



GRENZEN VERSCHIEBEN



APPROACH TO SUSTAINABILITY





GRENZEN VERSCHIEBEN

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FOREWORD

No other word has influenced the last few years as much as the word "sustainability". A responsible approach to managing our resources with respect to the environment, the economy and society as a whole is now becoming more urgent than ever. For Fronius, the long-term thought processes and actions needed for this approach have been a matter of course for years. Sustainability forms the basis of our entrepreneurial practice and is a central part of the company's mission statement.

This is why our company values are so closely linked to our understanding of sustainability:

Social

Our work with customers and partners is characterised by mutual trust and respect. Fronius employees can count on the company's support.

Cost-effective

We care about our economic independence. We are prudent and work towards making a sustainable profit.

Innovative

We enjoy innovation. We are excited by developing and applying revolutionary new technologies and processes.

Environmental awareness

Our grandchildren will be proud of us for the decisions we make, because we are committed to our environment and to society. The technologies we are developing play their part in taking care of the world's resources.

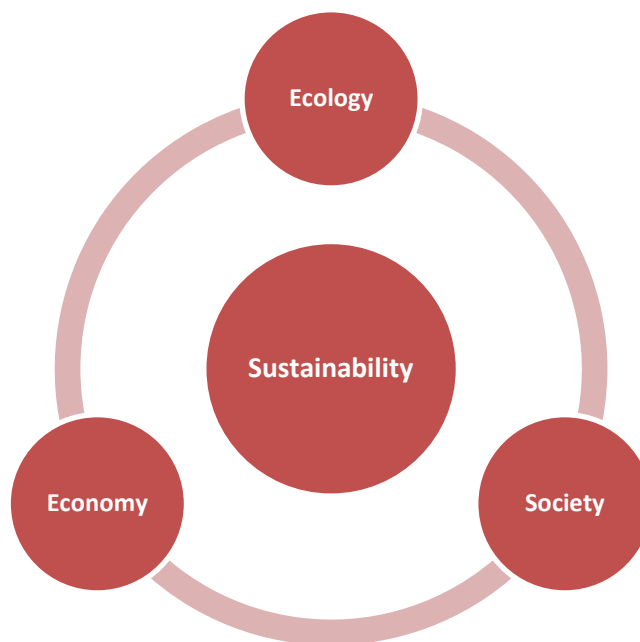
Quality-conscious

We constantly ensure that the quality of our products and services is in line with the demands placed on us.

WHAT IS SUSTAINABILITY?

