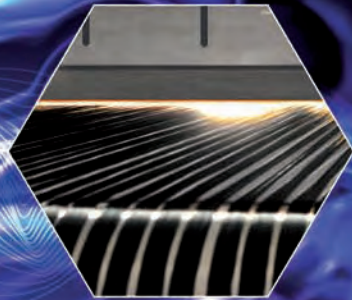


Thermal Solutions  
**for every challenge.**

Carbon Fiber & Felts



**CARBON FIBER & FELTS**



CARBON FIBER – MATERIAL OF THE FUTURE.

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*Oxidized PAN-Fiber.*



# CARBON FIBER LINES – THE COMPLETE SOLUTION

## One source

Integrated solutions for Carbon Fiber production lines with proven, best-in-class equipment, from the world's premier Carbon Fiber equipment supplier.

## Your benefit

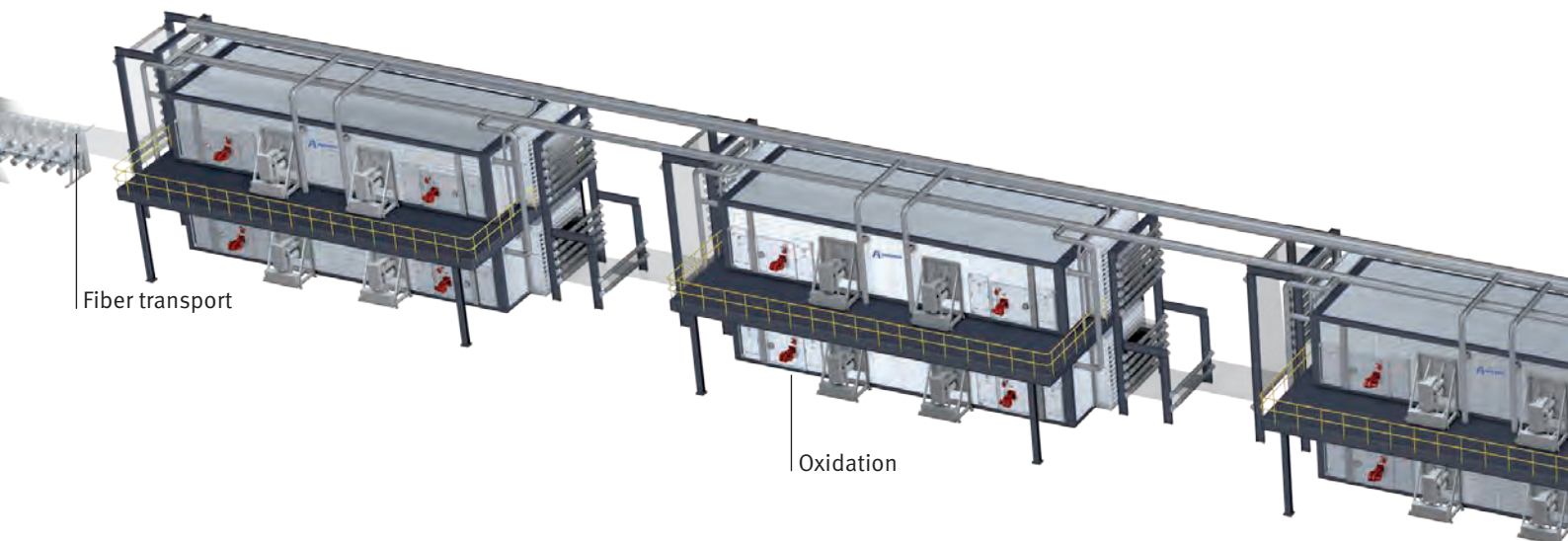
- Lower project costs through synergy effects in project planning, project management, installation and commissioning
- High reliability and productivity through perfectly synchronized equipment and interfaces
- Reduced planning efforts for the customer
- User friendly software integration for easy operation
- Fastest to the market and into production
- Lowest cost of ownership

