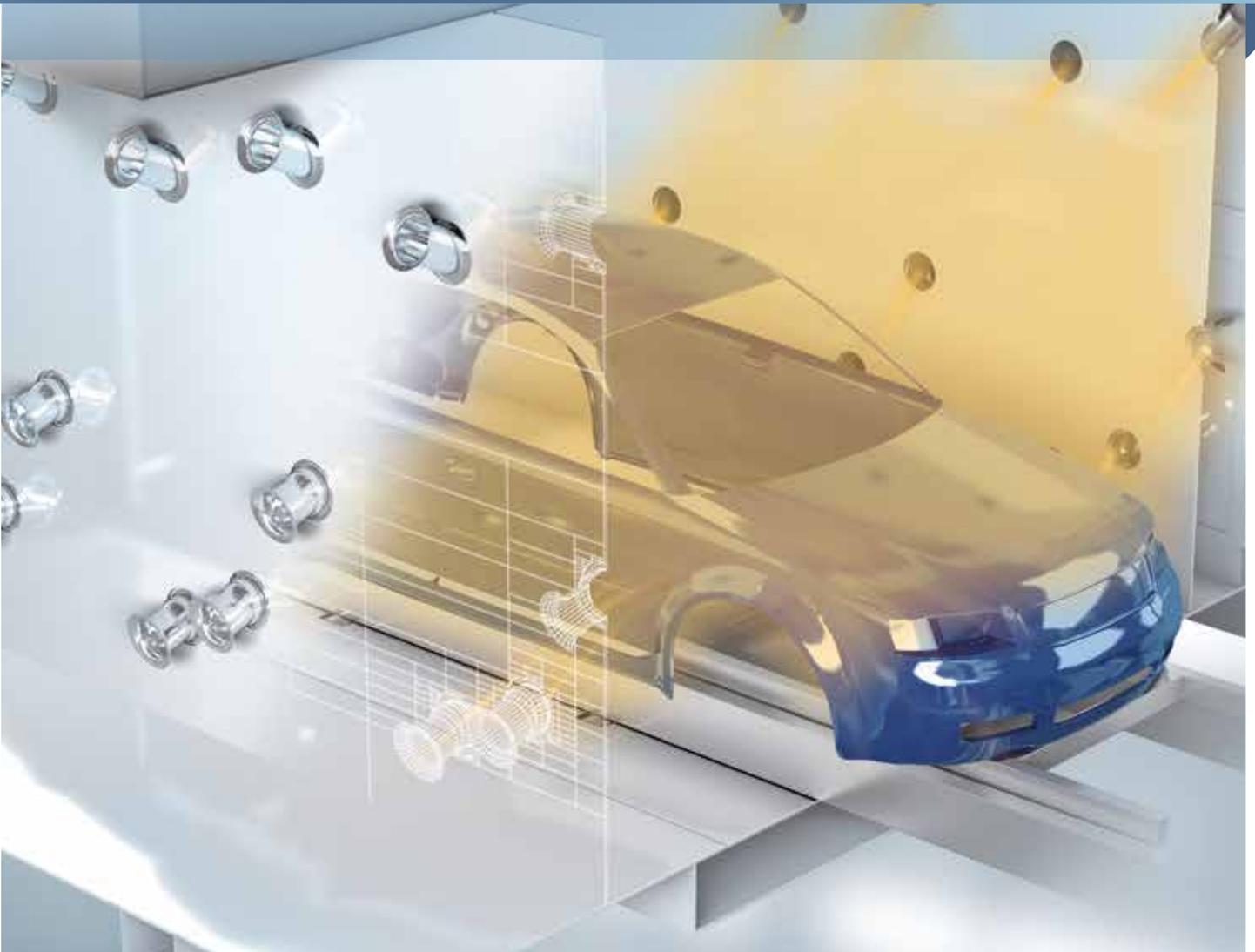




LEADING IN PRODUCTION EFFICIENCY

Ecopaint Oven

THE LATEST GENERATION OF OVEN SYSTEMS



Ecopaint Oven

» *Ecopaint Oven – Drying system for perfect surfaces*



The key to optimal curing of surfaces

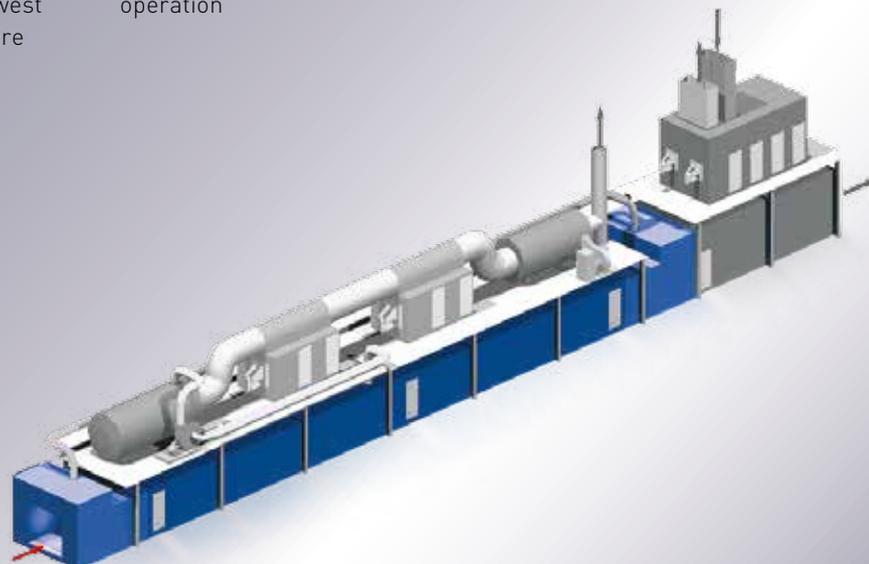
Dürr plans, delivers and installs turn-key paint shops. At the same time we work our way deep into your complex process environment to implement an individual solution. The **Ecopaint** brand name carried by our products and plants stands for innovation and maximum customer value. Dürr guarantees highest quality