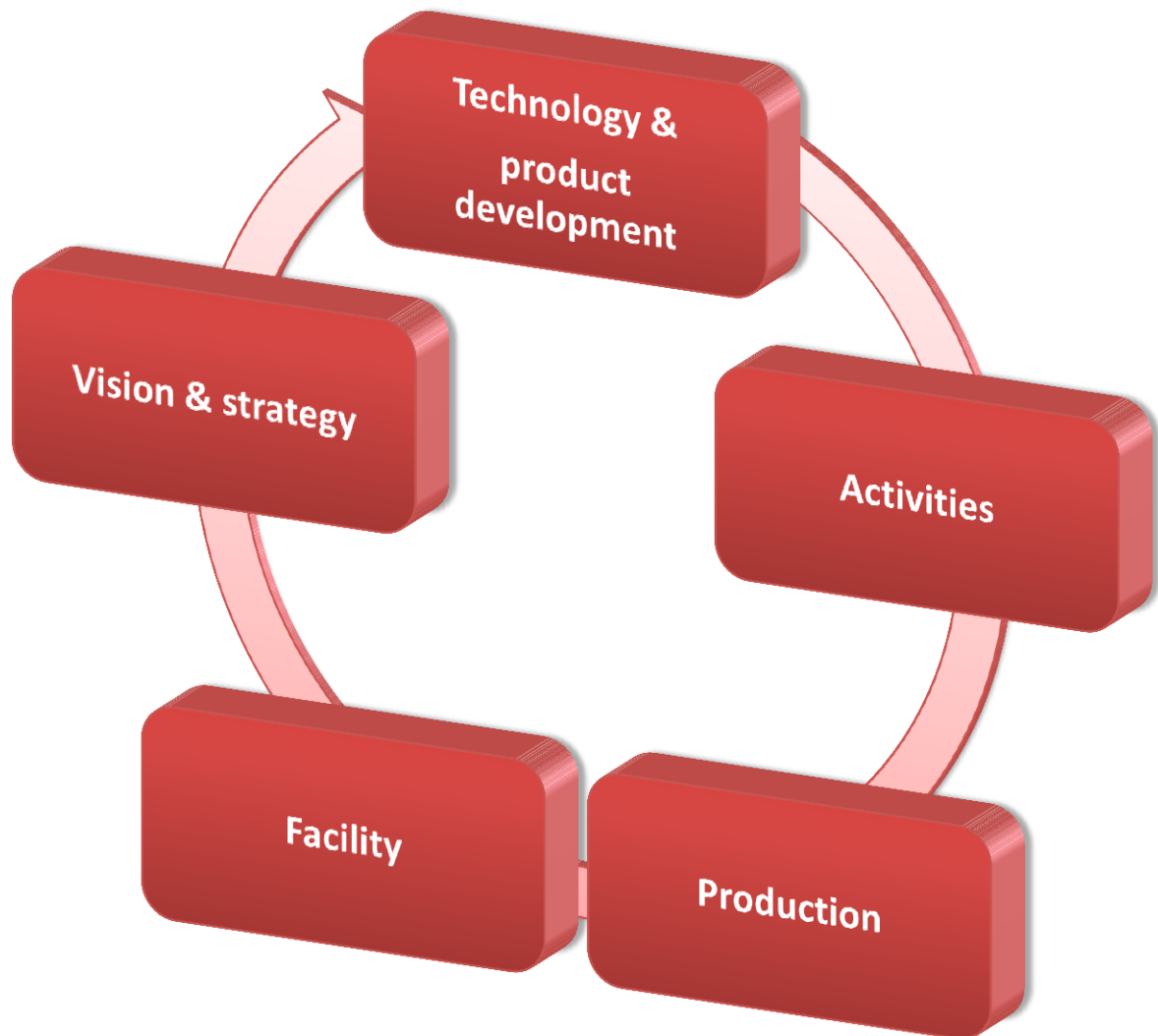
"Sustainability" – a word that, just a few years ago, only few of us knew. Today, "sustainability" has many meanings: environmentally friendly, social, forward-thinking, trustworthy or economical. The term is thus employed when the message that a company would like to get across is: "Our actions are based on solid principles. It's not all about a fast buck."

Sustainable development means giving the same consideration to environmental and social factors as economic factors. Building a sustainable economy thus means that our priority must be to leave our children and grandchildren an intact ecological, social and economic structure. One is not possible without the others - they are all interlinked.



Fronius believes strongly in a sustainable approach to the use of energy and resources. "Environmental awareness" is one of our main company values. The technologies we are developing play their part in taking care of the world's resources.

Fronius works with the theme of sustainability on several levels:



TECHNOLOGY & PRODUCT DEVELOPMENT

The focus in product development is on conserving resources and increasing cost-effectiveness.

Welding Technology Division

Product lines are developed in compliance with the "**ROHS** – Restriction On the use of certain Hazardous Substances" and "**WEEE** – Waste of Electrical and Electronic Equipment" standards. Other important considerations in this context are the material aspect (recyclability of used materials, e.g. plastics), the welding process (working environment of metalworkers, e.g. MWC values for CMT) and the effect of magnetic fields on the human body (EMF).

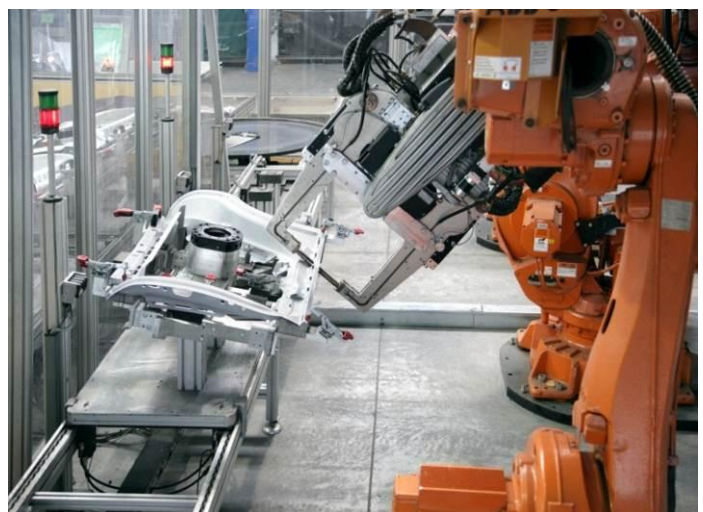
In order to maintain the quality and service life of our products, components are designed with a long service life in mind for the split TPS power sources. Numerous tests are carried out to demonstrate the quality of our products, in which we sometimes aim for even higher results than those specified in the standard.

