

# TACTILE TORSO DISPLAY



**TNO** innovation  
for life

**THE VEST, EQUIPPED WITH AN ARRAY OF VIBRATING ELEMENTS, SUPPORTS THE PILOT IN AN INTUITIVE WAY.**

#### CONCEPT

Tactile torso displays consist of numerous small vibrating elements. These elements are usually arranged in a matrix form. When activated they give a localized vibration, a sensation on the skin akin to a tap-on-the-shoulder or a vibrating mobile phone. The TNO tactile torso display (TTTD) is a tactile display integrated in a vest, but tactile displays can also be made in other formats, e.g., integrated in chairs or controls. In the spring of 2004 ESA astronaut André Kuipers tested a TTDD on-board the International Space Station.

#### INTUITIVE INFORMATION

##### PRESENTATION

The enormous potential of these tactile torso displays relates to their natural three-dimensional character. The "tap-on-the-shoulder"-principle means that the pilot gets fast and intuitive spatial information: a tap on the left side of the torso obviously relates to an event on the left, like a threat warning. Another major advantage of tactile torso displays is that they function independently of the visual channel. This makes the display a potential lifesaver in conditions of visual overload or during low visibility such as flying with night vision goggles, in situations of white or brown out, or under high G-load.

### AIRCRAFT APPLICATIONS

Four important groups of applications are:

- supporting aircraft manoeuvring, e.g., hovering
- providing tactical information, e.g., directional threat warnings or TCAS
- counteracting spatial disorientation
- low-altitude warning

Our results show that the current suit is so powerful that it can strongly reduce the position error in a hover task and allows the pilot to recover from a graveyard spin under severe conditions of spatial disorientation.

### INTERESTED?

We are looking for opportunities to advance the technology of tactile displays and to stimulate the use of this technology in military and civil applications. We are currently interested in foreign aerospace industry and airline companies wishing to evaluate the potential of this technology.

We can help you with setting up and conducting evaluation studies and can provide hardware. If you are interested please contact us directly or visit our facilities in Soesterberg, The Netherlands.

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### TNO

TNO is an independent innovation organisation. TNO connects people and knowledge to create innovations that sustainably boost the competitive strength of industry and the welfare of society.

TNO focuses its efforts on seven themes including Defence, Safety and Security: TNO works on a safe and secure society by creating innovations for people working in defence organisations, the police, emergency services and industry.

### CONTACT

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