and lowest costs per unit throughout the entire process: from pretreatment and painting right through to curing.

Ecopaint Oven is a modular drying system, ideally uniting all components and modules via integrative interfaces, to form complete systems that assure:

- » Highest quality
- » Minimum costs per unit
- » Resource and energy conserving operation

By using Dürr ovens you gain much more than the product alone. As a leading technology developer we offer you:

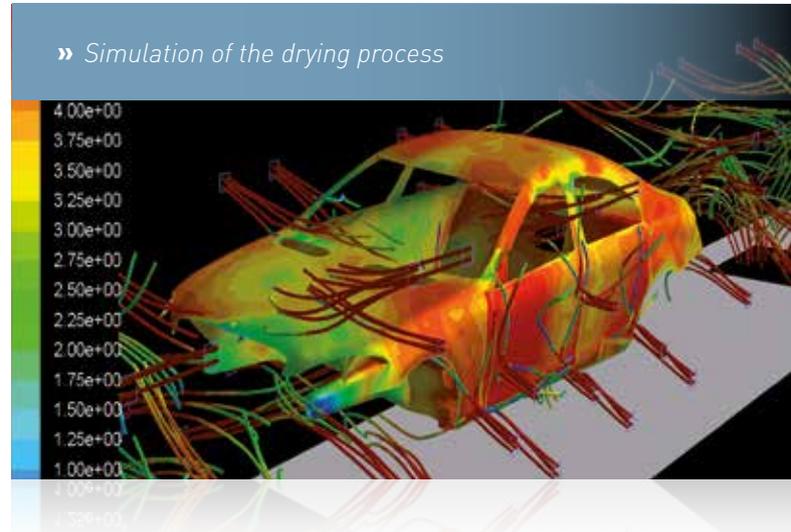
- » In-depth process know-how
- » Many years of experience and
- » A global presence



