



integriert. innovativ. international.

LIGHT IS NOT HEAVY-GOING FOR US

Liquid metal is not just a material,
but a passion of ours.



LIQUID METAL ISN'T JUST A MATERIAL, IT'S **OUR PASSION.**

The Fritz Winter iron foundry serves as vendor and partner to the international automotive, commercial vehicle and hydraulics industry. We develop and produce rough and finished part components as well as components for complex systems, with an increased focus on lightweight designs. With our innovative manufacturing concepts, we are constantly developing further, ensuring tomorrow's mobility today. We see ourselves as a company that stands and has always stood for the protection of our environment and its resources. This is also evident in our sustainable base of materials, which uses recycled iron as the raw material for our high-tech products.

19.0 MILLION

RAW AND FINISHED PARTS IN 2021

BRAKE DISKS

BRAKE DRUMS

HYDRAULIC HOUSINGS

FLYWHEELS

SPECIAL APPLICATIONS

CYLINDER BLOCKS

CYLINDER HEADS

FRITZ WINTER OVERVIEW

In coordination with our customers, we develop high-tech solutions that provide an optimum cost/benefit ratio, with designs tailored to suit individual requirements. In the process, we actively and sustainably support our customers in achieving their CO2 reduction targets.

Fritz Winter is known for the breadth and depth of its product portfolio with more than 650 sophisticated castings. These include finished part components and complex system components, in both conventional and lightweight designs. These ship as blanks or as rough-machined/finish machined parts, according to the customer's wishes.

New developments are created using state-of-the-art technology, from the simulation all the way to specific test bench inspections. The specifications required of the product are met in terms of weight optimization as well as cost optimization. Development at Fritz Winter is

distinguished by a close partnership with our international customers. In addition, cooperation with leading development partners and universities ensures high levels of development of our enterprise. This provides our customers with essential advantages.

For Fritz Winter, the focus is on developing a prototype concept that already accounts for close-to-production conditions. Our interdisciplinary development teams master the required know-how regarding product function. Fritz Winter searches for solutions at the very highest technical level, asserting its claim as an innovation and technology leader; a claim which is further substantiated by the company's own manufacturing process developments such as ecoCasting.

OUR CUSTOMERS BENEFIT FROM:

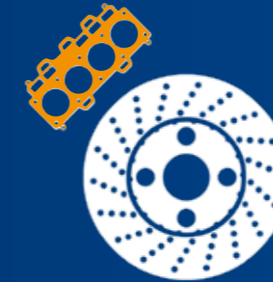
- » High process reliability of our various production lines
- » Economical manufacturing
- » Sustainable production
- » High level of vertical integration
- » Development with state-of-the-art simulation technology
- » In-house brake dynamometers
- » High melting capacity
- » An extensive portfolio with iron casting materials



**3,300 EMPLOYEES
WORLDWIDE**



**GLOBAL
PARTNER**



**> 600 COMPONENTS
MADE OF GRAY CAST IRON (GJL),
COMPACTED GRAPHITE IRON (CGI),
DUCTILE IRON (GJS) AND VARIFER**



**TURNOVER: EUR 860 MILLION
TONNAGE: 406.000 TONS**



**RAW MATERIAL:
100% RECYCLING MATERIAL**



**INDIVIDUAL
LIGHTWEIGHT DESIGN SOLUTIONS**



**FULL-SERVICE
ENGINEERING-PARTNER**



**IN-HOUSE
BRAKE DYNAMOMETERS**



YOUR GLOBAL PARTNER – FROM THE IDEA ALL THE WAY TO THE READY-TO-ASSEMBLE PRODUCT

For Fritz Winter, lightweight design, thin-wall castings and the implementation of highly precise production concepts for compliance with the tightest component tolerances are nothing special, instead they are a matter of course. We produce conventional castings as well as individual lightweight concepts tailored to suit the customer.

Our extensive portfolio of cast iron materials means that our customers can choose the optimum material to suit their requirements. For their daily work, our materials specialists have a test furnace available that was specifically designed for developing materials. Cooperation with renowned universities and other development partners compliments our offering. The breadth of materials supplied is like no other the world over. Materials developed in-house such as VARIFER are also

available. Our products are planned and manufactured on innovative state-of-the-art production lines. The flexible configuration of the degree of automation guarantees above-average product quality.

Moreover, this results in an increase in design freedom in the engineering design process. Our innovative strength is reflected in our product-specific solutions. In addition, downstream processes, e.g. machining and assembling, are already taken into account in the development stage. High-tech products are the result – extremely precise, cost-efficient and unique, from one of the world's leading iron foundries.

