Doosan Lentjes

Environmental technologies for thermal waste and sewage sludge treatment

DOOSAN

About us

Doosan Lentjes focuses on environmental technologies for the efficient use of resources in the sense of a sustainable circular economy.

With our proprietary processes for incineration, steam generation and flue gas cleaning, we supply tailor-made partial plants for thermal waste and sewage sludge treatment. Expertise in the circulating fluidised bed rounds off our range of services.

With more than 80 thermal waste treatment lines commissioned worldwide and over 35 reference lines in the field of sewage sludge treatment, we have decades of experience with projects of this kind. In compliance with strict emission requirements, our facilities ensure efficient recovery of environmentally friendly energy and valuable materials from the fuels used.

As a member of the globally acting Doosan Group, Doosan Lentjes is part of a powerful international network of companies offering complementary technologies and services worldwide.

Environmental technologies for thermal waste and sewage sludge treatment.

Proprietary processes for incineration, steam generation and flue gas cleaning.

Headquarters in Ratingen, Germany – further branches in Poland and the Czech Republic.

Member of the globally operating Doosan Group.

Our history

1928

Ferdinand Lentjes founds boiler manufacturing company

1980

Doosan Lentjes commissions first commercial-scale Circoclean® FGC[1] plant

1981

Doosan Lentjes designs, builds and commissions the world's first commercial CFB[2] boiler

1984

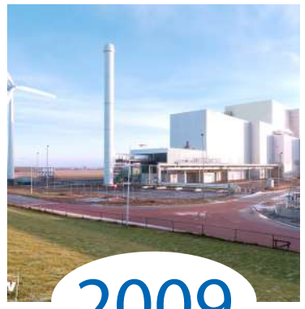
Takeover of Gottfried Bischoff GmbH – a specialist for FGC technology

1989

Entry of the company into the market for thermal waste treatment based on grate technology

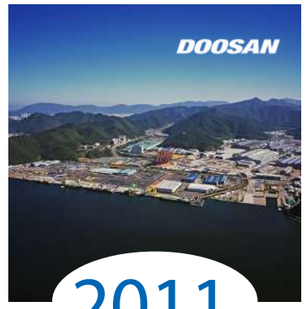
2009

The company delivers the largest single process line in its history for the WtE[3] plant in Harlingen, the Netherlands



2011

Doosan Group takes over the company – change of name to Doosan Lentjes



2012

Doosan Lentjes wins contract for technology supply for the WtE plant in Krakow, Poland

2016

40th anniversary of the application for the most important CFB combustion patents for power plant applications of the Doosan Lentjes predecessor company

2018

90th company anniversary

Supply of CFB technology for the first fully biomass-fired power plant in Japan

2020

Doosan Lentjes wins second contract for the supply of a WtE plant in the Polish market – Olsztyn – securing market leadership in the country

2021

Expansion of market leadership in Poland with the order to supply technology for the WtE plant Warsaw

Contract win in Wiesbaden: Doosan Lentjes is responsible for the planning, delivery, assembly and commissioning of the new WtE plant in the Hessian state capital

2022

Successful re-entry into the market for thermal sewage sludge treatment by winning the contract to supply the new Flanders plant in Belgium

[1]FGC – Flue Gas Cleaning
[2]CFB – Circulating Fluidised Bed
[3]WtE – Waste-to-Energy

Our philosophy

People and nature are always at the centre of our thoughts and actions. We strive for a world that is characterised by mutual respect. In this world, people live and do business in harmony with the environment. Because we take our corporate responsibility very seriously, we have developed a CSR (Corporate Social Responsibility) strategy that is firmly integrated into our business activities and processes. All our corporate activities are based on three pillars that guide our actions: *People, Sustainability* and *Charity*.