DRYING SYSTEMS FOR PERFECT SURFACES

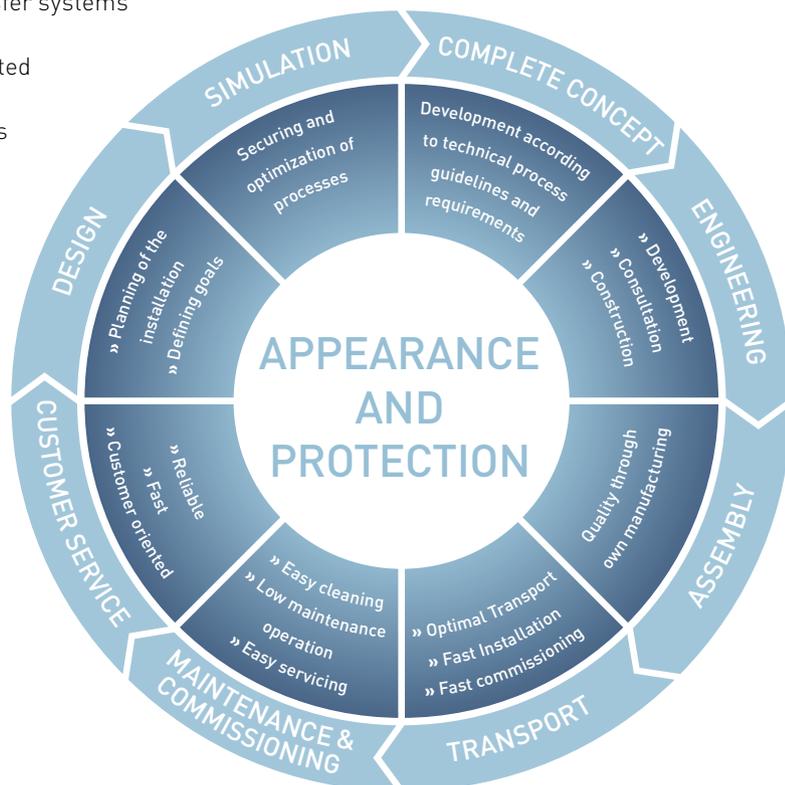
The drying process is used to cure coatings and to turn the paint finish into a perfect surface. Dürr delivers appropriate systems for each stage along the painting line: for gelling, intermediate drying and drying processes.

Take full advantage of Dürr's vast interdisciplinary expertise and the support it offers as early as your plant's planning phase. Put your trust in proven drying processes, which we analyze in advance through extensive simulations to ensure their reliability. We make these available to you as a virtual planning basis in the form of a simulated heating curve or as stress and distortion analyses, for example.

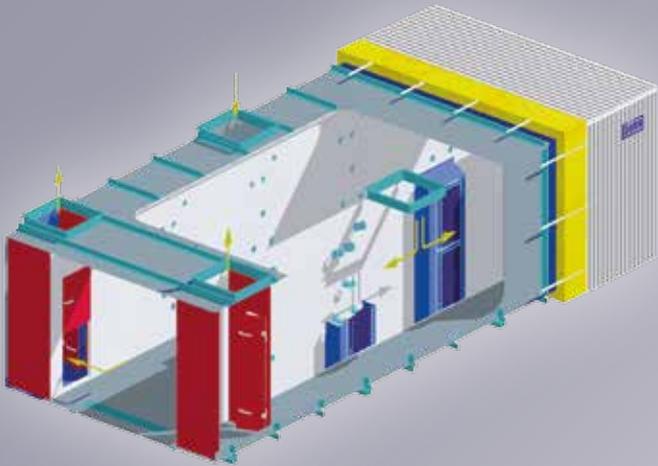


Ecopaint Oven modules for optimized total systems:

- » Oven tunnels with various heat transfer systems
- » Air seals
- » Heater units operated with recirculated air and recirculated gas
- » Fresh air supply and heating systems
- » Exhaust air purification systems
- » Cooling zones
- » Integrated conveyor systems



FLEXIBLE PLANNING THANKS TO MODULARITY



» *Pre-assembled oven module*

We plan and implement new installations and extend or modernize existing systems according to your requirements and using the latest technology.

In doing so we supply modular built systems which are based on standardized individual components and are delivered as completely pre-assembled modules. In this way we speed up installation and commissioning.

Modularity also has its advantages when the system is in operation: innovative solutions with fewer filters or optimized nozzles are the basis for quality and lower unit costs.

