



Doosan Lentjes

Circulating fluidised bed technologies



Doosan Lentjes is a global leader in circulating fluidised bed (CFB) boiler technologies. Our expertise gives you access to advanced, efficient and environmentally sound steam generation solutions that cater to a range of fuel types – delivering reliability and performance when fuel quality and range are critical to your project’s viability.

Shaping the future of CFB technology

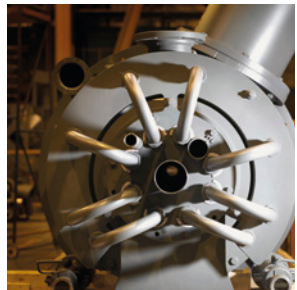
Doosan Lentjes has pioneered the development of CFB design for more than 30 years. We designed, built and commissioned the world’s first commercial CFB boiler, featuring the first fluidised bed heat exchanger (FBHE) in Germany in 1982. We have a proven track record in designs up to almost 300MWe (~700MWth) with a capability of up to 500MWe (~1300MWth).

Today, our reliable and cost-competitive CFB boilers generate power at more than 100 plants around the world, supported by the global sales and service network of our parent company Doosan Power Systems, reinforcing our reputation as a trusted partner for all your advanced steam generation needs.

What’s more, our commitment to improving the value and performance offered by our CFB boilers through investment in new technologies and supercritical capabilities will ensure that we continue to be at the forefront of CFB development, shaping the future of steam generation.



1982
Doosan Lentjes designed, built and commissioned the world’s first commercial CFB boiler.



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Your needs built in

We focus on delivering the right solution for you. Whether you are looking for flexibility for low-cost, difficult fuels, availability for secure generation, cost-competitive, reliable power or cleaner emissions, our products have been designed with all your project needs in mind.

Delivering flexibility and availability on utility-size circulating fluidised bed (CFB) boilers.

Getting the most from your fuel

Our utility-size CFB boilers focus on high-efficiency generation of power and heat on an environmentally friendly basis. Understanding that your project success can demand the use of low cost poor quality fuels, we are proud to possess a long and proven track record for the combustion of a wide range of fuels, from the straightforward to the most difficult applications.

We have developed our CFB technology for the combustion of a broad range of fuels but especially for those with difficult combustion properties such as low calorific and low reactive values or fuels with low ash melting temperatures. Examples include:

- High moisture / low calorific lignites (down to 1000 kcal/ kg)
- High ash coals (lignite and bituminous)
- Low volatile fuels (e.g. anthracite, petcoke)
- High sulphur coals
- Biomass co-combustion.

The challenges of such fuels lie in the handling and processing and the resulting ash as well as effective combustion. We have bespoke systems designed to avoid hang up and blockage of handling systems and combustion of fuels where volatile, fixed carbon, ash or moisture levels normally make reliable power generation impossible. More specifically, our CFB process has been tailored to operate with high efficiency cyclone and fluidised bed heat exchangers (FBHE) allowing for:

- **Efficient ash recycling to ensure efficient burn out**
- **Cooling of recycled ash for efficient temperature control, ensuring optimal desulphurisation and burn out, and low Nox conditions, resulting in low emissions**
- **Controlled flow of recycled ash through the FBHEs and respective heat exchange allows for high load flexibility without the need for support fuel, which is essential for meeting varying grid demands.**

Even with the most difficult and abrasive fuels, our unique Spiess valves have been developed as robust and reliable devices to ensure safe control of the ash flow through the FBHE, allowing greater fuel flexibility.

Design

Utility-size circulating fluidised bed.

Fuels

All kind of coals, waste coals, coal residues, pet coke, as well as co-firing.

References

Over 100 units in operation worldwide.



Cost efficient and cleaner

Compared to other technologies like pulverised coal our CFB technology is inherently cost-effective due to the reduced requirement for air quality control systems for SOx/NOx emissions control. In addition to this we have focused on further optimising costs by developing:

- **A less expensive, compact design for minimal boiler footprint**
- **Standardisation of materials and maximisation of more cost effective supply chain; and**
- **Development of more compact supercritical designs.**

We continue to focus on delivering a range of cost-competitive solutions that maximise availability, reliability and efficiency, while minimising emissions, making us the technology provider of choice for plant operators around the world.