## Sustainability

- Excellent energy efficiency in each production component
- Integrated energy recovering solutions
- Eco-friendly production methods
- Energy efficient exhaust gas purification systems

## Performance

- Well balanced equipment ensures continuous operation and reduced down time
- Every single equipment offers best-in-class performance



## Planning

- Concept
- Feasibility study

## Engineering

- Basic engineering
- Detail engineering
- Interface management
- HAZOP analysis

## Sourcing

- Manufacturing
- Purchase

## Installation

- Delivery
- Assembly
- Commissioning
- Training

## Operation

- Start-up support
- Process improvement
- Maintenance/Services
- Spare-Parts

*Supported steps to complete Carbon Fiber lines.*



### Extensive experience

A global network with more than 50 years experience with project management, planning, assembly and commissioning in system integration across many industries including automotive, chemical and ceramic.

### Close to you

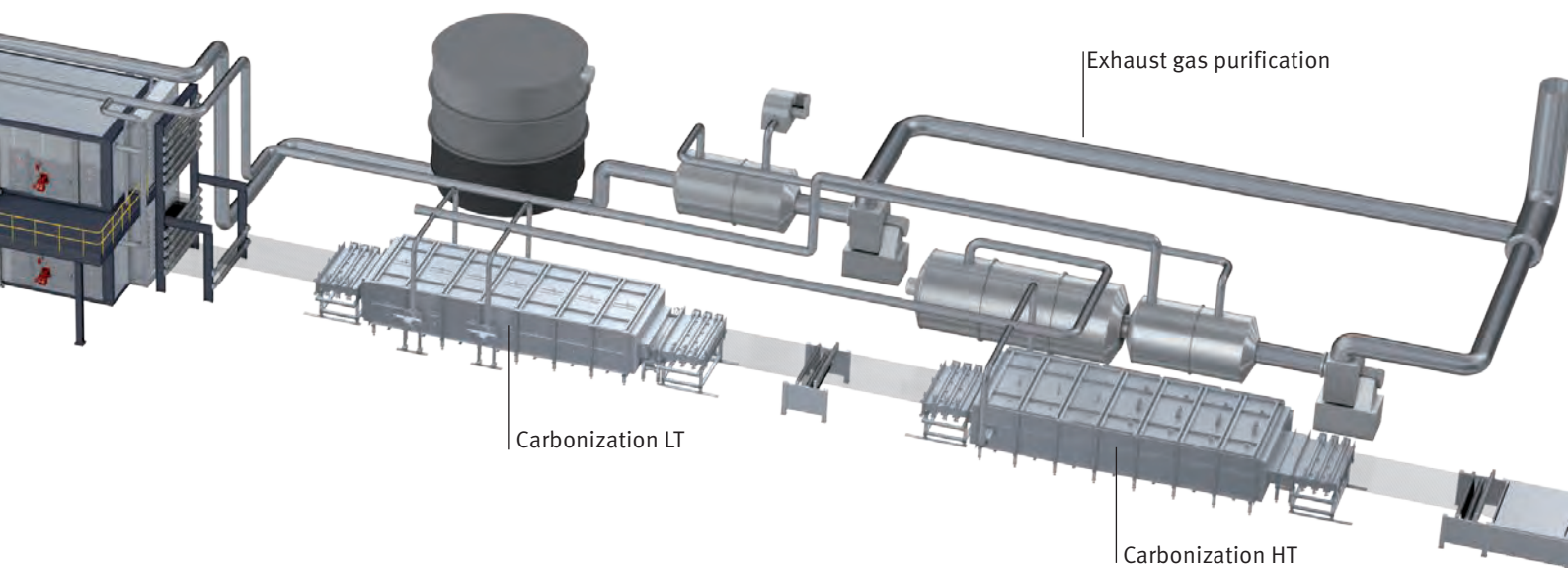
- Sales, Engineering and Service departments in Europe, North America, China and South Korea
- Production locations in Germany, China and South Korea
- Global sourcing