The details are often crucial for efficiency: for example, the asymmetric holding zones permit a compact design with a smaller surface area and less heat loss due to their one-sided air supply.



» *Cross-section of a heating zone*

CLEANLINESS CREATES QUALITY

With Dürr you opt for quality. As in all other stages of the painting process, the drying process is all about avoiding dirt coming into contact with the vehicle body so as to attain high value levels. Our plants, with their precise air nozzle and air directing systems, protect your vehicles by preventing dirt particles from being blown onto them and thus assure optimum application quality.

» Drying system heating zone with chain floor conveyors

» CIC oven with integrated roller bed and optional floor nozzles



Ecopaint Oven systems ensure uniform heating of the vehicle body and create ideal drying conditions with their fast and carefully managed energy input. Controlled heating up of the entire vehicle body is guaranteed – matched to the shape and material thickness so that thinner body parts are not overheated.

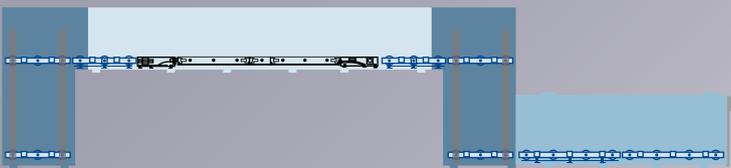
The new CIC oven optionally implements this. It consists of a complete oven module with integrated roller bed and external drives. With the possible pulse operation mode we achieve high flexibility. The integrated conveyor system ensures that no heat is discharged from the oven and the oven is very easy to clean.

INTERFACES AND PROCESSES THAT FIT

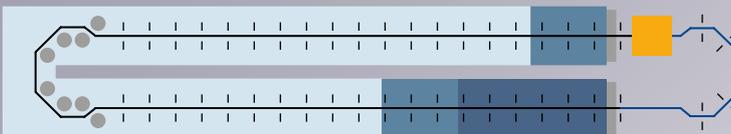
The design of every oven system is individual and dependent on the plant layout as well as on the requested or existing conveyor systems. We have the necessary interface and process competence to develop the solution tailored to your specific needs.



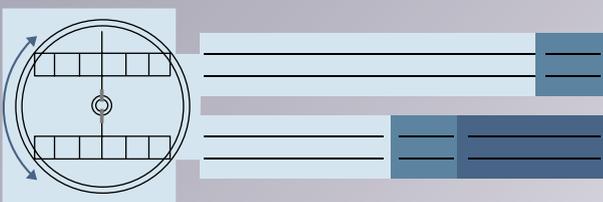
» Straight-through oven (side view)



» A-type oven (side view)



» U-turn oven (top view)



» U-turn oven with turntable (top view)

- Drive station
- Air seals
- Oven
- Roller bed
- Chain floor conveyor
- Cooling zone
- Lifting unit (for A-type oven)

Straight-through ovens: a high standard with a minimum footprint

Dürr straight-through ovens with classic skid conveyor technology stand out because of their compact design, offer high standards with a minimum footprint and are energy efficient. The efficiency of the air seals not only prevents hot air from escaping out of the oven but also keeps the amount of dirt carried into the oven to a minimum.

A-type and U-turn ovens

Depending on the layout conditions, we can optionally provide A-type and U-turn ovens. Recently, we have offered U-turn ovens in addition to IMC equipment with chain floor conveyors and turntables. This way we can now respond even more flexibly to individual customer requirements.

