



## Air Traffic Control the Netherlands keeps track with modified tablets



*In recent years, Air Traffic Control the Netherlands (LVNL) has been working hard on Tower 2.0. The aim of this project is to radically modernise the control tower at Schiphol.*

*Part of the project is the digitisation of the system by which air traffic controllers keep the flight information at hand. Tablets specially adapted by Mulder-Hardenberg play a key role in this.*

Schiphol has grown considerably in recent years. The number of flight movements has increased from 230,000 in 1991 to around 500,000. “We have clearly noticed this in the control tower”, says Maarten Repko. He is Team Leader Tower Systems at Air Traffic Control the Netherlands. As a result, the number of people needed on the tower to manage all movements has increased considerably. However, there is only limited space on the tower, so it has become physically busier.

### **Digitisation**

That is why LVNL decided to perform a major makeover of the Schiphol airtraffic control tower in 2018. The arrangement and layout of the air traffic controllers’ workstations within

the tower has been adapted. In addition, to make room for more workstations, a significant portion of the equipment has been moved to a data centre elsewhere in the building. The system for guiding and transferring aircraft from one air traffic controller to another has also been changed. Or rather, digitised.

“The towers of Air Traffic Control the Netherlands at Schiphol have several air traffic controllers who need to have a visual view of the planes at the airport”, says Repko. “An incoming or outgoing aircraft is guided by various air traffic controllers. For example, whereas one air traffic controller accompanies the aircraft during landing, another is responsible for taxiing towards the terminal and the gate”.

### **Digital strip system**

This means that an aircraft is transferred several times from one air traffic controller to another. A so-called strip system is used for this purpose. Previously, aluminium panels with a printed paper strip were used on which some basic information pertaining to an aircraft was stated. All strips were

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placed on a lectern in the tower, so that the air traffic controllers could find the information about their aircraft quickly and easily.

This system has worked perfectly for many years, according to Repko. However, with the increasing volume of traffic at Schiphol, the need arose to modernise this process as well. So that more flight movements can be supervised and the number of air traffic controllers can grow further. The paper strips have therefore been replaced by digital strips as part of Tower 2.0. These are displayed on tablets at the air traffic controllers' workstations.

#### Difficult to read

"However, we encountered a problem. Each air traffic controller uses a tablet on which the strips applicable to him or her are displayed digitally. The software that is used for this has a day and night mode, but the tablet itself has only one light intensity", says Repko. "As a result, the information displayed on the tablet was sometimes difficult to read".

In other situations, users can often solve this problem themselves by adjusting their viewing position or viewing the tablet at a different angle. Because air traffic controllers should not have to spend time looking for the right viewing angle, this is not practical on the Schiphol tower.

#### Challenging lighting conditions

"The lighting conditions on the tower are an important point of attention", says Hans van Heerwaarden, Technical Consultant Industrial Automation Solutions & HMI at Mulder-Hardenberg. "The ambient light is often very bright. There are limited possibilities for sun protection, because the air traffic controllers simply have to have a view of the aircraft. For the lighting conditions on the tower, the tablets did not really give enough light".

Mulder-Hardenberg was already involved in the Tower 2.0 project and supplies LVNL with, among other things, monitors and keyboards. Van Heerwaarden: "The tablets - of the Wacom brand - play an important role in this project because of their great ease of use. So we could not just swap them for another brand or type. That is why we started to investigate whether we could modify the tablets so as to considerably improve readability".

Mulder-Hardenberg has a great deal of experience in solving optical problems. Van Heerwaarden: "We worked with Notrott, a supplier of monitors from Oosterhout. We have a great partnership and often work together. Together we looked at how we could further improve the readability of the Wacom tablets. This has resulted in a number of adjustments".

#### Finding the right balance

The first modification was to replace the standard backlighting of the tablets with a Hi-Brightness version. The result of this is that much more light can come out of the tablet.

"An important point of attention in this respect was the fact that a balance had to be found between the maximum brightness and the thermal management. After all, the brighter the image, the more energy is dissipated or consumed. This could cause the temperature in the tablet to rise too much. That is why we reduced the maximum brightness of the Hi-Brightness module a little. This keeps the temperature in the Wacom tablets within acceptable limits".

This gives a very good result during the day, says Van Heerwaarden, but when it is dark, the brightness of the screen can blind the air traffic controller. "In many cases, a display screen can only be dimmed to 30 percent of the maximum brightness. That is not always sufficient for the situation at the control tower, because at maximum dimming, the brightness still had a blinding effect on the air traffic controller. We have therefore adjusted the tablets so that the screens can now be dimmed much further, namely up to 1 percent of the maximum brightness. This works very well when it is dark outside".

#### Optical bonding

Also, Mulder-Hardenberg has applied a technique known as "optical bonding". Here, a water-like thin adhesive with very good optical properties is used to fill the so-called "air gap" between the top of the TFT and the bottom of the cover glass. This results in the big advantage that there is now only one medium transition in the tablet screen: air to glass, and not

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three, as in the old situation. The consequence of the use of optical bonding is that the image on the screen has a much higher contrast. Van Heerwaarden: "The image displayed is no longer "sunken", but simply on the screen. This has a significant positive effect on the readability of the information displayed".

"Meanwhile, all tablets have been adapted to the Schiphol tower", explains Repko. "This also applies to the tablets we keep in reserve. Thanks to the modifications of Mulder-Hardenberg, the image on the tablets is now easy to read - at all times of day and under all lighting conditions. With this, we have taken an important step towards making Tower 2.0 a great success".



Project: Modification of tablets for Tower 2.0	
Client	Air Traffic Control the Netherlands (LVNL)
Location	Amsterdam Airport Schiphol
Solution	- Backlight of the tablets replaced by a Hi-Brightness variant - Optical bonding applied in order to improve image on the screen - Light intensity of the tablets can further be dimmed so that in the evenings, air traffic controllers are not dazzled by the brightness of the image on the tablets.

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