### Reliability

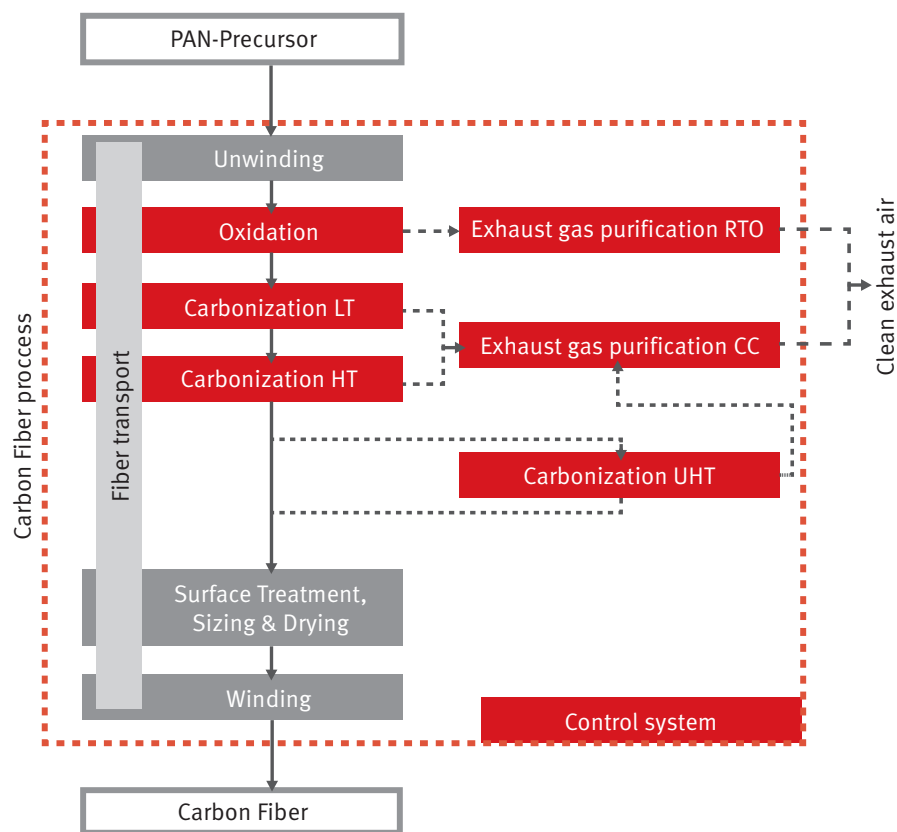
- World class engineering ensures state of the art equipment with proven quality and reliability
- Closely connected partners for creels, winders, material handling, surface treatment and sizing

### Service

- Extensive range of services, tailored individually to customer needs
- 24 hours, 7 days on-call service for inspection, service, repair and spare part management



PORTFOLIO



Complete based Carbon Fiber process.

Type	Oxidation Oven			Carbonization			Control system	Exhaust air purification		Winding unwinding	Fiber transport	Surface treatment, sizing & drying
	Center-to-End	Vertical-Down	Horizontal-Crossflow	LT	HT	UHT		RTO	CC			
Laboratory line		●		●	●	●	●		●	●	●	●
Pilot scale	●	●		●	●	●	●	●	●	●	●	●
	Combined											
Production scale	●	●	●	●	●	●	●	●	●	●	●	●
● ONEJOON										● Partners		

ONEJOON product range for Carbon Fiber lines.