INTELLIGENT AIR MANAGEMENT PROTECTS THE ENVIRONMENT

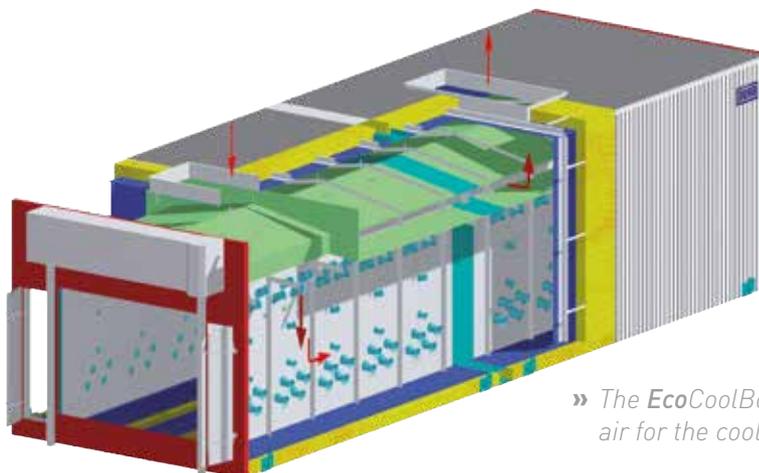
Dürr systems meet the most stringent environmental requirements and function in an extremely energy efficient manner. Through the continuous development and improvement of our products, we equip your plants with the latest technology and provide environmentally friendly processes.

The oven with its high temperatures contains enormous energy savings potential. Therefore, Dürr offers its oven system **Ecopaint Oven** with integrated air management. It contributes an extension of the heating-up time for the plant, the use of waste heat boilers and improved insulation for saving energy. Thermal exhaust air purification also includes heat recovery systems to ensure that energy is used efficiently. **Ecopure TAR** cleans the exhaust air by incineration and the purified gas arising from this process generates energy for the **EcoHotBox**.

With the **EcoHotBox** we offer a standard module for the economical heating and filtration of air for the drying process. Your vehicle body is thus heated up optimally with an efficiently managed supply of energy yet with the minimum influx of dirt particles.

The **EcoCoolBox** ensures an adequate supply of air to the cooling zones and handles filtration, heating and cooling.

» *Cooling zone with IMC (Inverted Monorail Conveyor)*



» *The EcoCoolBox supplies air for the cooling zone*

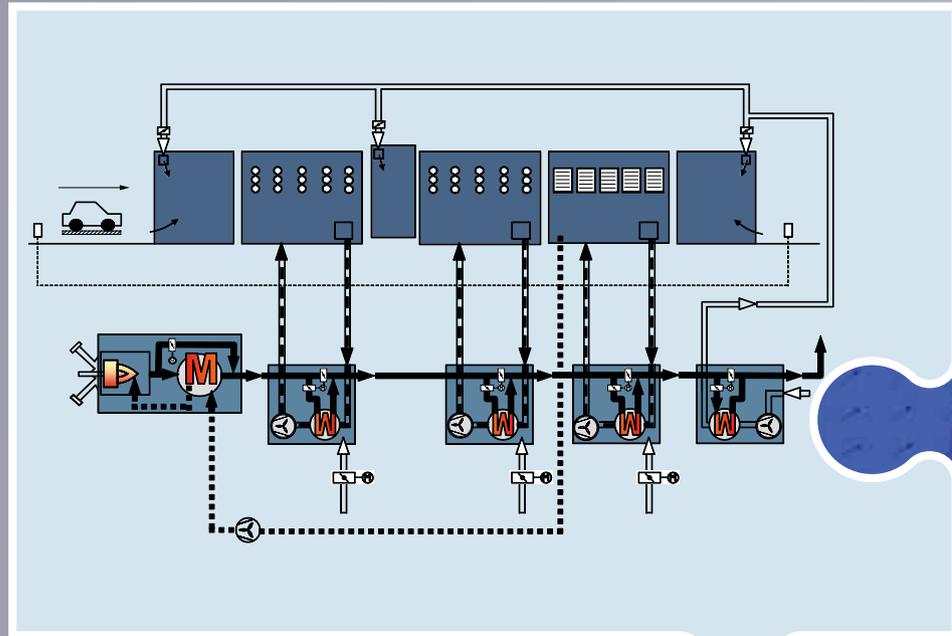
COMPONENTS FOR ENERGY EFFICIENCY

Reduced demand for fresh air in the air seals

Our optimized dryer air seal, **EcoAirSeal**, results in less fresh air being needed in the air seal area which then no longer needs to be heated. We are able to reduce to levels approaching 50% of the original amount of air needed with unchanged performance. We achieve this through improved air flow that is optimized with the help of fluid dynamics simulation. This new air seal design is the foundation of another component – fresh air control.