Our CFB technology also offers cleaner, integrated, best-in-class emissions control. More than 90% of the sulphur dioxide (SO₂) released during combustion can be captured by adding limestone to the CFB. The comparatively low combustion temperature of 850°C and the staged air supply also prevent the formation of thermal NO_x. This negates the need for separate external flue gas desulphurisation and DeNO_x for a wide range of fuels, while still complying with EU emission regulations.

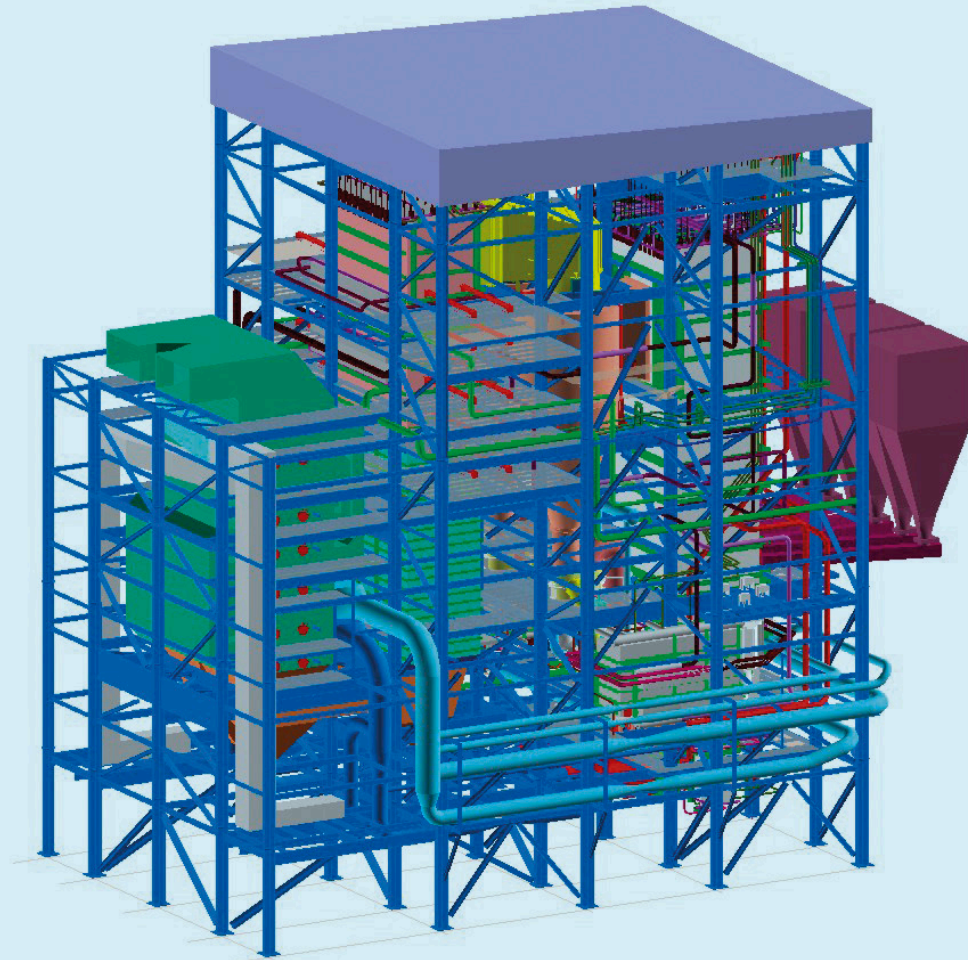
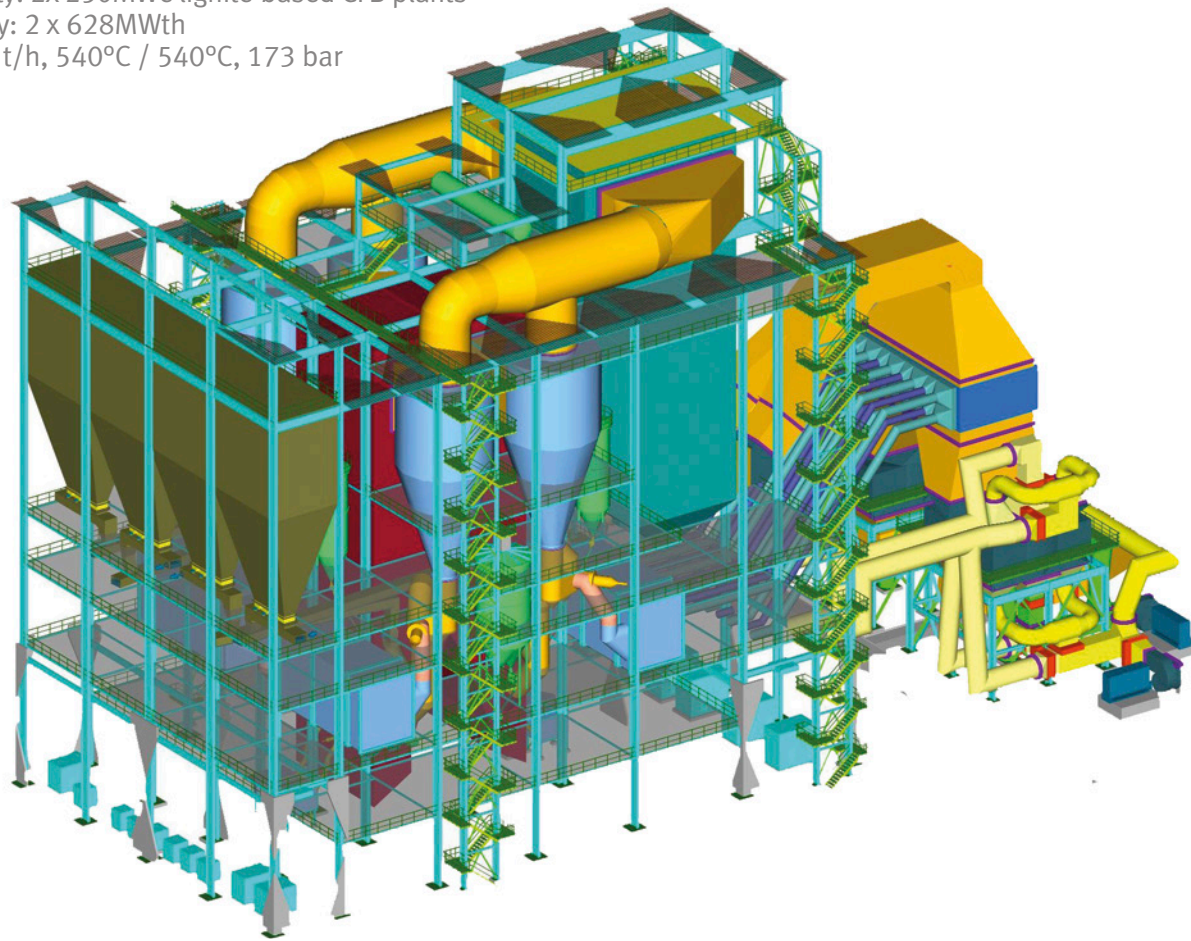
In addition to the effective reduction of SO_x/NO_x emissions, our utility-size CFB technology offers the additional benefit of a cleaner carbon footprint through co-combustion of biomass/ biofuels (including waste wood, sawmill residues and green wastes) with a track record in biomass for co-combustion and use as a single fuel.

Neyveli, India

Utility-size circulating fluidised bed

Fuel:
Lignite

Technical data:
Electrical capacity: 2x 250MWe lignite-based CFB plants
Thermal capacity: 2 x 628MWth
Live steam: 845 t/h, 540°C / 540°C, 173 bar



Morupule, Botswana

Utility-size circulating fluidised bed

Fuel:
High-ash bituminous coal

Technical data:
Electrical capacity: 4 x 150MWe
Thermal capacity: 4 x 422MWth
Live steam: 511 Mg/h, 540°C / 139°C / bar



Doosan Lentjes is there for you even after the commissioning of your CFB boiler, with a full range of after-build services designed to optimise the lifetime performance of your plant.