» Simultaneous engineering with its development tools for casting simulations, material development, CAD, FEM, etc. makes it possible for us to achieve an effective and efficient development phase, which in turn leads to shorter development times. Fritz Winter is able to produce initial near-series prototypes at an early point in development. «



Daimler Supplier
Award 2019

GLOBAL FOOTPRINT

The Fritz Winter iron foundry delivers the same excellent quality standards from all manufacturing sites to global locations. Likewise, sustainability is defined with a standard that sets the benchmark in our industry. The careful use of resources has always been one of the cornerstones of our environmental policy.

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- Sites
- Agencies and representations

IF WE DON'T TAKE CARE OF THE ENVIRONMENT, WHO WILL?

Fritz Winter has its own Environment Department with an interdisciplinary staff that advances its own solutions, e.g. special filter techniques, and creates applications for filing with the authorities. A certified environment management system (DIN EN ISO 14001:2009) as well as a certified energy management system (DIN EN ISO 50001:2011-2012) are a matter of course for us. By strategically improving our environmental performance, we gain valuable room to maneuver that allows us to develop the enterprise further.

OUR HIGH-TECH PRODUCTS ARE MADE OF RECYCLED MATERIAL



Fritz Winter shoulders its responsibility to treat the environment and its resources with care. That's why protecting our environment is an integral part of everything we do. This has always been at the core of how we see ourselves as a company. Since as early as 1953, our products have been made of recycled materials and have been capable of being completely reused. Our company actively lives holistically integrated environmental protection and has

set this forth as a principle for action. At all levels, our employees take responsibility for our environment and future generations in a special way. The environment management system helps us ensure adherence to the prescribed thresholds for our products and our production processes. It also helps us stay up to 95 percent below the applicable measured values. This is continuously confirmed by independent testing institutes.

- » The environment is no longer a niche issue – and this has been the case for some time now. Fritz Winter recognized the signs of the times at the beginning of the 1990s and set up its own department.
- » With the insight that sustainable production is only possible in combination with far-reaching changes to workflows, the Environment and the Investments/Plant Planning Departments merged.
- » Thus arose a center of expertise for Fritz Winter's declared objective – sustainable, CO2-free production.
- » Processes are re-thought, with CO2 balance and reduction already implemented as a given in the planning stage.
- » In doing so, Fritz Winter takes a holistic approach to design processes for the future that make a positive contribution towards using resources carefully and reducing the impact on the environment – an approach that successively leads to production that is more CO2-free.
- » The introduction of the ecoCasting process, the most sustainable iron-casting process in the world, demonstrates our active transition to new technologies.

QUALITY HAS A NAME HERE WITH US – **3,500 NAMES ACTUALLY**

Fritz Winter serves as one of the largest employers in Mittelhessen with high levels of investment to keep jobs in Germany. Over the past six years, Fritz Winter has invested more than EUR 225 million in its various sites and in doing so is well above the industry average.

IRON RUNS IN OUR VEINS!

Fritz Winter views offering professional training as a social responsibility. Every year 50 young people start training in the company. Upon signing the training contract, they are guaranteed a position of responsibility after they finish their training. In addition, every year, several university graduates successfully complete their final thesis in collaboration with Fritz Winter. The high value placed on training at Fritz Winter is underscored by the investment in the new training center. More than EUR 750,000 went towards the meanwhile 970 m² building, which is used exclusively for training young people.

OUR STAFF ARE OUR GREATEST ASSET

Besides 14 different types of career training, Fritz Winter provides an opportunity to take part in a combined vocational training and degree programs in four different fields. At Fritz Winter, all corporate activities revolve around the people, who are the heart and soul of the company. This high esteem accorded the employees goes hand in hand with solidarity and a sense of responsibility. Fritz Winter employees have a high degree of self-determination, the freedom to make their own decisions and individual responsibility. They are involved in company processes via team and department meetings as well as via the operational proposal system in place in the company. A vibrant company culture, a good work environment and high levels of identification on the part of the employees set Fritz Winter apart.

As a rule, people tend to stay with the company for a long time. The comprehensive offering of further qualifications secures and supports the highest levels of knowledge and training. The conviction behind this is that employees who are satisfied and trained well are the only ones able to contribute significantly to the success of the company.



WE LOVE WHAT WE DO

Making heavy things light.

Enabling the impossible.

Perfecting processes.

Reacting flexibly.