Load – dependent fresh air control

Since the required volume of fresh and exhaust air an oven needs is a measure of its energy consumption, we adjust these parameters with an intelligent control system. Thus, the amount of fresh air is precisely adapted to the current needs; the system responds independently to production conditions such as underutilization, ramp-up, shut-down or pause modes. The annual energy consumption can be reduced to such an extent that the investment pays for itself in just two years.

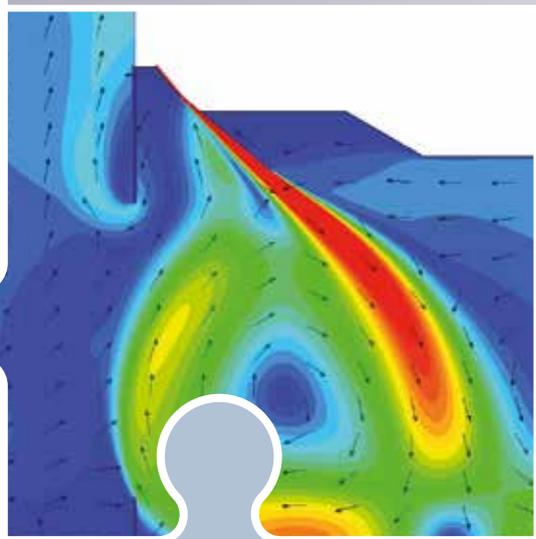


» Variable fresh air/exhaust air

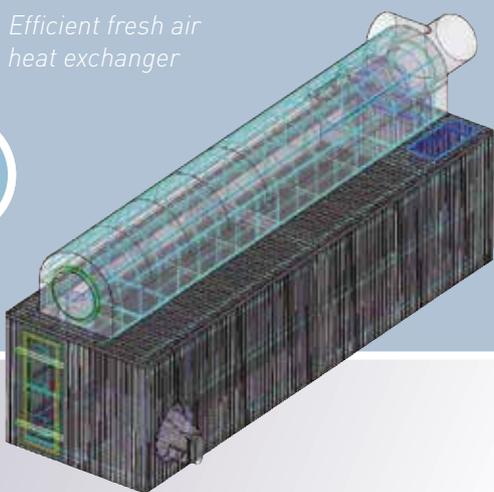


» Temperature control

» *High-speed air seals*



» *Efficient fresh air heat exchanger*



Optimized exhaust air purification with purified air temperature control

The fourth generation of our **Ecopure TAR** recuperative thermal exhaust air purification system proves itself with a heat exchanger that controls the purified air temperature. With this temperature control, the plant operator receives, in addition to purified air control, another control element in order to respond flexibly to capacity changes and to reduce energy consumption.

Fresh air heat exchanger with higher efficiency

The fresh air heat exchanger is the last link in the process chain. Our new generation heat exchanger cools the outgoing purified air to 120 °C and uses the recovered heat energy to heat the fresh air. This way the efficiency of the heat exchanger from Dürr is significantly higher than the previous standard. We combine this sustainable technology into a compact design that unites all the components like heat exchangers, fans, filters and sound damper.