With you all the way

Our Global Service business offers plant owners and operators decades of experience, best-in-class engineering expertise and an uncompromising approach to safety – a winning combination that provides you with the peace of mind you need in today's high-risk business environment.

Our proven delivery record in the maintenance and upgrade of established assets, newbuild construction and equipment installation makes us the preferred partner for plant owners and operators across the globe.

We undertake day-to-day maintenance work, large-scale outage shutdowns, project work and major engineering, procurement and construction projects.

Working closely with our customers, our aim is to maximise plant availability and minimise downtime, ensuring a cost-effective operation and an optimised cost-benefit ratio.

CFB boiler pressure parts

Our ready supply of boiler pressure parts is manufactured by experienced, high-quality manufacturers at competitive costs around the world. We have Doosan factories in India, Vietnam and South Korea with specialised facilities in the UK and Germany.

Maintenance and overhaul

Our highly specialised engineers can provide a range of services to ensure your boiler operates at peak performance.

Performance studies

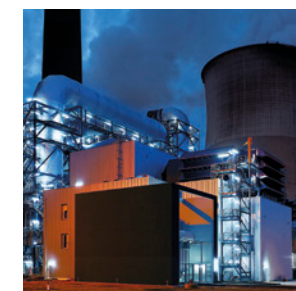
We can measure the performance of your existing boiler and offer solutions that improve output.

Boiler inspections

We can quickly locate and diagnose boiler faults and provide solutions to prevent reoccurrence. We can even provide training to facilitate future operational reliability onsite.

Fuel conversions

We are a specialist in fuel conversions, including biomass, helping our customers take advantage of opportunities that allow them to access both lower cost fuels and lower carbon emissions.



At Doosan Lentjes we continue to invest in research and development activities that provide our customers with unique and modern technologies. Our state-of-the-art technology development centre, which opened in 2007 in Renfrew, Scotland, UK provides a centre of excellence for the global development of CFB boilers and associated technologies.

Enabling future generations

Boiler and environmental technology

Our focus is on boiler technology design, performance and materials that further improve plant efficiency, flexibility, reliability and availability while optimising cost and environmental compliance.

The reduction of greenhouse gases is a global objective and we are committed to the provision of equipment and plant solutions that substitute or mitigate the impact of fossil fuels – both important factors in reducing CO² emissions.

Software and tools

To support our product portfolio we continually invest in our design tools to ensure we can optimise design and construction timescales and costs while improving performance.

Exploratory research

Recognising that every product has its lifecycle we strive to pioneer next generation technologies and maximise the value of our existing technologies for our clients.