The technologies developed make a significant contribution to sustainability.

- / The inverter technology and high level of efficiency means energy is converted effectively, while CMT and DeltaSpot enable us to reduce energy consumption when joining certain materials.



CMT (Cold Metal Transfer)



DeltaSpot (spot welding)

- / Our product ranges exhibit intelligent energy concepts (e.g. efficient cooling mode).
- / Using CMT has enabled us to reduce emissions, making the workplace healthier.
- / Virtual Welding provides fantastic support for training sessions and means fewer materials are used.



CMT (Cold Metal Transfer)



Virtual Welding

- / The use of modular and upgradeable systems increases the life cycle of our products.

Battery Charging Systems Division

The clear advantage of products from the Battery Charging Systems division in terms of environmental impact and sustainability is their energy efficiency. Using **high-frequency technology** means that **resource-intensive components** like the transformer can be made considerably more compact and using the minimal amount of materials. The devices are produced using fewer and very robust components, resulting in a **long service life**.

Active Inverter Technology provides optimum battery service life as well as "ultra cool" charging.

The measures taken to reduce energy consumption and demand for raw materials are numerous.

- / The various charging characteristics, which can be adjusted to perfectly match different battery types, allow high levels of energy efficiency to be achieved.
- / Using high-quality parts and high-frequency technology guarantees efficiency levels of 96%.
- / To avoid peak currents, time delays and a gentle current rise are applied. There is also a standby mode option for zero energy consumption and integrated power factor correction.
- / An adjustable power feature keeps energy consumption to a minimum when charging smaller batteries.



Fronius SELECTIVA (battery charging systems for traction batteries)



Fronius ACCTIVA (battery charging systems for starter batteries)

Solar Electronics Division

The **product cycle** for our inverters is around **20 years** – because the manufacturing of components for photovoltaic systems is very demanding in terms of energy consumption and cost, it only makes sense ecologically and economically to produce them if the service life of the resulting system is suitably high. A longer service life means better conservation of resources and increased cost-effectiveness.

- / Service life targets are considered right at the start of product development, in the initial drafting stage, which influences the choice of materials, design, etc.
- / Failures experienced by customers during operation have been documented and investigated by Fronius for decades. This allows weak points to be eliminated and many proven components can be used in new products.
- / Supplier information is also important when determining service life targets. All stress issues that arise over a 20-year period of operation are narrowed down to individual components in the system. This provides the manufacturers of the installed purchase parts with clear specifications in terms of robustness and service life.
- / Accelerated tests show whether the service life target has been met in an acceptable time frame. This test programme was developed through analyses of possible long-term damage mechanisms.



Fronius IG Plus series

Fronius owns 878 active patents. In the area of "Research & Development" a new technology centre was opened in Thalheim/Wels in 2011, in which 418 employees work to the latest high-tech standards.



Thalheim R&D site

Extensive quality control tests are carried out during the product development phase. These include **vibration tests, UV tests, salt spray tests, icing tests, weathering tests and reliability tests**. The stability of the packaging is also checked. We test beyond existing standards to meet our customers' requirements. Simulations are employed to check the features of new products at an early stage in their development.



Icing test



EMC test

The development process used for implementation of pre-development, product range and adaptation projects is based on a phase model with clearly defined QualityGates, which cover all stages from the initial specification draft request right through to the ramping-up of production.

Products can be subjected to very specific quality requirements.

- / A photovoltaic system with Fronius inverters has been built in the Negev desert in Israel. There, the inverters are exposed to extreme environmental conditions such as heat, sand and rain.
- / The Fronius Time Twin Digital systems can weld in temperatures as low as -50°C , e.g. in the construction of a 3200 km long gas pipeline between Alaska and Chicago.
- / Fronius developed a battery charging system for the dispatch warehouse of paper manufacturer SAPPI. The system supplies power seven days a week in a three-shift operation. The battery charging system at Schiphol airport in Amsterdam was installed outside and must be able to withstand extreme weather conditions.

Fronius also produces renewable energy with the Fronius Energy Cell. Direct current is produced from sunlight using one of the photovoltaic systems. This would normally be converted to alternating current by the inverter and fed to the consumers. If power is not needed straightaway, the energy cell converts the current to hydrogen via electrolysis – this can then be temporarily stored in cartridges, as required. The hydrogen is then converted back to current when it is needed. The **HyLOG project** provided an internal logistics solution for Sattledt, which is based on the energy cell.



