

AVAT & BACHMANN

The innovation drivers of efficient controller systems
for gas and dual-fuel engines

AVAT GmbH has established itself worldwide as a reliable and competent engineering partner on the market. With its team of 80 employees, the Tübingen-based company has been well-known amongst reputable manufacturers of large engines. With over 7,000 installations, AVAT is one of the largest, independent suppliers of control systems for gas and dual-fuel engines. The specialists develop these in the rating classes from 400 kW to 10 MW, with particular importance placed on increasing efficiency as well as smooth operation. The core of the AVAT system solution is the M1 control technology of Bachmann electronic. This provides flexible maritime automation with open software and hardware and has all the relevant marine approvals, such as DNV-GL (Det Norske Veritas and Germanischer Lloyd).

Together on course for environmental protection

The world's oceans have been the most important transport routes since the beginning time. Due to the increase in maritime transport, more stringent emission laws are already applicable in coastal waters. »Environmentally-friendly drive concepts are therefore more in demand than ever before,« explains Martin Greve, head of product management at AVAT. »Compared to diesel units, low-emission gas engines are being used increasingly more frequently.« Ship operators thus benefit from the reduced production of smoke and soot, as well as the flexibility of operating dual-fuel engines with natural gas or liquid fuel. »The regulation of gas engines and the monitoring of operating parameters are highly complex areas, requiring a great deal of know-how,« explains the graduate engineer. »Combustion processes must be ensured in changing gas mixtures and increased nitrogen oxide emissions or ignition failures must be prevented. Engine control and gas propulsion combustion processes also have to be coordinated precisely.« Reliable and powerful components are indispensable for this kind of control solution. For this reason AVAT chose Bachmann electronic's automation system.

Flexible, autonomous and custom controllers

Based on a modular system, all engine manufacturers receive perfectly matched controller solutions from AVAT – from the combustion control right through to teleservice. If necessary, this can also be expanded with several function modules at a later time. This offers engine manufacturers maximum flexibility, individuality and openness in the controller solution.

The powerful M1 controller technology of Bachmann electronic is an important element of the openECS engine control from AVAT. This fan-less industrial controller was designed especially for the harshest environmental conditions and guarantees smooth operation on rough sea. The proven PLC is designed for the extended temperature range from -30 °C to +70 °C at the top level as well as worldwide and long-term availability. Bachmann electronic's robust M1 can also withstand all typical engine vibrations. The controller platform also comes with all the relevant marine classifications and, together with the AVAT technology modules, handles functions such as anti-heeling, speed, power or mixture control and engine control. Bachmann electronic's system architecture designed for network



The Gansslos engineering consultancy was started in 1988, offering development services in the field of decentralized energy generation and power supply technology. AVAT Automation GmbH was founded in Tübingen (Germany) in 1993. The company is one of the specialist engineering partners for manufacturers of large engines, plant builders, energy suppliers and operators of decentralized energy systems. Its portfolio includes a range of hardware, software and services for energy automation.

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Martin Greve,
Head of product management
for large engine automation

capability also enables the M1 to be integrated easily into innovative controller platforms, as well as that of the engine control system. Real-time Ethernet, CAN, Profinet and many other open standard interfaces ensure trouble-free communication.

Greater degree of freedom for engine manufacturers

Several different programming languages can be used for programming the Bachmann controller: IEC 61131-3, C/C++, Java, Controllab 20-sim, MATLAB®/Simulink® or HTML5. The IEC 61131-3 development environment also offers the application developer a wide range of ready-to-use functions in the form of function blocks and libraries, which save a great deal of time.

Engine manufacturers and plant builders are able to implement their applications on their own or have them developed by AVAT – the certified system integrator for Bachmann (CSI). AVAT allows customers to access the source code of the software levels. This makes it possible to view and change all details at any time. The central database is a special feature of the openECS. All relevant data objects are managed at a central location so that monitoring, logging and recording functions run in the background. This program configuration can be changed quickly and allows comprehensive monitoring functions and complex release conditions to

