# Who will operate the OTMs of tomorrow?

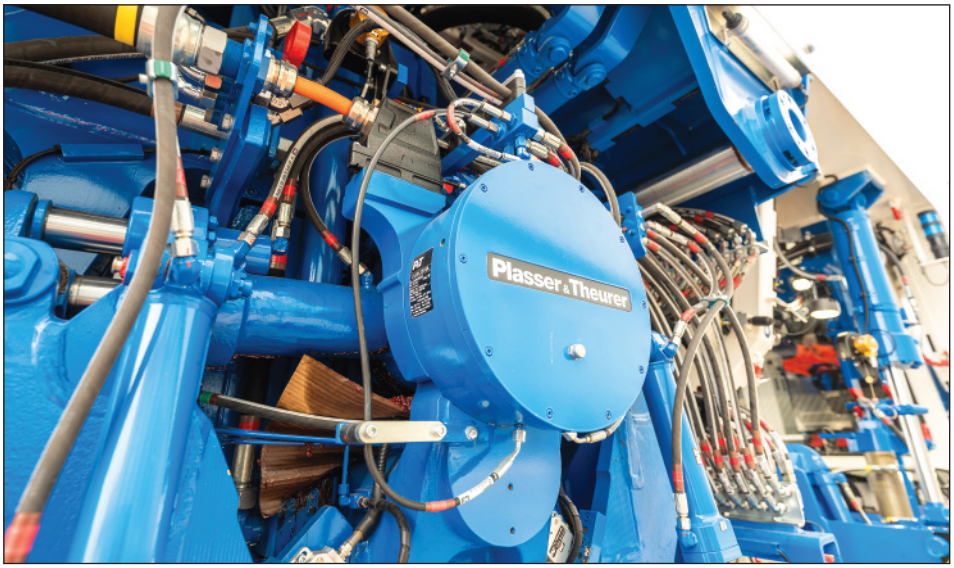
**Plasser & Theurer's Simon Misar details the development of autonomous technology in a tamping machine.**

Everyone is talking about AI and automation, which are often touted as solutions to the shortage of skilled labour and loss of know-how. As we know, there is often a major discrepancy between their potential and using them in the real world of work. And then, to top it all, there is the railway system, with the heavy backpack of tradition it has carried over 200 years, coupled with new normative and regulatory frameworks. That does not exactly sound like the ideal space for developing the latest track technologies. It was all the more refreshing to see what is already technically possible at the iaf 2025 exhibition in Münster, Germany.

On-Track Machines (OTMs) with hydraulic motors have dominated track maintenance for decades. Increasingly, powerful electric motors with fine response behaviour, alongside faster generations of control systems, provided the prerequisites for thinking in new ways. Thoughts were put into action - as is regularly the case at Plasser & Theurer. The renowned company spared no expense, investing in research and development, and the results are impressive.

**Above: The empty work cabin of the Unimat 09-4x4/4S E³ tamper while working autonomously.**

**Below: Balfour Beatty's new Unimat 08-4x4/4S tamping machines have electric tamping units with TampingControl for a safe maintenance process on board.**




## Sensor technology

Four new Plasser & Theurer Unimat 08-4x4/4S tamping machines for Balfour Beatty are currently being delivered to the UK (see page 14). They already have tamping units with electric motors and sensitive digital tools to make everyday work easier. The Plasser TampingControl includes a multi-tiered toolset for safe, reliable maintenance intervention under sleepers. VoidDetection ensures the durability of railway foundations. It indicates to the operator whether the degree of ballast filling is correct, which is a basic requirement. ForceAutomation can adapt the tamping pressure to the ballast conditions, and BallastMonitoring evaluates the ballast condition qualitatively. This shows when the next cleaning of the ballast is due.

Nowadays, it is not only tamping units which feature sensor technology. The complete maintenance processes can be automated. Plasser TampingAssistant has now been in use for several years and more than 10 tamping machines in seven countries already have the assistance system on board. It actively supports operating staff in setting the work units according to the infrastructure manager's tamping plan and the conditions recognised on the track or turnout section immediately before tamping.

The TampingReport documents three sources of information - the position of the work units including obstacles, a complete view of the working parameters for each sleeper and the quality of the inner track geometry after tamping. The Plasser ReferencedTrackGeometry system can also be used to document the absolute track geometry, which is particularly relevant to safety for high-speed lines. In May, the demonstration at the iaf showcased how far research into automation has progressed.

## Autonomous working - where do we currently stand?

In Münster, a Unimat 09-4x4/4S E³ from Eiffage Infra-Rail was demonstrated tamping a turnout fully autonomously. The operating desks in the main work cabin and additional work cabin remained empty while working. The lifting and lining units, third-rail lifting unit and tamping tools were controlled through automation. It was inspiring to see how the driver left his typical workspace and was only on-site for monitoring purposes.

There are further steps necessary for this scenario to become part of everyday worksite life. However, it is up to all of us as stakeholders in the rail industry, in construction and in the railway infrastructure to create suitable landscapes conducive to innovative solutions, such as those described. These will all make the railway fit for the next 200 years.

**Left: Visitors watching the autonomous machine demonstration at the iaf exhibition.**