Refuelling the energy cell



HyLOG (internal logistics solution)



ACTIVITIES

Fronius has joined the regional **Aimtal Climate Alliance** in Pettenbach. This Alliance is committed to reducing emissions that are harmful to the climate and to protecting the rainforest.



Membership of the WWF Climate Group

The WWF CLIMATE GROUP is a platform of companies in Austria that are committed to climate protection. Members of the WWF CLIMATE GROUP fully accept their responsibility of thinking and acting in a climate-friendly way and offering commercial solutions.

As a member of the WWF CLIMATE GROUP, Fronius is committed to energy efficiency and sustainability in order to reduce global CO₂ emissions. This is our way of showing that we are adhering to the "2 degree limit" decided at the G8 summit - the average air temperature of the planet must not rise above two degrees Celsius if we are to prevent mass extinction of animal and plant species.

As a climate-responsible actor and partner of the WWF CLIMATE GROUP, we are committed to the following goals:

- / Reducing our CO₂ emissions by at least 15% in the next three years
- / Raising widespread awareness among our customers, employees and partners with regard to energy efficiency and sustainable use of resources

Since 2008, Fronius has implemented the following projects in collaboration with the WWF:



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- / Fronius equipped the WWF office in Laos, which employs 50 staff, with a grid-connected solar power system. For the first time in the history of Laos, surplus electricity produced by solar power is being fed into the public grid.
- / Fronius has installed two weather stations, 60 night vision cameras and path lighting, all of which run on solar power, in the WWF panda reserve at Wanglang in the province of Sichuan, southern China.
- / In the Thap Lan National Park in Thailand, which is located some 200 km east of Bangkok, WWF operates a ranger station, which is responsible for maintaining the local tiger population. Fronius has installed a photovoltaic system at this ranger station.

PRODUCTION

Various support systems are available for production processes, such as work instructions, test schedules and sample parts. These contain essential parameters for the manufacturing of high-quality products. **Safety instructions** and **documented procedures** are also available.

A standardised process sees products make the transition from R&D to series production. This process ensures top quality and stable processes, and also provides the foundation for simultaneous engineering, procedural analyses and sample approval before entering series production.

New systems/lines are tested for **ergonomics** and **safety**, subjected to a technical inspection and approved by the relevant departments. Testing equipment is periodically inspected and certified.

The process parameters are provided by R&D in the "Technical Manuals". Depending on the complexity of the process, the process parameters for quality assurance are monitored and managed by the control circuit.

Job descriptions and methods recorded in the qualifications matrix ensure that employees have the right skills and continue to undergo professional development. Employees joining the company receive a training plan relevant to their duties. A continuous improvement process (CIP) also identifies and harnesses the potential offered by each employee.

Audits are used to check workplaces, machines, equipment and tools. "5S" helps keep areas clean and pinpoints any deviations from the standard. Maintenance and repair schedules implemented by special teams ensure maximum machine availability and reduce unscheduled downtimes.

To guarantee proper identification and traceability of products, a process is in place to ensure that there is no mix-up of products and technical documents, from receipt to delivery. The end identifier ensures that products and individual parts can be identified in the utilisation phase.

In the area of warehouse logistics, a continuous goods identification process along the supply chain ensures that parts and products are identifiable at all times. Technical specifications for parts are documented in a part database.

Defects or goods that fail to meet the required quality are labelled separately and temporarily stored in a quarantine area.

Various measures reduce consumption of energy and raw materials when manufacturing products.

- / **Energy efficiency** is closely monitored for new machines.
- / For example, to lower energy consumption in the electronics the ice formation effect of the nitrogen evaporator is used to supply cooling water for the system.
- / During assembly, energy is recovered when carrying out final inspections on power sources and solar equipment.
- / Mechanical and electronic parts and materials that can no longer be used are directed separately into a recycling system.
- / In mechanical manufacturing, certain programmes arrange production parts optimally on the sheet of metal, minimising cut-off scrap.
- / With electronics, defective assemblies and end devices are repaired if possible.
- / Depending on the level of utilisation, machine capacities are harnessed in a manner that conserves resources as far as possible.
- / The "last user rule" is in place to ensure that the last employee switches off the entire power circuit in a defined area so that no devices are unnecessarily consuming energy.



