

About Vemcon

Vemcon GmbH, based in Haar (near Munich), is re-thinking control and automation of mobile work machinery like excavators, graders, wheel loaders as well as agricultural and municipal machinery. Here, the core competencies lie in the simplification of machine operation through the combination of intuitive ergonomics and operator assistance, as well as the use of self-learning software and cloud services. The product portfolio builds on a modular, flexible and manufacturer independent technology platform, starting with tailor-made control concepts and joysticks to retrofit solutions for full automation of work machines. On the journey to semi-autonomous and autonomous work machines, the company makes use of its expertise, experience and research in the areas of hydraulics, robotics, ergonomics and artificial intelligence.

Vemcon counts OEMs, suppliers and operators of mobile work machines as their client base.

Vemcon – a hands-on company that re-thinks machine control.

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THE VEMCON COPILOT FOR SEMI AUTOMATION OF WORK MACHINES



Vemcon CoPilot

For more productivity, transparency and efficiency

More and more building contractors have to handle construction projects under increasing time and cost pressure, with capital-intensive machines and hardly available skilled workers. To master this task, contractors try to optimize the collaboration of work-force, machines and material. Expensive machines are particularly an obstacle because of their difficult operation:

- The manual operation of the machines is complex and difficult. For example, each joint of an excavator is controlled individually. Productivity therefore depends on the operator's skills and daily constitution. Digging the hole right is practically impossible on the first try, leading to extra work and costing time and money.
- Tools are used less efficiently, because on the one hand the operator has no support in selecting the most suitable tool for each task and on the other hand the machine and control system are not aware of the currently mounted tool.
- Fleet and tool management for preventive maintenance is only possible to a limited degree.

The Vemcon CoPilot – a must have for OEMs and contractors

OEMs increase machine sales and open up new business segments

- Joystick, operator assistance and networking to increase productivity and create unique selling points
- Shorten time-to-market with market-proven platform solutions and expertise
- Generate new revenue through productivity-enhancing functionality in quickly integrated apps
- Stand out from the competition and increase market share with intelligent machines

Contractors benefit from time and cost savings and increased efficiency

- With artificial intelligence machines learn to work independently and precisely.
- Intuitive joystick, excavator automation and tool management from a single source: work accurate and the ability to change tools quickly save time and money.
- Operators are mentally and physically relieved. Inexperienced operators are trained faster.
- The machine's work processes are broken down into individual steps using the machine's data. Productivity-enhancing functions are identified, and corresponding cloud services can be loaded onto the machine.

Semi-automated machine movements with the Vemcon CoPilot

The Vemcon CoPilot is a manufacturer-independent retrofit solution. It supports the operator even in difficult jobs and relieves him mentally and physically. After a short period of training, even inexperienced operators can work faster, more confidently and more precisely. The relief for the machine operator means an increase in productivity of up to 40% for the contractor.

The CoPilot automates and optimizes recurring machine movements. In the case of an excavator the assistance system allows the operator to control the entire excavator arm with just one joystick, without having to operate each individual joint in the excavator arm. This first step in semi automation enables:

- Automatic grading
- Automatic grading at an inclination of -100% to +100%
- Automatic control of bucket, boom and adjustable boom as well as stick
- Automatic grading without laser and GPS - no external reference necessary

This is how the operator experiences this simple assistance system: he manually brings the tool – e.g. a bucket – into the desired starting position of the grading process. To activate the automatic grading system the operator presses a button on the left joystick. An acoustic signal from the terminal tells the operator that the automatic grading system is active and the left joystick (stick) is pulled in the desired direction. The joints are automatically controlled and the bucket is held in position. The same applies, depending on the pre-set inclination when using the assistance system to dig slopes. The operator stops the grading process as soon as he moves the joystick to the neutral position. Again, an acoustic signal tells the operator that the automatic is switched off.



Automatic grading for excavators – Vemcon CoPilot components in detail

For automatic grading, the CoPilot contains all hardware components of the three packages (Basic, Sensor Kit, Automation Hydraulics) as well as a corresponding app for the assistance system. The app contains automatic grading (also at inclines) as well as the reading sensor data for and controlling joints (bucket, stick, boom & adjustable boom). The hardware components are part of the Vemcon technology platform and can be used in almost all excavator types:

Automatic grading for excavators

CoPilot Basic

- Terminal for displaying the system status, error messages and generates acoustic signals; +/- buttons of input the grading inclination
- Connectivity Module (Bluetooth & Internet)
- Touch surface and buttons to use additional functions (developed functionally safe)

CoPilot Sensor Kit

- Powerful control unit developed to be functionally safe: uses CoPilot algorithms to control the grading movement and monitors the correct actuation of the valves.
- Highly dynamic IMU sensors on cabin, boom, adjustable boom, stick and tool: precisely measures the joints' current angles and angular speeds
- Pressure & temperature sensors
- Wiring harness
- Brackets, contacts and connections

CoPilot Automation Hydraulics

- Electro-hydraulic CoPilot block: in manual mode it lets the joystick set the hydraulic pilot pressure. In automatic mode joystick motions determine the grading direction through SIL 2 pressure sensors, while pilot pressure is regulated by electrical pressure reduction valves. The system can be extended to include even more hydraulic functions.
- Pressure & temperature sensors
- Wiring harness
- Brackets, contacts and connections



Vemcon CoPilot apps – for the semi automation of work processes today, upgradeable to tool and fleet management of tomorrow.

The CoPilot can easily be expanded with numerous functions via apps. This is made possible by the modular structure of the easily applicable Vemcon technology platform. Clients have the option to combine, supplement and expand the system, products and components of their choice. This lets the CoPilot meet machinery requirements after a short development period. Components are compatible with other marketable system interfaces.

CoPilot Apps for excavators

CoPilot Basic

- Tool recognition (combinable with tool management)
- Fleet management
- Remote maintenance
- Tool control (hydraulics, tiltrotator, quick coupler)

CoPilot Sensor Kit

- Dynamic scale
- BIM integration
- 2D system height display
- Fleet management integration of excavators and attachments

CoPilot Automation Hydraulics

- Automatic grading
- Optimal bucket guidance
- Swing angle limitation
- Tilt function control
- Mounted compactor guidance
- Hydraulic pulveriser guidance
- Height and depth limitation
- Optimal tool guidance such as for rail construction and demolition work
- Interfaces to 2D/3D systems
- Tool recognition incorporated into tool management