# INTEGRATED ENERGY RECOVERY SOLUTIONS

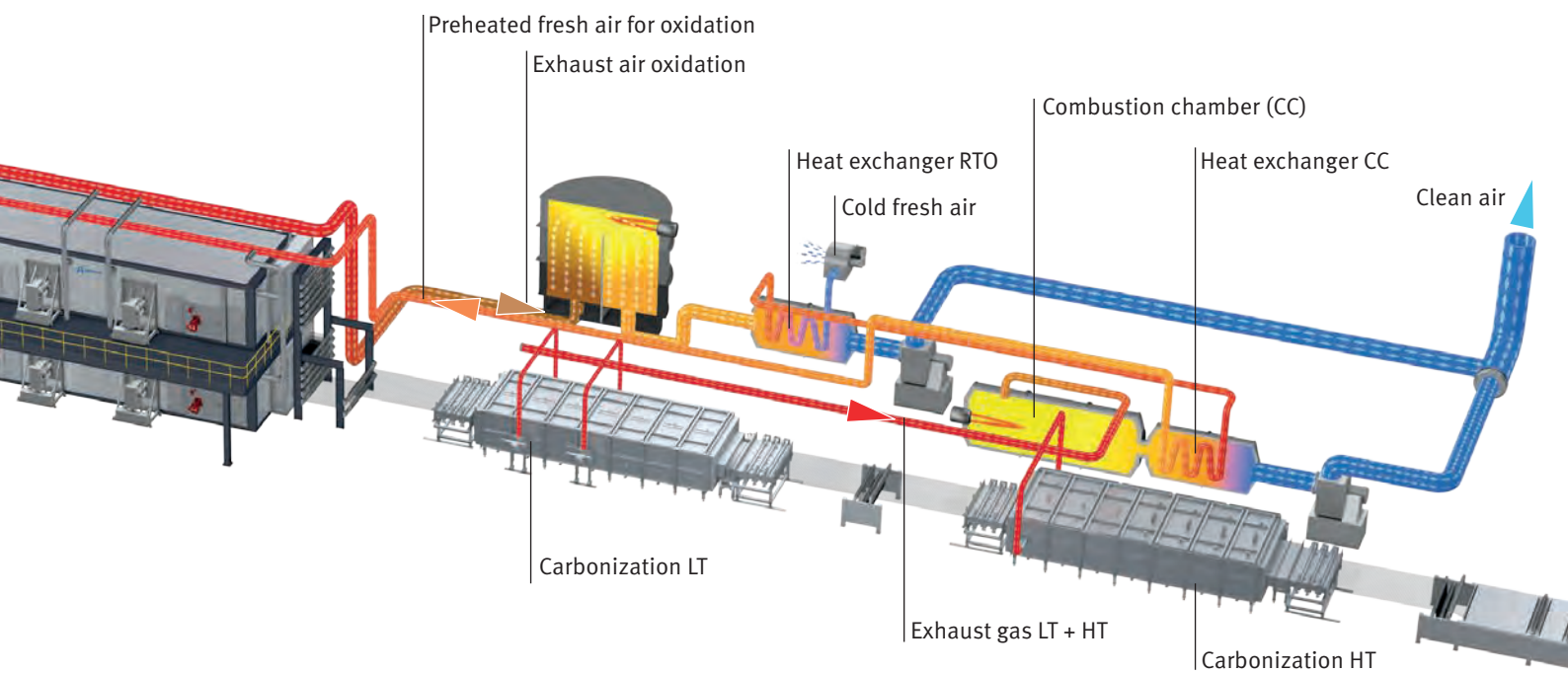
ONEJOON offers an excellent energy reduction strategy for the complete Carbon Fiber production line. This strategy includes reduced energy consumption in every single process step as well as integrated and customized energy recovery solutions, resulting in reduced operating costs and a smaller carbon footprint.

## Heat recovery

- Integrated within the exhaust gas streams of the RTO and Combustion Chamber
- Air-air heat exchanger
- Air-gas heat exchanger
- Air-fluid heat exchanger (water, thermo-oil)

## Highest energy efficiency

- Preheated fresh air for oxidation ovens
- Thermo-oil heated oxidation ovens
- Preheated nitrogen for carbonization furnaces
- Preheated process water or other process media
- Facility heating



Example of an integrated heat recovery system for preheated fresh air for oxidation.



