and electronics and an indium antimony sensor developed in-house, heat-based image recording Soon after the liberation in 1945, the becomes possible. Even now, this type of camera is still Dutch government decides to accelerate indispensable during night-time campaigns. the reconstruction by investing in knowledge and skills. In post-war years,

1947 Formation RVO-TNO

The post-war government predicted 'that a small country can be scientifically significant as a military actor and an ally

a selection.



TNO develops one of the first infrared cameras in the

world with photovoltaic cells in 1961. Due to optics

The National Defence Organisation

TNO started its research in 1947.

Physics Laboratory of the Ministry

research is still carried out here,

in addition to projects involving

simulation, cyber security and

Anti-submarine

installation (ASI)

operational analysis.

of War. Even after 75 years, physical

One of its pillars is the former

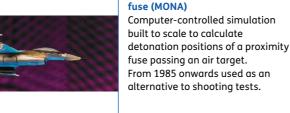
-000 000 *CO 00 00 00 0 ... × 000 000 000 x -

Vesta radar transponder system

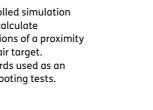
Landolt C visual acuity chart An iconic design from 1969, this visual acuity chart, developed for military examinations is still used in eye tests worldwide.

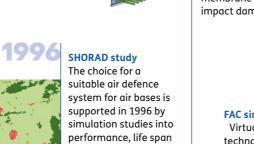
In 1981, TNO builds a full-scale wooden replica of a walrus-class submarine in order to optimise ergonomics and layout. The construction of the wooden mock-up also

built to scale to calculate fuse passing an air target.



Model track proximity

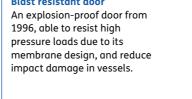


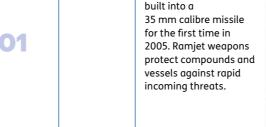


ınd interoperability o

andidate systems.

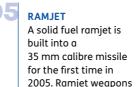
FAC simulation technology has enabled the realistic training of Forward





RPG nets

Analysts to Afahanistan In 2003, TNO personnel join the ISAF mission in Afghanistan as Operational Analysts. They support commanders' decision-making processes using analyses and effect





Automatic

behaviour analysis

and cameras to detect

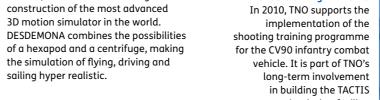
suspicious behaviour.

Since 2010,

deployment and

characteristics of

In 2007, TNO finalizes the design and



missile for the gun on board the F35 in 2010. The ammunition has no explosive charge and Demonstration from 2008 of a system based on radar contains no depleted uranium.

CV90 training in TACTIS In 2010, TNO supports the

simulation facility.

25 mm ammunition Development of a 25 mm Frangible Armour Penetrator

Launched in 2010, in use since 2011.

The Royal Netherlands Navy is the first

party worldwide to use radar, optical

perception and communication systems

integrated into one mast. The sensor

mast was developed by TNO, Thales

Nederland and the Ministry of Defence.

2011 Life Extension Walrus Class In 2011, the combat center of the Walrus-class submarine



Since 1998, the acquisition and introduction of the new fighter jet

was refurbished by TNO. The ergonomics were improved, and space was created for the operation of the optronic mast, a private workplace for the command center officer and shared situation screens for the team.



Replacement F-16 2013

is supported by candidate evaluations, cost analyses and answers to questions about operational effectivity, maintenance, design, and training

it possible to produce gunpowder,

performance.

rocket propellant and warhead loads

on site. In addition, smart shapes and

smart material combinations enhance

Since 2016, 3D printing has made



asswords or internet onnections, it is easy for yber criminals to break to organizations. Human behaviour is therefore one of

people are careless with

ne most important pillars of ybersecurity. In 2018, TNO launched the Cyber Security Assistant, a tool that offers organizations tailor-made nterventions to stimulate

Since 2020, the Dutch armed forces have been

made unrecognizable in a very distinctive

self-repeating patterns also encountered in

works exceptionally well up close and at a

nature. The 'Netherlands Fractal Pattern' (NFP)

manner. TNO developed a multipurpose

camouflage pattern based on fractals:

with Less Labels In 2019, TNO programmed an advanced self-learning algorithm to rapidly recognise and identify vision and sounds. The AI in question, commissioned by DARPA (Defense Advanced Research Projects Agency), requires up to



laser radiation on a wide range of materials.





