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HIGH EFFICIENT CHP SINGLE 10MW GAS ENGINE POWER PLANT EXPERIENCE REPORT

A power plant in the smallest possible space

By Ralf Losch, Senior Product Manager, MAN Diesel&Turbo SE

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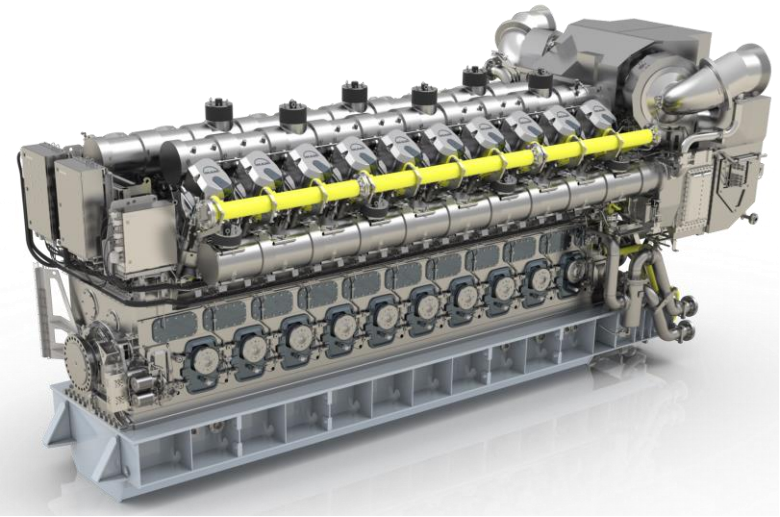
The Project

MAN has built a combined heat and power plant on the VW site in Brunswick

MAN Diesel & Turbo SE was asked by VW Kraftwerk GmbH to build a combined heat and power (CHP) plant on the Volkswagen site in Brunswick. The modern and highly efficient 20V35/44G gas engine was installed with an output capacity of 10.4 MWe and 9.15 MWth. In this special configuration the plant achieves a net overall efficiency of 84.3%.



The MAN 20V35/44G gas engine

The scope of work included engineering and planning services, together with genset delivery and various mechanical and electrical components. Furthermore, the client required the plant to be assembled and made ready for use.

Challenges

The project was a huge challenge. Besides having to respect strict noise and emission limits in line with the TA-Luft regulation and meeting common European standards, there were also special requirements with regards to the plant's construction. As a result of its location within the Volkswagen production site, the plant had to be constructed in a very confined space. One part of

the plant had to be installed in an existing building, while another part was to be housed in a new building, which had to be constructed by the client.

The main components for the extraction of heat from waste gas were installed in the existing boiler house, within its sub-basement that had a height of 2.3 metres, while the motor itself, together with the systems for the extraction of heat from the engine coolant water and for the waste gas treatment, were housed in a new three-store building next door.

Calculating the statics for the new building proved to be specifically demanding. As a result of the limited space the surface area available was very small and yet the building needed to comprise several levels. These architectural specifications came on top of the requirements to withstand the heavy weight of the plant equipment.

Construction progress

As these plans were being developed, the plant components were being installed in the existing building. The completion of the new building in just a matter of days demonstrated the impressive benefits of pre-fabricated constructions.

Faced with significant time pressure, the construction work, the building of pre-fabricated parts and the assembly of heavy plant components were undertaken all at the same time. A streamlined process of this kind is only possible when all parties work perfectly together. This is where the customer's project management team in particular, also played a vital role. As the customer provided a health and safety coordinator, it was also possible to ensure that all the requirements for risk prevention and occupational safety were met in full.


Assembly of the plant in Brunswick

Immediately after the completion of the ground floor, the modules that were to be fitted next to the engine were installed and the engine and generator were moved into position. The individual components and units were connected by completing the piping system and the electrical wiring

Conclusions and results

The cold and hot commissioning was performed directly afterwards. This ensured that nothing more stood in the way for first ignition, network connection and the start of commercial operations. Today the plant operates stable within the projected operational parameters and exceeds the forecasted overall plant efficiency. Operation of the new CHP plant delivers a great contribution to the protection of the environment by $C0_2$ savings of 30.000 tons per year. While producing 50% of the Factory's total Energy need, the plant likewise supplies 50% of the total Heat required. For future projects this engine model has recently been upgraded by application of the 2 stage turbocharging system granting a significant further increase in power output and efficiency.

References

MAN Diesel & Turbo is a global expert in designing, constructing, assembling and preparing engine and turbine power plants up to 250 MW. Our engines and turbines are manufactured on our production sites in Germany, Denmark, the Czech Republic, France and India. Our global service network grants access to competent service representatives in practically any country in the world. We are able to offer genset delivery and consortium solutions or partnerships, and can take on sole responsibility for EPC projects. We work closely with our clients to determine the optimum working structure for each specific project.

Selected international projects:

Client	Location	Application	Engine type	Power	Fuel	MAN involvement	Comments
Power and Water Corporation	Australia	Base load power plant	3 x 12V51/60DF	34 MW	Dual fuel, mostly gas-driven	EPC	Provision of an underground tunnel
Gibelec	Gibraltar	Base load power plant	3x 14V51/60G + 3x14V51/60DF	84 MW	Gas/DF	Genset with mechanical and electric accessories	Replacement of existing facility
Government of Gabon	Libreville, Gabon	Base load power plant	4 x 18V51/60DF	70 MW	Dual fuel, mostly gas-driven	Genset with mechanical and eclectic accessories	Electricity generation for the capital city Libreville
EdF	Corsica, France	Base load power plant	7 x 18V51/60DF	125MW	Initial operation on Diesel fuel	Engineering Procurement Commissioning	Replacement of existing facility
VW Kraftwerk GmbH	Brunswick	Hot water generation for industrial use	1 x 20V35/44G	10 MW	Gas	EPC excluding civil works	Plant in commercial operation

The basic principles for the construction of our engines are ease of maintenance, operational safety, the reduction of emissions, the use of alternative fuels (such as biofuel or biomass) and the optimisation of combustion systems to the respective fuels and operation methods. These principles mean that our plants can be operated with a focus on economic viability and environmental responsibility.

The optimum configuration for the plant technology is developed taking into account the respective needs and individual conditions of each project. Typical and well-tested applications are the Open

Cycle Mode for pure electricity generation, the Combined Cycle Mode with downstream steam turbines or the CHP mode for combined heat and power systems. Depending on their use, these plants can achieve efficiency levels beyond 90%.

Today our company has around 14,400 employees and is represented in 150 countries. The company headquarters are located in Augsburg. MAN Diesel & Turbo is a company within the Power Engineering division of MAN SE and is a member of the Volkswagen Group.

Our product portfolio for fitted applications includes our diesel and gas engines, ranging from 1 MW to 21.6 MW.