Being available worldwide.

Making a difference long term.

Lightweight brake design from Fritz Winter

WE HAVE THE SOLUTION TO YOUR CHALLENGES

Fritz Winter's lightweight design concepts are the perfect amalgamation of agility and sportiness combined with the aspects of safety and sustainability. The weight reduction improves driving dynamics and lowers CO2 emissions. In this way, Fritz Winter solves many challenges.

LIGHTWEIGHT DESIGN

- » Weight reduction
- » CO2 reduction
- » Braking comfort

COATING

- » Emissions
- » Corrosion
- » Performance

MATERIAL


- » Natural frequency
- » Absorption
- » Wear

FRITZ WINTER OFFERS THREE DIFFERENT LIGHTWEIGHT DESIGN CONCEPTS.



PLUG-IN


- » Two-piece brake disk
- » Steel hat/Gray iron friction ring

 Weight reduction: 10–15 percent



PIN DISC


- » Two-piece brake disk
- » Aluminum hat/Gray iron friction ring

 Weight reduction: 10–15 percent



CAST-IN

- » Two-piece brake disk
- » Steel hat/Gray iron friction ring

 Weight reduction: 10–18 percent

OUTSTANDING QUALITY

- » Reduced component weight
- » Appealing design

CUSTOMER BENEFITS

- » Lower vehicle weight
- » Improved driving dynamics

GLOBAL FOOTPRINT

- » Modular process
- » Global availability
- » Process localization possible

» Developing and implementing innovative lightweight design concepts require new technologies and unique casting methods.«

SHAPING A SUSTAINABLE FUTURE

»Value our resources«

THE FOCUS IS ALWAYS ON CUSTOMER-SPECIFIC REQUIREMENTS

- » Reduction of vehicle consumption long term
- » Conservation of resources
- » Use of cost-efficient material
- » Global availability

»One of our most important goals is the implementation of innovative lightweight design technologies. With our new ecoCasting manufacturing technology, we are setting new benchmarks in the foundry industry in terms of quality and the environment.«

PASSENGER CAR ECOCASTING – THE NEW BENCHMARK ALUMINUM IS A THING OF THE PAST



MORE AFFORDABLE MATERIALS

Cost savings of at least 28 percent compared to an aluminum cylinder block mean considerable cost-efficiency – with a standardized but flexible process and outstanding quality guaranteed.



LIGHTER PRODUCTS

Our product is 30 percent lighter than a conventional gray iron cylinder block. This not only saves on resources, it also supports our customers in the long term in achieving their environmental targets.



LOWER ENERGY COSTS

There is only a slight difference in weight of 1.5 percent compared to the same engine with an aluminum cylinder block (HPDC). But, compared to aluminum, producing a metric ton of cast iron only takes about a fifth of the energy.



PRECISE WITH LOW WALL THICKNESS

The engine block is the largest and heaviest part of a combustion engine. Our unique technology ensures top precision and succeeds in reducing the wall thickness to a mere 2.5 mm – and with a tolerance of just +/- 0.5 mm.



PRODUCT AND PROCESS AVAILABLE WORLDWIDE

Our high quality standards of the innovative light-weight construction of cast iron are available worldwide. The standardization of our processes and tools guarantee a high process reliability – from the development to the series.



RECYCLABLE RAW MATERIALS

Our raw materials consist of recycling material which means that our products are 100 percent recyclable. With this, we protect the environment and require less energy than for the conventional iron casting process or in comparison with the production of aluminium.



MOST SUSTAINABLE IRON CASTING PROCESS WORLDWIDE

The ecoCasting process is the new benchmark among the sustainable pouring processes. By means of the process without the use of mould sand, the associated mono-sand-system and the closed circuit of materials, big savings can be achieved for resources, energy and water.



OUTSTANDING QUALITY STANDARD

Fritz Winter quality means for our customers to receive a product according to specification that ensures an undisturbed utilization. The quality management is completely integrated in all business processes. We say: "Castings of quality!"

OUR PASSION UNBRIDLED HIGH-TECH PRODUCTS IN LIGHTWEIGHT DESIGN

We have revolutionized the iron foundry and set new benchmarks in the foundry industry with our innovative ecoCasting manufacturing technology. Developed to harmonize economy and ecology, our green foundry offers future-oriented solutions in gray iron that are always focused on customer-specific requirements. Our innovative processes for manufacturing cast parts for the international automotive, commercial vehicle and hydraulics industry are trendsetting in view of the ecological, economic and technical parameters.