Our focus is on people

People are at the centre of everything we do. Our efforts are directed at all people we influence through our entrepreneurial existence. The goal is to create an environment that promotes motivation and creativity and gives the highest priority to physical and mental well-being. Because we know that only satisfied and healthy employees can develop the cutting-edge technologies for which we stand. Our occupational health and safety management system has been certified by TÜV Nord as compatible with the requirements of the new DIN ISO 45001:2018.

Sustainability is our business foundation

We understand sustainability as the foundation of our business model and activities. Along our entire value chain, we attach great importance to the highest environmental standards and the reduction of our carbon footprint.

Thus, our environmental technologies contribute in many ways to reducing people's ecological footprint and shaping a green and healthy future. They support the ideas of a circular economy and make an important contribution to the implementation of the energy transition.

Our focus is on the consistent optimisation of our products and technologies from an environmental point of view. In doing so, we consider the entire cycle of our plants, from engineering and planning to operation and dismantling. In engineering, we strive to consistently reduce the need for building and construction materials for our plants, for example through resource-saving value engineering.

Doosan Lentjes has implemented an environmental management system aimed at reducing the environmental impact of our business activities and processes. This system has been certified by TÜV Nord in accordance with DIN EN ISO 14001:2015. This confirms that our efforts in these areas are in line with internationally recognised standards.

With regard to the results of our work, our top priority is to fully meet the requirements of our customers. Therefore, we attach great importance to a high level of quality, which is confirmed by the certification according to DIN EN ISO 9001:2015.

National and international charity activities

Charity is the third pillar on which our CSR activities are built. With this element of our social responsibility strategy, we follow our conviction that caring for others is our corporate duty. In doing so, we do not limit ourselves to our community, but help where help is urgently needed. Therefore, we coordinate a number of initiatives for regional and international aid organisations that support people in financial or health emergencies.

Doosan Lentjes provides high customer satisfaction through best practice procurement of goods and services. Our focus is on optimising costs and efficiency while maintaining legal compliance.

We develop global sourcing strategies that leverage the full capabilities of the Doosan Group while focusing on a geographically balanced and locally based portfolio of world-class suppliers. This approach allows us to develop optimal supply chain solutions.

We know that our suppliers make a significant contribution to our performance. Therefore, we strive to build long-term, mutually beneficial relationships that help ensure consistently high quality.

When pursuing project interests, we always strive to uphold our ethical and social responsibilities, as well as our commitment to sustainability and transparent business practices. To achieve this, we have established a *Code of Conduct for Contractors of Doosan Lentjes*.

This *Code of Conduct for Contractors of Doosan Lentjes* has been developed to ensure that our subcontractors or service providers meet the highest standards in their part of the value chain.

The paper defines our basic requirements in the areas of human rights, working conditions, environment and business integrity. It is based on the Doosan Code of Conduct, which sets out guidelines for responsible corporate governance applicable to all Doosan subsidiaries, as well as the principles of the United Nations (UN) Global Compact.

Doosan Headquarters, Changwon, Korea

Doosan Vina, Vietnam

Our procurement expertise

Your satisfaction is our goal

We are aware that flexibility and sustainability are crucial to the success of your business. That is why our customised solutions are tailored to your specific ecological and economic goals.

Doosan Lentjes is proud to be the Doosan Group's global centre of competence for waste-to-energy and sewage sludge incineration technologies, circulating fluidised bed boilers and flue gas cleaning systems.

We continuously invest in the development of our technologies to ensure that we remain at the forefront of our industry, delivering products and services that meet our customers' expectations. These investments also provide the foundation for a culture of continuous improvement that is reflected throughout our organisation.

To provide our customers with solutions that contribute to achieving their economic and environmental goals, we have developed the Doosan Lentjes Operating Model. This model provides for the integration of product requirements into modular solutions that are adapted to specific customer needs. This approach maximises cost efficiency, optimises project completion time and ensures high flexibility.

By continuously integrating all lessons learned into the modular solutions during the project delivery phase, we ensure a consistent learning process to the benefit of all future projects.