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Measures for stabilising manufacturing quality include continuous product and process audits, employee qualifications matrix, further education and training opportunities, new technologies, process monitoring, poka-yoke training and continuous monitoring of important KPIs (key performance indicators).

During final assembly, assemblies and individual parts are subject to 100% testing and/or preliminary testing through the FTS (Final Test System).

FACILITY

The former industrial district surrounding the train station in Wels has been re-developed as an energy-independent site for use as a new Fronius international sales hub. The historic brick building was left unchanged in some respects, but completely - and very energy-efficiently - modernised in others. Before the renovation work, heating requirements stood at around 225 kWh/m² usable floor space; afterwards, energy autonomy for heating and cooling was achieved by combining geothermal energy with solar power.



Maintenance and highly efficient modernisation of old structures, especially the historic brick building

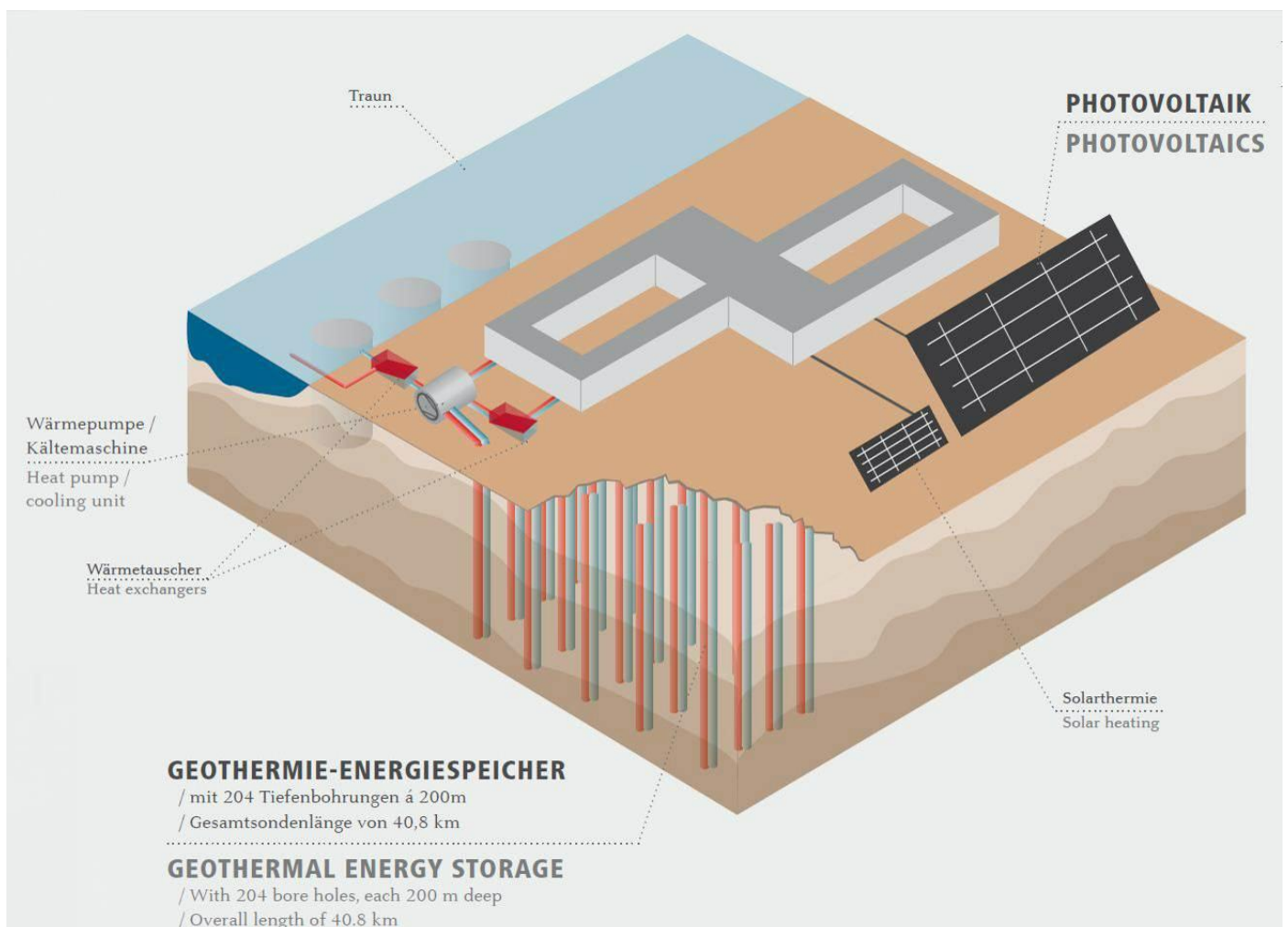


Active Energy Tower (energy-independent renovation in Wels)

The Fronius R&D site in Thalheim is a flagship building for large numbers of highly-qualified employees and future graduates of universities, higher technical institutes and technical colleges.