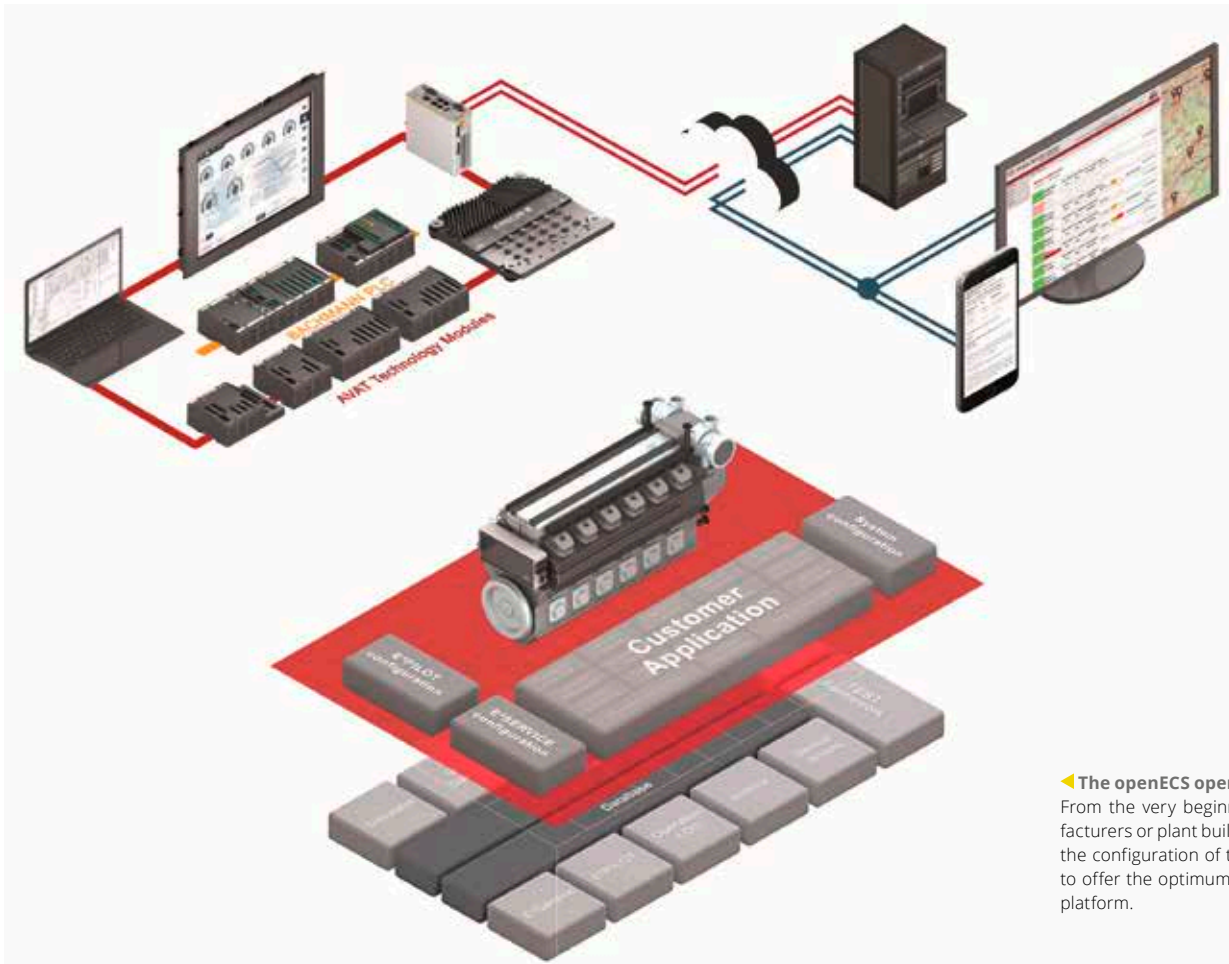
be implemented. »Our customers particularly benefit from the standard functionality on all levels, simplified testing and detailed simulation options. Engine simulation is particularly important for manufacturers or plant builders. This significantly reduces costly testing and commissioning times,« product manager Greve further explains.

Operating status called up from anywhere in the world

With preconfigured VPN routers establishing encrypted communication between a secure rendezvous server, authorized users can log into controller platforms in order to obtain information about actual plant status. This saves considerable time and costs for maintenance and service operations. AVAT can also boast a new software module which sends time-triggered or event-triggered encrypted data packets to central servers. These are further processed into status indications or fault messages and sent by email or SMS to the responsible service employees.

Together on course for success

The innovative controller concept is very well received on the market. Engine manufacturers and plant builders particularly appreciate the openness and flexibility of this system. »You can configure your own controller platform to customer specifications at any time,« Thomas



◀ **The openECS open control concept:** From the very beginning, engine manufacturers or plant builders are included in the configuration of the system in order to offer the optimum possible controller platform.

Hutter, sales manager for large engine automation, describes the product features. »Our modular system, consisting of hardware and software modules, offers the right modules for standard applications right through to complex tasks. Every customer can determine themselves whether to purchase just components or a fully developed system. In any case, they receive a tailored controller solution that meets their requirements 100 percent.«

»We chose Bachmann electronic because we found the M1 to be a controller that already comes with a host of marine certifications. The expansion with AVAT technology modules has resulted in a highly specialized engine control system for large gas engines. We also appreciate the expert advice and partner-based support which was a key factor in the success of the collaboration with Bachmann electronic,« Thomas Hutter emphasizes.

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Sales manager for large engines

