epilepsy using transcutaneous nerve stimulation (TENS). The vagus nerve stimulator consists of a specialized ear electrode and a



stimulation unit the size of a cell phone. The patient is able to determine at what intensity and in what interval the device should electrically stimulate the vagus nerve in the ear.



RFID Snap-On Module

exclusively for Bartec GmbH and Collantz + Trojan GmbH

acad systems GmbH developed an RFID snap-on module for explosion proof applications for Bartec GmbH in Bad Mergentheim and Collantz + Trojan GmbH, in Hamburg.

acad systems cooperated closely with both companies to develop a 2 components plastic housing based on design templates which is able to stand up to high levels of mechanical stress and is waterproof. The housing also clicks into a hand scanner using an innovative snap-hook developed using MIM technology.

Besides development, acad systems GmbH also took over manufacturing of the plastic components for serial production as well as procuring mechanical components.



The snap-on module for the Motorola® MC95 series hand scanner allows users to identify objects without touching them, for example a package delivery service reading out a barcode. The BARTEC company is one of the leading providers of industrial safety technology in areas where there is a risk of explosion.





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