PROCESS HEAT FROM SOLAR ENERGY

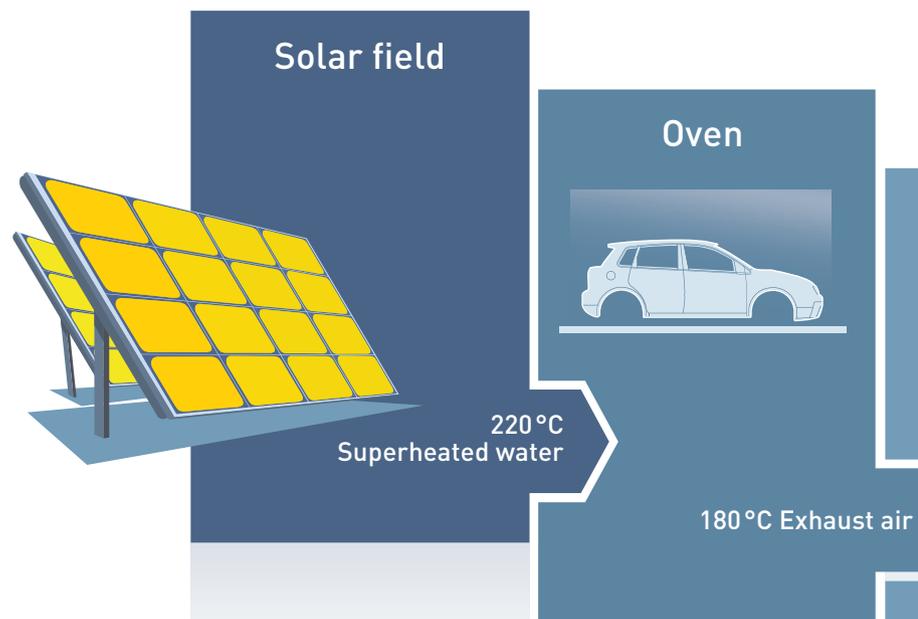
Stagnation is a step backwards – therefore Dürr is breaking new ground in sustainability even with heating its ovens.

Dürr heats ovens with high performance collectors for solar energy. Unlike conventional solar modules, these Fresnel collectors produce process heat of up to 400 °C. Especially in oven operations in which temperatures of up to 220 °C are required, their use results in major savings.

The low maintenance and space saving Fresnel collectors are mounted on the roof and have low wind loads as a result of their design. They concentrate sunlight and work very efficiently in this way. Especially in countries with direct sunlight of over 1,500 kWh/m² per year, the potential for solar thermally generated process heat is great and can be used well beyond just oven heating.

In the case of the oven, in sunny paint shop locations we obtain about 30 to 50% of the required energy from solar energy. A significant reduction in CO₂ emissions by up to 1,000 tons per year contributes to production with very low emissions and thus helps conserve non-renewable energy sources.