The compact design of the building makes it an excellent quality workplace with a high degree of energy efficiency. Integral parts of the Fronius energy concept are the geothermal energy storage device and photovoltaic system.

In future, the huge amount of thermal energy from the various R&D testing processes at the Thalheim site will be used to heat the complex in the winter and the geothermal array will serve as a mass storage system. To meet the cooling demand of the system in the summer, water from the nearby river Traun is used as a source of geothermal energy.



Fronius is a large producer of renewable energy, helped by photovoltaic systems at nearly all company sites. The photovoltaic system in Sattledt is one of the largest in Austria, with a module area of 3800 m², an annual yield of 680 MWh and 615 kWp of installed power. Enough power is produced to meet the energy needs of 160 households. Photovoltaic systems do not produce any emissions. They are positive energy converters and using them does not use up any resources at all.



The Sattledt site has one of the largest flat roof photovoltaic systems in Austria



Photovoltaic systems at the Wels site



At the Pettenbach site, a climate protection façade has been erected with glass-integrated PV elements.

In addition to the photovoltaic systems, a **biomass heating plant** is also being operated in Sattledt. It meets 80% of the heating requirement. 95% of the heat from the biomass heating plant is provided using wood chips from exclusively local suppliers. To generate this heat in another way would require burning 600,000 litres of heating oil. The remaining 20% of the heating requirement is covered by a **geothermal array (118 holes for every 100 to 150 metres)**. In addition, the sites in Wels and Thalheim have similar systems that in the summer months also meet part of the cooling requirement.



Biomass heating plant in Sattledt covers 80% of the heating requirement

VISION & STRATEGY

Here at Fronius, we constantly ensure that the quality of our products and services is in line with the demands placed on us. As a core company value, quality awareness is at the forefront of all employees' minds. The Fronius quality promise means that our customers can be sure of receiving goods and services that are right at the cutting edge and are of the very best quality on the market.



Quality awareness as a core company value

- / Fronius has been certified since 1993 and is continuing to drive forward its documented quality management system in line with ISO9001 requirements.
- / The incoming goods inspection for purchase parts is carried out using various spot test instructions and continuous 100% testing requirements for safety-critical components. Incoming goods, intermediate and final inspections are carried out by trained personnel using calibrated measuring and testing equipment. All finished products are subject to a 100% final inspection before delivery to the customer.



Incoming goods inspection



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- / Fronius uses **supplier, system, process and product audits** as proof of compliance with the stipulated requirements. Production sample audits of products are carried out during the manufacturing process. A regular external assessment of our quality management system is carried out by an external certification company or as part of customer audits. This helps to ensure that our processes are fully compliant and sustainable.
- / After-Sales activities are carried out to ensure the same service quality all over the world, local on-site technical support and the division dependent standard warranty.

Supply chain management

In supply chain management, all suppliers are inspected annually through the "**supplier assessment**" process. The supply chain management strategy specifies that when selecting suppliers, **environmental factors** should also be considered. All approved suppliers are documented in a list. We endeavour to list only **ISO-certified suppliers**.

Orders and approvals are checked in line with **commercial, technical, quality requirement, customer requirement and quality certification/documentation** criteria. Orders to suppliers are processed in line with defined processes. Products can be allocated to the relevant technical documentation at any time, as well as batch tracing for each article.

Fronius also observes various environmental guidelines to encourage an improved **environmental protection** situation at our suppliers and contract partners. The

- / Chemical products and ozone layer regulation,
- / WEEE Directive (Directive 2002/96/EC)
- / REACH (Regulation (EC) No. 1907/2006)
- / RoHS (Directive 2002/95/EC)
- / Prohibition of chemicals regulation
- / Regulation on the use of hazardous substances

are observed and implemented.

At Fronius, only reusable packaging is used and Fronius containers are used most of the time. This starts in incoming goods, where the goods are unpacked and deposited in the ESD chutes. This is an advantage for the manufacturing department as the goods then arrive free of packaging. Many suppliers already make deliveries in Fronius containers, in order to save on packaging materials.



Electronics production