# OXIDATION OVENS

## Fiber quality

- Superior oxidized densities and fiber quality across the entire tow band by providing best-in class temperature and airflow uniformity over the entire process chamber
- Optimized fiber quality by matching the best airflow system for your precursor material

## The airflow you need

Depending of your preferences, ONEJOON offers different kind of airflow systems:

- Vertical-Down flow – typically used for small tows
- Center-to-End flow – used for small and heavy tows

## Design is Key

- Patented supply nozzle air delivery channels for the Center-to-End technology
- Patented state of the art end seal system
- Control system and software
- Thermo oil, electricity or natural gas as heating source
- Natural gas heat exchangers with the highest thermal efficiency in the industry

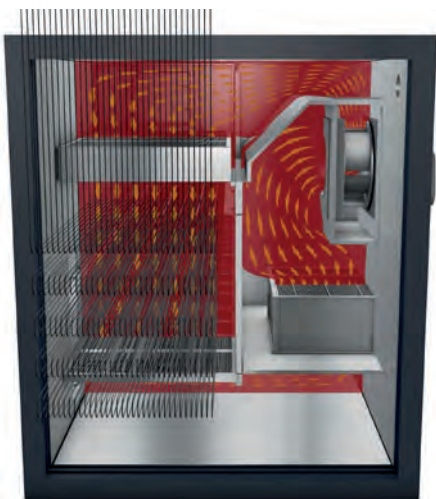
- Optional hybrid heating with two heating sources
- Online airflow measurement
- Maintenance – free, seal welded interior

## Productivity

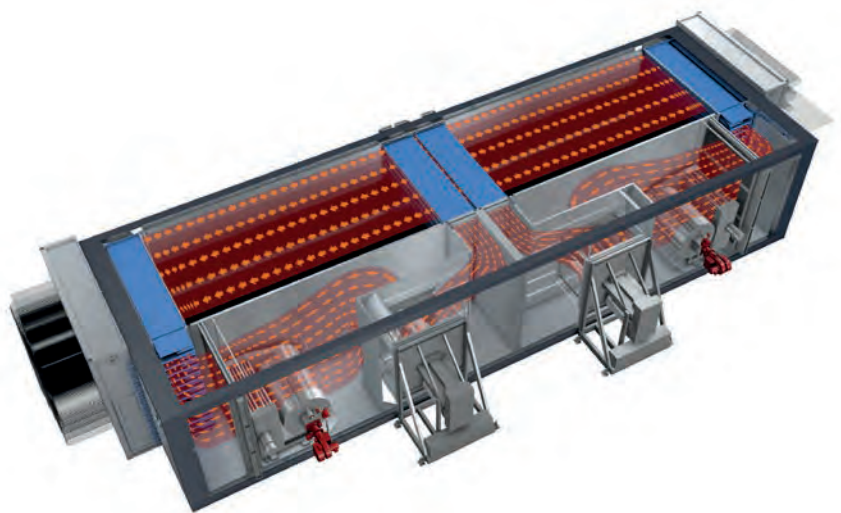
- Shortest oxidation times through best and safest control of the exothermal reaction
- Reduced maintenance time by providing complete access
- No down time is required for the cleaning of filters during operation
- Removable supply and return nozzles provide easy access for cleaning
- Short heat up time with hybrid heating technology

## Efficiency

- Energy cost savings through minimized transmission losses and preheated fresh air for the end seal technology
- Lowest manufacturing costs per kg of Carbon Fiber
- Lowest expenses for energy using multiple heating sources
- Smallest footprint in the industry



Vertical-Down.



Center-to-End.