Combined with our investment in the further development of our technologies, we are one step ahead in terms of both state-of-the-art and sustainable business development, leading your project to success.

We are driven by anticipating our clients' needs and differentiating through focused innovation. With the Operating Model, we integrate, consolidate and realise synergies to achieve sustainable performance in a challenging business environment.

Thermal waste treatment

Doosan Lentjes is an experienced partner for thermal waste treatment. More than 80 process lines have been commissioned from us worldwide to treat non-recyclable waste in a reliable and environmentally friendly way. We offer in-house expertise along the entire chute-to-stack process chain of thermal waste treatment and supply partial plant solutions from a single source.

Sustainable disposal method for non-recyclable waste

Thermal waste treatment is the only proven large-scale method to treat non-recyclable municipal waste in a safe and environmentally friendly way. According to the European waste hierarchy, it is part of a sustainable waste management concept that prioritises thermal treatment over simple landfilling. By thermally treating residual waste, these plants make an important contribution to maintaining health and to efforts to reduce the ecological footprint.

During incineration, the energy contained in the waste is utilised to generate electricity and heat. As more than half of the energy contained is of biogenic origin, its utilisation contributes to the achievement of renewable energy targets. Utilising the energy also saves CO_2 emissions that would otherwise be produced by burning climate-damaging fossil fuels. The recovered energy can be used for domestic, industrial or commercial purposes.

In addition, the bottom ash produced during incineration is increasingly fed into recycling processes, e.g. as road construction material or as an additive for cement raw materials and in concrete production.

Valuable metals can also be recovered from the bottom ash. The possibilities of energy and material recovery make it possible to use fewer primary raw materials and new fuels.

The process of waste incineration also frees the circular economy from pollutants whose retention in the system would contaminate recycling streams.

Grate combustion technology

Grate incineration is the world's most commonly used technology for large-scale thermal waste treatment. Doosan Lentjes has used it very successfully all over the world. Our proven grate types, such as the reciprocating / counter-reciprocating grate (air- and water-cooled) and the roller grate, are tailored to the high requirements of waste incineration. They allow flexible adaptation to different fuel properties such as calorific value or moisture content, which can change over the entire service life of the plant. Thus, you benefit from long-term disposal safety.

Multi-stage flue gas cleaning systems

Our multi-stage flue gas cleaning systems reliably remove acid gases such as HCl, SO_2, and HF as well as heavy metals and organic substances such as dioxins and furans from the flue gases. In the process, all legally required values are reliably complied with in accordance with the revised BREF documents *(Best Available Techniques Reference)* of the European Union or the 13th, 17th and 44th BImSchV.

Case Study: Olsztyn, Poland

Contract award: 2020

Fuel: Refuse derived fuel (RDF)

Number of lines: 1

Total plant capacity: 110.000 t/a

In 2020, the consortium **Doosan Lentjes** and Doosan Enerbility was commissioned by the plant operator, Dobra Energia, to build the new waste-to-energy plant in Olsztyn, Poland.

The turnkey single-line plant was supplied including combustion grate, boiler, dry Circoclean® flue gas cleaning and selective catalytic reduction (SCR). In addition, two gas-fired peak load boilers as well as the entire construction services were part of the delivery.

The plant, which is co-funded by the EU, meets all European requirements in terms of recycling and disposal while complying with the stringent emission limits according to the revised BREF documents.

Case Study: Flanders, Belgium

Fuels: Dewatered sewage sludge, dried sewage sludge

Number of lines: 1

Total plant capacity (dry substance): 65,000 t/a

Doosan Lentjes has been contracted to supply the new sewage sludge treatment plant in Flanders, Belgium. The end customer and project developer is the company Aquafin, which is responsible for the collection and treatment of the municipal wastewater in the Flemish region. Aquafin awarded the DBFMO contract for the new plant to FOSTER, a consortium of BESIX Group and Indaver NV.