Since 2019, TNO has been conducting research into laser weapons in the High Energy Laser Lab. Here, we evaluate the effects of high power

High Energy Laser Lab **201**9



In 1965, a new transponder system is put to use,

gimed at improving the detection of non-hostile

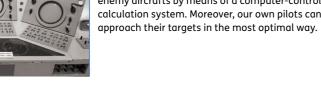
the AIS system which is now used worldwide.

helicopters and small vessels. It is the precursor of

Interception calculator (IRMA)

Navigation bridge

From 1963 onwards, it becomes possible to track enemy aircrafts by means of a computer-controlled calculation system. Moreover, our own pilots can now



A long tradition of research and advice for ship design kicks off in 1965 with a modern design for the navigation bridge of the new frigates.

In 1950 TNO contributes to an anti-submarine installation for the Navy. We develop the electronics and transducer for this active 'searchlight sonar' with adjustable

Van Speijk-class



colour reactions.



channels. Developed in 1980, but nowadays

Walrus mock-up

reveals errors in the technical design.

District communication system

development and rollout of a

between all army command

network with regional coverage

In 1971, TNO supports the

to enable communication

A kit from 1970 to detect chemical weapons.



Speech transmission index (STI)

still the international standard.

A method using test signals to measure

speech transmission through communication

The pump, test tubes and the detection



and staff training

wargame from 1982

combat situations

to simulate detailed





From 1995 onwards, all expertise about phased array radar, accumulated since the sixties, is used in the development of the APAR for the air defence and command frigate (ACF). Using four active antennas, the APAR can detect low-flying targets and guide anti-aircraft missiles.

used in the biennial JPOW exercise to Ship design with virtual reality

simulate systems In 1996, a design for a ship's like Patriot, LCF and bridge is evaluated for the first AGBADS. time by combining physical and virtual simulation. The study results in adaptations to the

optic windmill

Since 2000, the

JROADS model is

Air Controllers

since 2001.







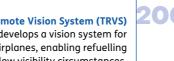


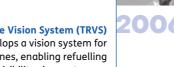
A net, made in 2005 from

Dyneema fibre, protects

vehicles and buildings

against RPG attacks.







in low visibility circumstances.



Tanker Remote Vision System (TRVS) In 2006, TNO develops a vision system for the KDC10 airplanes, enabling refuelling

roadside bombs improvement of the electronic defence against these weapons.

The command bridge of the OPV

A design launched in 2008, integrating

the technical and command centre

to operate all critical functions of the

Operational Patrol Vessel.

with the bridge, enables a small team

Enhanced operational

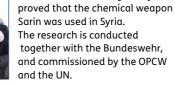
soldier system (EOSS)

Advice, tests and research into new concepts for C2 system, helmet and carrying system have been part of the support given to the acquisition of the EOSS since 2010.



from a victim unambiguously Sarin was used in Syria.
The research is conducted Sarin was used in Syria.



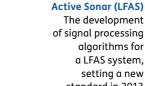


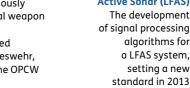
In 2013, analysis of samples taken

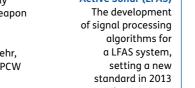
Proven deployment of

Sarin in Syria

for detecting and identifying







submarines.





Remote visual

system from

2014, serving the

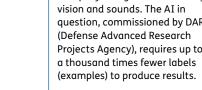
disposal squad.

and audio

robot of

the bomb







of value'. TNO has been living up to tha' for the past 75 years. For 75 years, it has been our duty to provide security professionals with state-of-the-art equipment and the best possible information, instruction and preparation. The partnership with the Ministry of Defence has resulted in a wide variety of innovations. This timeline shows