INVEST NOW IN THE FUTURE!

Secure the success of your company through cost-efficiency and sustainability with the light-weight cast-iron design concepts from Fritz Winter – from development to series production. We were so convinced by our completely new manufacturing process that we invested more than EUR 50 million in implementing this process at the beginning of 2013. An investment that paid off. Find out for yourself!

OUR MOTIVATION

As a vendor and partner to the international automotive, commercial vehicle and hydraulics industry, from the very start it was clear to us that innovative lightweight design concepts would require new technologies and unique casting methods. Aiming to create high-precision high-tech products, and integrate all customer-specific requirements in the process, the implementation provided us with particular motivation.

ecoCoating

COATING METHODS FOR THE FUTURE

In order to reduce particulate matter, improvements in emission behavior, especially with regard to brake wear, are critical. This is the reason that, for several years now, Fritz Winter has been intensively involved in researching suitable coating methods so that it will be possible to meet the limit values required as a result of the future Euro 7 standard. The Fritz Winter LMD (laser metal deposition) process which was consequently developed comprises an innovative coating system on the brake surfaces that drastically reduces particulate matter emissions. The coating applied by means of laser metal deposition reduces wear as a result of the admixture of suitable carbides;

moreover, the corresponding matrix material prevents self-corrosion of the friction surfaces.

In order to be able to reliably ensure the consequently longer service life in the vehicle, the remaining areas of the brake disk are treated with the company's own LTP (long term protection) coating. As a result, the combination of LMD and LTP processes constitutes a perfect solution to meet the requirements of the Euro 7 standard as well as the requirements of electromobility.

OUTSTANDING QUALITY

- » Protection against corrosion and wear by applying a layer of stainless steel and a hard material
- » Reduced particulate matter
- » Glossy surface

CUSTOMER BENEFITS

- » Compliance with Euro 7 standard
- » Improved performance
- » Improved corrosion protection

GLOBAL FOOTPRINT

- » Modular process
- » Global availability
- » Process localization possible



»For us, as one of the very first recycling companies, the subjects of sustainability and environmental protection have always been the cornerstones of our company philosophy. This means creating economic and ecological solutions for the future.«

IRON FOUNDRY 4.0 THE MOST SUSTAINABLE FOUNDRY PROCESS

Our innovative casting method requires no molding sand. As a result, there is no need for transporting or disposing of it after. The core sand used is completely recycled. As a result of this mono-sand system with its closed-loop material flow, the ecoCasting process is the new benchmark when it comes to sustainable casting methods.



**NO CONSUMPTION OF
POTABLE WATER 22 MILLION
LITERS SAVED**



LOWER CO2 EMISSIONS



100% GREEN ELECTRICITY



COMMERCIAL VEHICLE ECOCASTING **FURTHER DEVELOPMENT**

Following the use of ecoCasting technology for series passenger car cylinder blocks, which began back in 2015, the technology has been developed further over the past few years in order to be able to produce heavy cylinder blocks for commercial vehicles as well. The new ecoCasting foundry resulting from these efforts provides ideal conditions for meeting the future requirements of customers from the commercial vehicle segment. By means of the specific integration of components as well as the utilization of considerably lower production tolerances, it is possible for us to support our customers worldwide with significant weight savings so that they can achieve their CO2 emissions targets.

Not only does the further development of the ecoCasting technology offer technical benefits, it also delivers considerable advantages in the area of sustainability. The process consumes less energy and thus saves CO2. And the component itself saves CO2 as a result of the difference in weight. Thanks to the casting process which requires no molding sand, we save tons of CO2 and millions of liters of water, and implement closed-loop material flows. This leads to a decrease in the consumption of resources such as sand. The major savings of water and CO2 were recognized with a six-digit subsidy from the German Federal Office for Economic Affairs and Export Control.

OUTSTANDING QUALITY

- » Dimensional stability
- » 4.0 mm wall thickness
- » Tolerance reduction
 - +/- 0.5 mm wall thickness tolerance
 - +/- 1.2 mm general tolerance

CUSTOMER BENEFITS

- » Weight reduction
- » Component integration / Function integration
- » Representation of more complex structures
- » Advantages in machining

GLOBAL FOOTPRINT

- » Modular process
- » Global availability
- » Process localization possible

**CO2
REDUCTION**

**WEIGHT
AND COST
REDUCTION**

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WE VALUE OUR RESOURCES

Developed with a balance of economy and ecology, our sustainable foundry offers future-oriented solutions in gray iron.