### **Environmental protection**

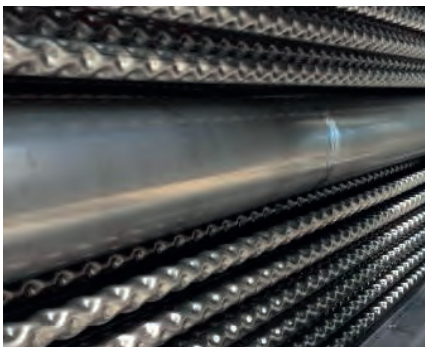
- Emphasis on operator safety through 100% prevention of process gas emissions by the patented multi stage air sealing system and seal welded housing

### **Technical Capabilities**

- Comprehensive technical expertise of more than 60 years of experience in thermal processing technology
- Superior oxidation oven technology proven in pilot and large scale production facilities
- Preferred supplier for the oxidation process at established Carbon Fiber manufactures for high-end applications like aerospace

### **Customer support**

- Customer focused world-wide sales support
- Short delivery times and efficient project realisation
- R&D oven for customer trials



*Natural gas heat exchanger.*



*Oxidation oven vertical-down.*

# CARBONIZATION FURNACES

## Fiber quality

- Superior carbonization quality across the entire tow band by providing best-in class temperature uniformity inside the whole muffle

## Low temperature furnace

- Carbonization temperatures up to 950 °C
- Natural Gas or electric heating
- Patented muffle bearing system
- Steel muffle with the longest lifetime in the industry
- One of a kind exhaust ports cleaning capabilities
- Gas distribution, measuring and control stations
- Control systems and software

## High temperature furnace

- Carbonization temperatures up to 1,800 °C
- Electric heating
- Thoroughly designed graphite muffle
- Graphite heating cage with 75% reduced lead-throughs
- Significantly reduced risk for oxygen infiltration
- Gas distribution, measuring and control stations
- Control systems and software



*Low temperature furnace.*

## Ultra high temperature furnace

- Carbonization temperatures up to 3,000 °C
- Electric heating
- Gas distribution, measuring and control stations
- Control systems and software





### Sealing boxes

- Insulated inlet sealing boxes with adjustable distortion free orifices
- Multifunction outlet sealing boxes with integrated cooling
- Gas preheating systems
- Cooling water distribution stations

### Productivity

- Reduced down time through the best in class durability of muffles and heaters
- Minimized condensation of tar at the inlet area of the muffle

### Energy efficiency

- Low transmission losses
- Minimized consumption of protection gases

### Reliability

- More than 100 years of experience in high temperature technology up to 3,000 °C
- Over 25 years in the carbon industry
- Specialist for heat-treatment plants with protective-gas and reactive gas atmospheres
- Preferred supplier for the carbonization process at established Carbon Fiber manufacturers for high-end applications like aerospace

### Customer support

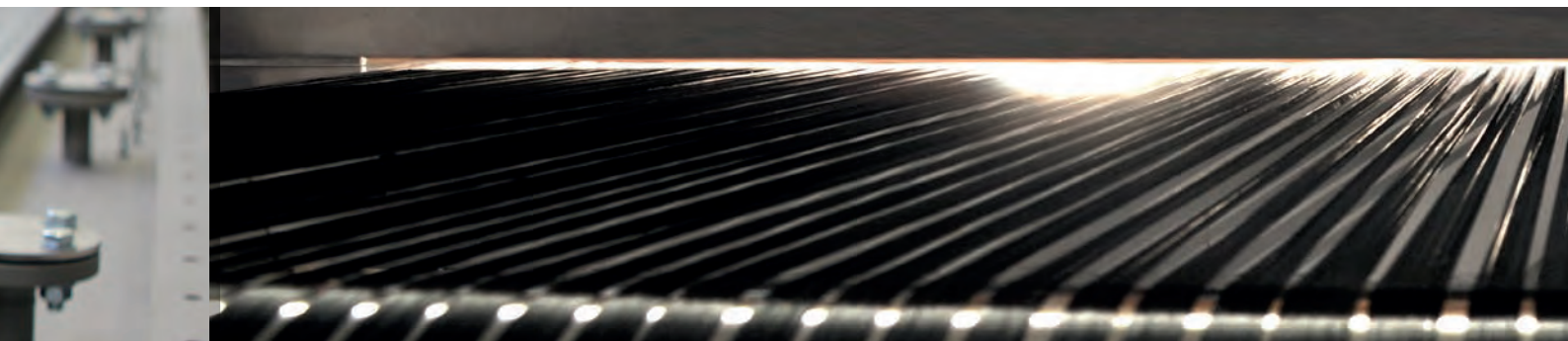
- Customer focused world-wide sales support
- Short delivery times and efficient project realisation