As part of the turnkey project, Doosan Lentjes will be responsible for the design, supply, installation and commissioning of all process, mechanical and electrical equipment. One process line consisting of a bubbling bed furnace, a steam generator, a multi-stage flue gas cleaning system and a water-steam cycle will be supplied.

Mono sewage sludge incineration

Doosan Lentjes has extensive experience in municipal sewage sludge incineration, with more than 30 commissioned incineration plants in Germany and Europe. We supply reliable partial plants based on the proven bubbling bed boiler technology.

Covering the entire process chain

We offer customised mono-sludge incineration concepts based on the proven bubbling bed boiler technology. Our expertise covers solutions across the entire reception-to-stack process chain from dewatering and drying, incineration, heat recovery and district heating/electricity generation to flue gas cleaning and ash separation.

Compliance with strict emission regulations

Our proven multi-stage flue gas cleaning processes ensure that the strict emission regulations according to the revised BREF documents or the 13th, 17th and 44th BImSchV can be reliably complied with. This is achieved through the maximum removal of harmful pollutants such as acid gases, heavy metals and solid particles from the flue gas.

Preconditions for phosphorus recovery

With our customised plant concepts, we support you in meeting the new legal requirements for sewage sludge treatment: An integrated electrostatic precipitator separates the ash from the flue gas and thus creates the prerequisite for subsequent phosphorus recovery.

Cost effective design

Doosan Lentjes' equipment solutions benefit from their compact design and high process and cost efficiency.

CFB boiler technology

Benefit from efficient and environmentally friendly solutions for steam and power generation by working with Doosan Lentjes – a recognised pioneer in advanced circulating fluidised bed (CFB) boiler technology. Our solutions help you to implement the global energy transition.

Efficient combustion of renewable and alternative fuels

Renewable and alternative fuels play a crucial role in making electricity generation environmentally friendly. Compared to burning hard coal or lignite, the use of renewable or alternative fuels can drastically reduce the carbon footprint.

However, we are aware that when you use sustainable fuels, you place high demands on the combustion solution, which must not only ensure efficient fuel handling but also achieve excellent economic results. You can rely on our proven circulating fluidised bed (CFB) boiler technology to fully meet these requirements. Our CFB boiler technology is characterised by the highest fuel flexibility, which enables safe and high-performance combustion of different fuels such as biomass, sewage sludge and refuse derived fuels (RDF) – even in varying mixing ratios.

Integrated emission control

The controlled combustion temperature and air supply of the CFB boiler technology also ensures a combustion process that is already optimised and efficient from an environmental point of view. Depending on the fuel and its sulphur content, a reduction of more than 90 % of the sulphur dioxide (SO_2) emissions released during incineration is already possible in the combustion chamber.

In addition, both the low and controlled temperature of about 850° and the multi-stage airflow avoid the formation of thermal nitrogen oxides (NO_x) and thus deliver minimised NO_x emissions. Depending on emission requirements and fuel composition, there is little or no need for further flue gas cleaning for the full range of fuels. If legal requirements demand further emission reduction, we can offer additional systems for gas cleaning that can be easily integrated into the CFB plant concept while meeting all known standards.

Decades of experience as an Original Equipment Manufacturer (OEM)

We have a history of more than 40 years in CFB technology. Our predecessor company filed the essential patents of the circulating fluidised bed for power plant applications in 1976, making us the Original Equipment Manufacturer (OEM) of this technology.

In 1981, we designed, built and commissioned the world's first commercially used CFB boiler with the first so-called Fluidised Bed Heat Exchanger (FBHE) in a multi fuel-fired industrial power plant in Germany.

Our track record includes more than 110 boilers, each with a capacity of between 20 and 300 MW_e, which we have delivered around the globe. These units reliably generate more than 22 GW_{th} of electricity and steam. In recent years, we have particularly pushed the development of smaller decentralised plants for firing biomass, sewage sludge or other substitute fuels.

