New equipment for Air Traffic Control

The Dutch Air Traffic Control (LVNL) focuses mainly on services to civilian air traffic. Great responsibility rests on the shoulders of the air traffic controllers. Modernisation of the equipment used must not interrupt the continuity of the air traffic controller’s operating procedures in any way. Mulder-Hardenberg has the task of creating and implementing solutions as carefully as possible.

The Challenge
The LVNL has a system that has been used for some time and functions well, but some components need modernisation. Three problems occur:
A. New solutions must be thought up for a number of components.
B. Some parts should be replaced because the delivery of reserve parts can no longer be guaranteed, and
C. In a number of cases replacing segments results in other equipment needing modification.

The changes will be introduced in phases.
Some years ago it emerged that the light pens regularly break down. It also became clear that a better tracker ball was needed.
The use of the present Touch Input Devices (TID) is a recent problem. The air traffic controllers are used to working with interactive communication via touch screen and IR (infrared) Touch. The air traffic controller’s operating procedure must not be changed but the TIDs must be replaced. The limited availability of reserve parts is also a problem here and some elements can no longer be supplied at all.
The monochrome display must be replaced by a TFT screen with good depth of colour. The screen must be as large as possible but still fit into the existing recess in the console. However the new screen has different dimensions than the old one. Direct replacement without radical modification is not possible.

The air traffic controllers require the infra red touch in the new TID to react more delicately. Moreover the transparent layer over the screen must have the same reflective properties of the Lexaan which was used up until now, but also be scratch-proof.
The alternative is glass. However, matted glass does prevent material reflecting but gives insufficient contrast; with unmatted glass the image is clearer, but has too much (read: dangerous) reflection from external light sources. Another requirement is a dimming function of the so-called ‘back light’.

The system is based on Sun Solaris. The new TID is not supported by this Operating System. It is inevitable that the communication protocol between TID and OS is adapted to still make it possible – after all the system is still required to revolve around Sun Solaris.
The last challenge is the guarantee of continuity. That applies to the availability of parts and ‘back up’ systems, to the air traffic controller’s operating procedure and to the system itself: which must stay in the air during the modifications.

The Solution
The light pens have been greatly improved by M-H in collaboration with the manufacturer, and they now offer more possibilities and the quality is assured. In the meantime M-H have the moulds for the parts and the necessary expertise in
house which means that the supply is guaranteed for always. The air traffic controllers have been equipped with a perfect tracker ball for their specific operating procedures.

The so-called ‘form fit’ problem of the touch screen has been solved with the design of a frame of minimum thickness so that the screen fits into the existing console. The video signal will be optimized for the new TFT monitor screen. The very high resolution of Caroll Touch has been chosen as infra red ‘touch’. After long experimentation a solution has been found for the replacement of the Lexaan in the form of glass that is only matted on one side, a costly and time-consuming procedure. The matted surface prevents reflection. The smooth under-layer ensures optimal ‘back light’ perception. Moreover an additional mirror by the lamps reflects the external light input. This increases the amount of light without annoying reflection. The lamps are equipped with a dimmer.

To get the touch screen started it was necessary to adapt the communication protocol between the new TID and the existing Sun Solaris system. M-H has been successful in rewriting this software in such a way that the TID is supported by Sun Solaris OS in every aspect.

**The Implementation**

The fabrication of the glass has taken much time because experimentation with the various options was necessary.

The demands were extremely high; the result was eventually very satisfying. All the hardware has been fabricated externally and made to fit exactly so as to guarantee the continuity of the system.

The physical implementation in the air traffic control system can therefore be carried out within a very short time.

**The result**

Mulder-Hardenberg has carried out the necessary modifications to the air traffic controller’s equipment in the course of time without endangering the operational process. The LVNL will call on Mulder-Hardenberg again for future modernisations of systems in all the important air traffic control towers in the Netherlands.