### Further customer benefits

- Symmetric loading of electrical network system
- Spare of expensive electric compensation



*High temperature furnace.*



# SERVICE

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## **Energy balance**

- Plant analysis by our process specialists
- Energy flow analysis to identify heat losses
- Establish thermal, furnace and heat transfer efficiency
- Analyze specific losses for your given product throughput
- Providing strategies for optimization
- Joint cost /benefit assessment of the proposed performance improvements strategies
- Technical and cost effective evaluations
- Action plan and implementation options

## **Inspection and maintenance**

- Annual inspections by our specialists
- Identify and rectify potential points of failure at an early stage
- Inspection report with our recommendations to your hands
- Assessment of insulation, refractory linings and the furniture employed
- Inspection, repair or replacement of mechanical components such as conveyor systems, pneumatic components, gates and feeders
- Inspection, repair or replacement of process equipment such as gas burners, burner nozzles, gas supply systems, heating elements and thermocouples

- Inspection, repair or replacement of fans and air systems such as fans for combustion air, exhaust gas, cooling air and circulation air, piping for exhaust gases, exhaust air and cooling air

## **Mandatory furnace safety inspections**

We can perform mandatory safety inspections for you at regular intervals – ensuring your plant complies fully with all operational safety regulations.

## **Safety inspections include**

- Functional testing of all safety components
- Testing of emergency shutdown mechanisms
- Checking the current status of the facility and its functions against applicable standards and legislation
- Detailed post-inspection report and documentation of the findings



# THIS IS ONEJOON

ONEJOON GmbH is a Germany based thermal processing equipment manufacturer with locations in Bovenden and Böblingen Germany. ONEJOON recently acquired Eisenmann Thermal Solutions and the new company has a combined 100 years of experience with high temperature equipment used in the Thermal Processing industry. The combined companies employ approximately 250 people worldwide.

ONEJOON is the technology and market leader for oxidation ovens and carbonization furnaces used in the production of carbon fiber. ONEJOON also has a very strong position in the markets for cathode and anode material production for lithium-ion batteries. Other key target markets include the following:

- Hardening of blades and saw bands
- Sintering of metals and ceramics
- Heat treatment of aluminium wheels and structural parts
- Powder chemistry and advanced materials

ONEJOON supplies not only customized furnace technology but can also provide all supporting equipment and services as well. This includes the application of automation equipment, material flow expertise, process integration and system optimization.



ONEJOON Headquarter in South Korea

Since the acquisition of Eisenmann Thermal Solutions in January 2020, all operations in Germany, USA and China are now subsidiaries of ONEJOON Group.

The parent company ONEJOON Co., Ltd. is a mechanical engineering company based in Suwon, South Korea, whose primary market is the production of high temperature furnace systems including the required material handling and process technology for the treatment of cathode and anode material in lithium-ion batteries.





CARBON FIBER EQUIPMENT BY ONEJOON

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Lowest risk supplier!

Best in class  
performance!

Superior quality!

Complete thermal solutions from a single source!

Energy saving concepts  
for lowest cost of ownership!

Energy saving concepts  
for lowest cost of ownership!

Contact us

[carbonfiber@onejoon.de](mailto:carbonfiber@onejoon.de)

or via our offices in United States, China, Germany and South Korea.



## NOTES



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