People

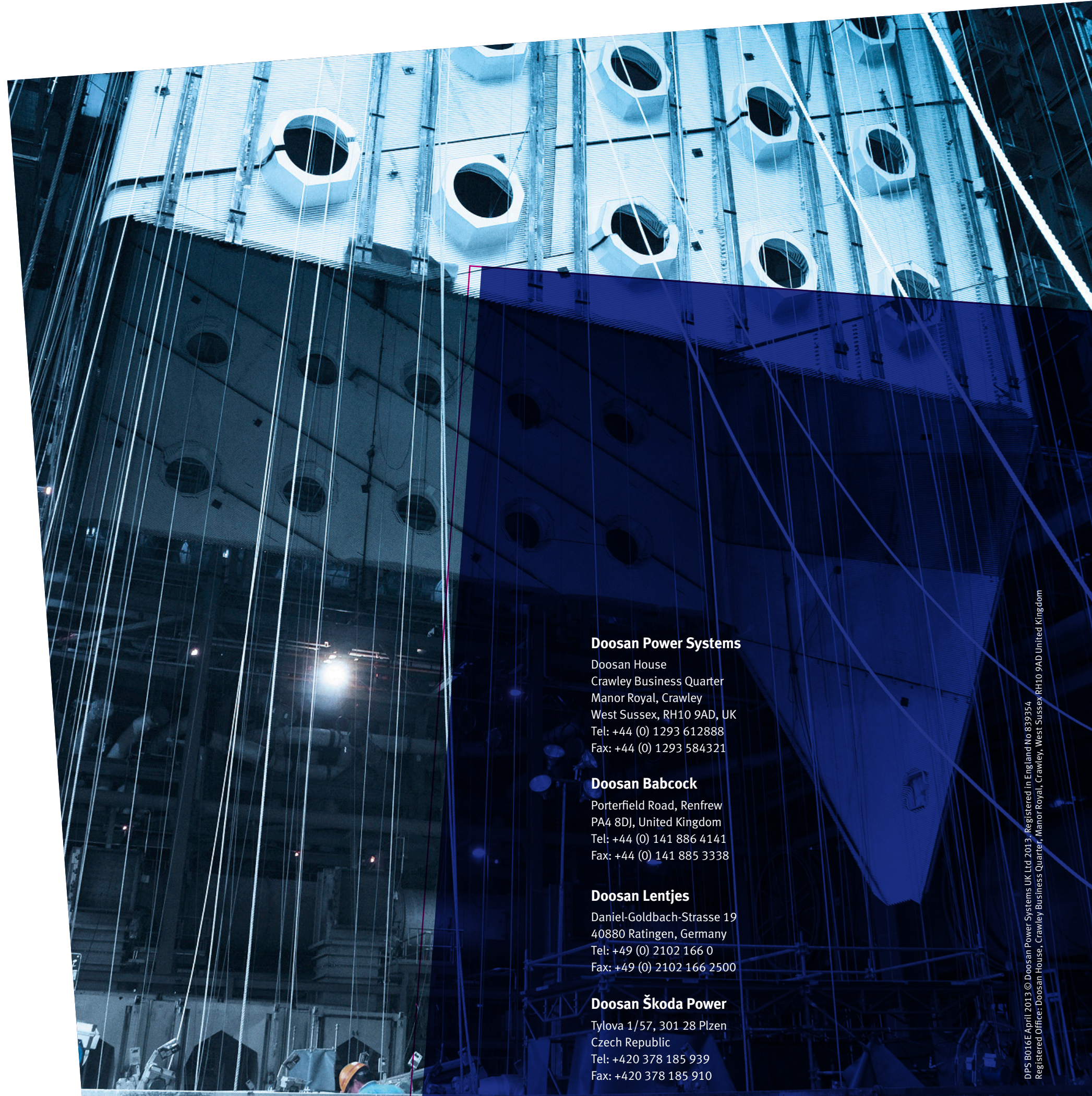
Of course, our products and services are only as good as the people behind them, so we work hard to ensure we recruit, train and develop the very best. Our people focus on strong project delivery of new build and retrofit projects by providing:

- Project management and project control
- Design and engineering
- Manufacturing
- Procurement and logistics
- Construction and commissioning
- Quality, health, safety and environment.

Our people are at the heart of everything we do and embody our business philosophy. We are committed to fostering and realising talent, and to growing our business through the development of our workforce.

Global reach

Our global track record gives customers confidence in our ability to deliver. Across our comprehensive range of product areas and service offerings, we harness our global strength and expert local knowledge to provide you with fully integrated energy solutions.



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Doosan Lentjes and Doosan Power Systems

Doosan Lentjes is part of Doosan Power Systems, which specialises in the build, maintenance and life extension of power plants across the world. We provide clean, efficient, flexible and integrated power solutions, using the latest technologies and best-in-class engineering expertise. From advanced turbine design and a range of boiler technologies to comprehensive after-build services, we offer a wide breadth of capabilities spanning both traditional and renewable fuels, as well as the industrial and petrochemical sectors.

We unite the rich heritage of Lentjes and Babcock in advanced steam generation, waste-to-energy and nuclear with the global leadership of Doosan Škoda Power in the design and manufacture of turbines. Supported by our global service capabilities, this winning combination gives Doosan Power Systems the capability to provide efficient and cost-effective solutions that create real value for our customers and their assets around the world.



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