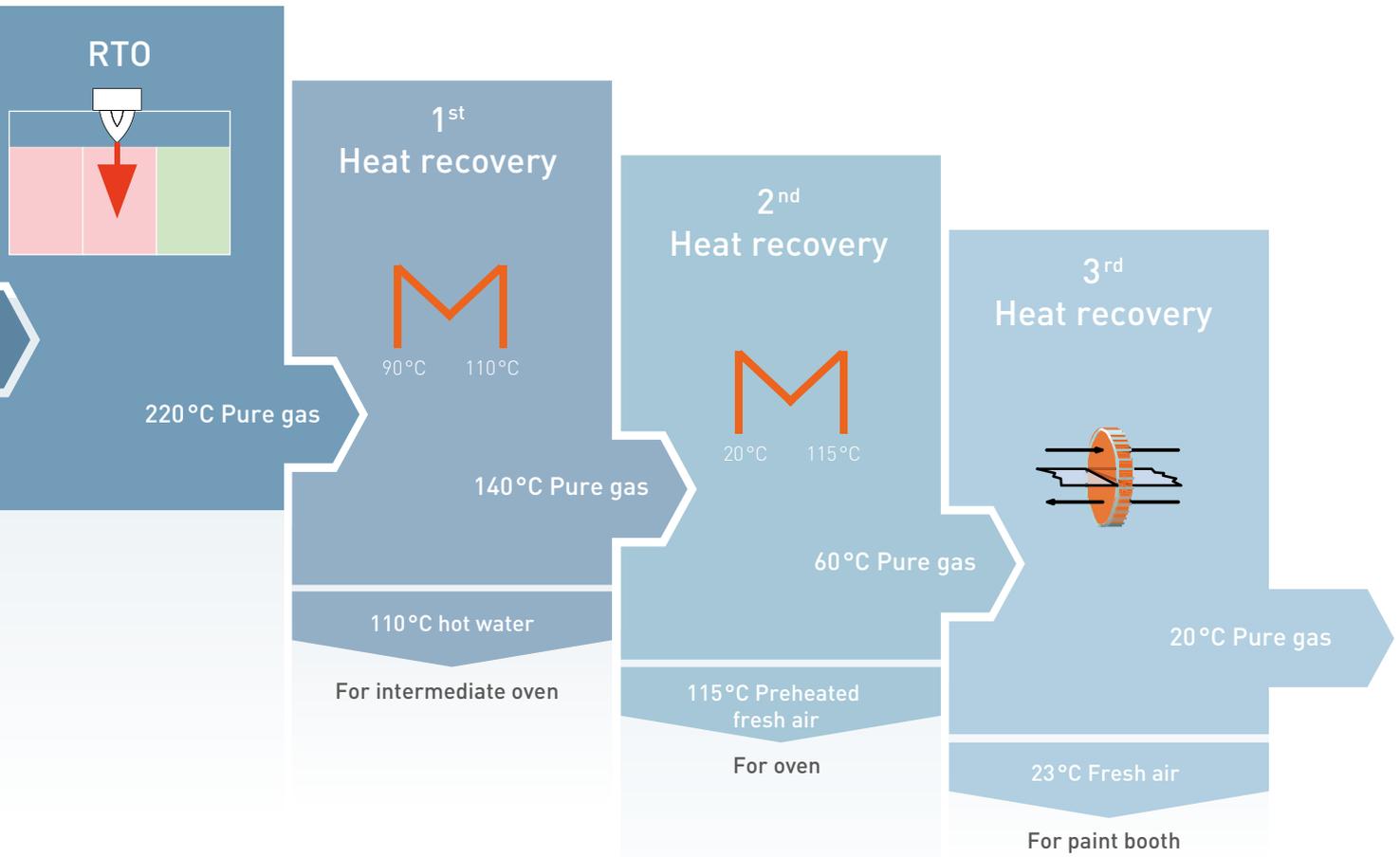
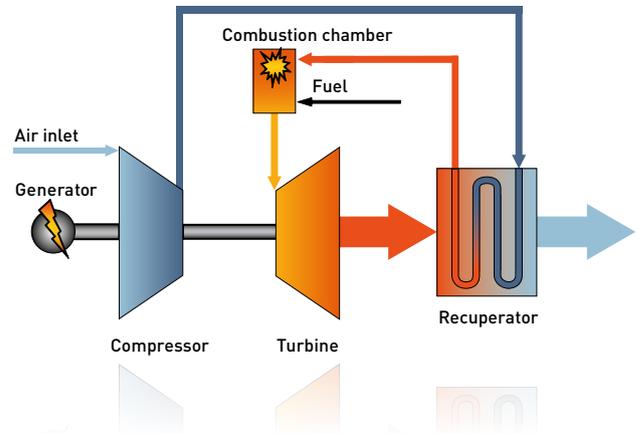
An additional effect: since the roof-mounted solar collectors reflect solar radiation, the paint shop is not heated up as much; therefore, the operator must spend correspondingly less energy for cooling.



COMBINED HEAT AND POWER – A STRONG ALTERNATIVE

Electricity is generated with a combined heat and power unit via a low-emission combustion process in a gas turbine whose waste heat is used both directly and indirectly to heat the oven. The CO₂ emissions can be reduced by 2,000 tons per year at an absolute minimum with this sustainable technology. Through decentralized power generation the unit costs drop with the electricity costs. In addition, combined heat and power generation by means of a gas turbine offers extremely high availability and low maintenance costs.

Both solar thermal energy and combined heat and power are important steps towards energy independence.





LEADING IN PRODUCTION EFFICIENCY

Dürr – Leading in Production Efficiency

Five divisions, one goal: maximum production efficiency for our customers

- » **Paint and Final Assembly Systems:** paint shops and final assembly systems for the automotive industry
- » **Application Technology:** robot technologies for the automatic application of paint as well as sealants and adhesives
- » **Clean Technology Systems:** exhaust-air purification systems and energy-efficiency technology
- » **Measuring and Process Systems:** balancing systems as well as assembly, testing and filling technology
- » **Woodworking Machinery and Systems:** machinery and systems for the woodworking industry

Subject to change. The information in this brochure contains only general descriptions or performance characteristics which may vary in actual cases. The requested performance parameters shall be binding only if they are explicitly agreed within the sales contract. © Dürr 2016