Case Study: Sodegaura, Japan

Fuel: Biomass wood pellets

Thermal capacity: 180 MW_{th}

Electrical output: 75 MW_e

Doosan Lentjes provided key CFB boiler technology for the new 75 MW_e biomass-fired power plant located in Sodegaura Japan. The contract comprised engineering and procurement of the boiler island including the major boiler and flue gas cleaning equipment.

Carried out to the benefit of the plant owner, Osaka Gas Group, our work is executed under the terms of a larger EP contract awarded to our Korean parent company, Doosan Enerbility. Through our close collaboration with the experienced local partner, Chiyoda Corporation, the project brings together strongest competencies along the entire EPC value chain.

Case Study: Dinslaken, Germany

Flue gas cleaning technologies: Circoclean® & SCR DeNO$_x$

Flue gas volume: 2 x 112.000 m³/h (STP, wet)

Fuel: Waste wood (class I-III)

Doosan Lentjes was commissioned in 2020 to supply the complete flue gas cleaning system for the new waste wood incineration plant in Dinslaken. The project was delivered as part of a turnkey contract – also executed by Doosan Lentjes – which includes the construction of two incineration process lines. The owner of the new power plant is Dinslaken Holz- und Energiezentrum (DHE).

The customer benefits from a reliable flue gas cleaning solution that ensures compliance with emission limits in accordance with the revised European BREF documents.

Flue gas cleaning systems

With more than 50 years of experience Doosan Lentjes is a leading supplier of various flue gas cleaning technologies. Whether for thermal waste treatment or sewage sludge incineration plants, power stations or industrial facilities, Doosan Lentjes offers the most suitable flue gas cleaning concept for your process and specific requirements. In doing so, the strict emission regulations according to the European BREF documents *(Best Available Techniques Reference)* or the 13th, 17th and 44th BImSchV are reliably complied with.

Our proven proprietary technologies, which can be flexibly combined, include:

Semi-dry Circoclean® flue gas cleaning – an advantageous solution for the reliable separation of various pollutants such as SO_2, SO_3, HCl, HF, dioxins and furans as well as heavy metals such as mercury from the flue gas. The process can be used for biomass, refuse derived fuel, domestic and industrial waste incineration plants and in the industrial sector, as well as downstream of multi-fuel-fired boilers.

Dry FER-DI® flue gas cleaning – a simple process suitable for moderate pollutant concentrations from waste incinerators, power plants and industrial facilities. The pollutants to be removed include acid gases such as SO_x, HCl and HF as well as dioxins and furans and heavy metals such as mercury.

Particle separation technologies – including electrostatic precipitators (ESPs), high pressure pulse jet (HPPJ) fabric filters and low pressure pulse jet (LPPJ) fabric filters for dust removal.

While HPPJ filters are typically used for smaller installations, LPPJ type fabric filters are the method of choice for installations of a certain minimum size.

Wet scrubbers – including acidic and alkaline processes. The acid process is mainly used to absorb HCl, HF, NH_3 and mercury from the flue gas. The alkaline stage mainly absorbs sulphur dioxide (SO_2) and sulphur trioxide (SO_3) as well as residual amounts of the remaining pollutants. Wet scrubbers are often used as a second stage when particularly low emission values are to be achieved.

Denitrification technologies (DeNO$_x$) – including primary measures (selective non-catalytic reduction, SNCR) as well as separate (secondary) applications (selective catalytic reduction, SCR) for nitrogen oxide reduction. While in SNCR the reducing agent (ammonia water) is injected directly into the first boiler pass, in SCR nitrogen oxides are reduced to the desired level with the help of a catalyst while ensuring a low NH_3 slip.

Technologies for heat extraction – including processes for heat recovery and flue gas condensation to make the heat contained in the gas usable for internal or external applications.

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