



## Testimonial Statement

Product: TUnIS.moving station | Project: Grand Paris Express

The science of tunnel navigation is an area of technology that over the decades has moved from the simplest of surveying techniques to the modern complex IT supported systems we have today. VMT has always been at the forefront of such developments and has recently introduced the latest innovation TUnIS.moving station.

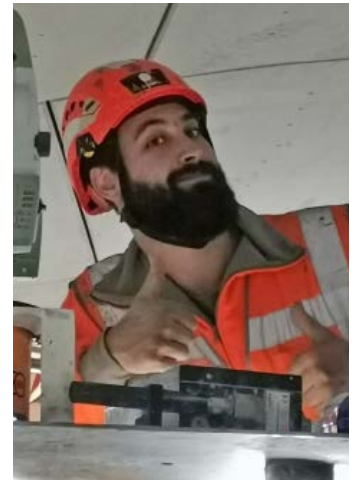
**Q: Why did you agree to the transformation from the standard system TUnIS Navigation TBMLaser to TUnIS.moving station?**

**A:** Our former tunnel director suggested to try this system. I found the principle interesting; so, why not have a go? I like working on new technologies likely to improve the surveyor's working conditions.

**Q: How were your TBM operators effected by the TUnIS.moving station? What is the opinion from them?**

**A:** TBM operators are not that open for changes. In the beginning, they were skeptical, since they were not familiar with this system. They had a system that worked highly precise and well and now they were given a system that needs a different interpretation of the accuracy with a slightly reduced but still sufficient precision which had position jumps at the beginning.

By explaining how to use this system, by discussing with the shift engineers and thanks to periodic system updates by VMT, it was possible to clearly improve the accuracy of the moving station and along with this the acceptability among the TBM operators.



*Surveyor Christophe Cottanceau*

**Q: Which were the main arguments with which VMT systems could convince finally?**

**A:** This system is beneficial for the production teams since they no longer need to intervene on the total station whether to change the battery or relocate the device and the bracket. To them, this is one less thing to worry about.

Depending on the TBM's configuration, using the moving station may be more interesting than the traditional system. In our case, the window in which to act was somewhat reduced as a result of the change of position of a mortar bucket. It also sent vibrations onto the total station which, in the long run, can harm the device. Today, the problem is solved. The interest is even greater for surveyors, since the system provides flexibility for relocating the backsight prisms and, in most cases avoids changing the consoles (which are very heavy and impossible to install alone).

The surveyor also saves time in the field, since it is faster to install a simple prism than a huge console to be handled by two people. He can take care of it alone without asking for assistance.

**Q: Could these VMT solutions generally fulfill the expectations – did they perform like it was expected/ordered/bought?**

**A:** In the beginning, the TUnIS.moving station generated jumps in the position of the machine due to vibrations and suboptimal use. Since then, we have carried out several adjustments with the pilots, shift engineers and VMT, and today the system gives a smooth navigation that comes close to the traditional system. This system has been accepted by almost everyone.

**Q: How do you judge the collaboration with VMT?**

**A:** Whether during installation of the navigation system equipment, during training on the TUnIS software or while resolving technical problems, the VMT teams have worked with us since the start of the project.

The engineers listen and respond to the needs, take our remarks into account and improve the navigation system in order to increase its reliability and precision.



“The surveyor also saves time in the field, since it is faster to install a simple prism than a huge console to be handled by two people. He can take care of it alone without asking for assistance.”

Christophe Cottanceau, Surveyor at Implenia AG

**Q: Do you have any proposals for improvement of our technologies?**

**A:** I have already given you my feedback and some ideas during your last visit for improving TUnIS.moving station and TUnIS. mobile app. Like for example

- ▣ We can't do calculation of position during the ring building because of vibration of the conveyor, so we do it at the beginning.
- ▣ If the total station can measure the ALTU before monitoring prism it's better because the navigation will be ok, the monitoring is less important.

**Q: Would you opt again for our product solution and VMT as partner?**

**A:** The navigation system is intuitive and works well, and so I recommend it.