

militær *Teknikk*®

– the Scandinavian Military Magazine –

4-5/2016



Kr 48,-

50 INTERPRESS NORGE
RETURNED TO
9 770806 615906 04



NORWEGIAN DEFENCE AND
SECURITY INDUSTRIES ASSOCIATION





SAAB

SOLUTIONS FOR ANY MISSION



SEA GIRAFFE
3D RADAR & IFF



**VIDEO SITUATIONAL
AWARENESS** SYSTEM



W-AIS



**HELICOPTER CONTROL
AND INTEGRATION**



**UNMANNED
AERIAL VEHICLES**



**NAVAL LASER
WARNING SYSTEM**



**SHIP CONTROL
SYSTEM**

**FIRE CONTROL
SYSTEM**



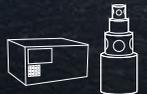
COMMS-ESM



TACTICALL ICS



RADAR-ESM



CBRN



**MEDICAL CARE
SYSTEM**



**UNDERWATER
SYSTEMS**



NATO EUROPE HAS TO TAKE MORE RESPONSIBILITY

In his election campaign for president of the USA, Donald Trump shocked many Europeans when he remarked that if he were President, the United States might not come to the defence of an attacked NATO ally that hadn't fulfilled its "obligation to make payments."

It is not unlike Trump to make such shocking statements; in fact, a great deal of the Trump campaign has been more or less based on the shock value of his statements. Still, Donald Trump has had a remarkable flair for making statements that rings a tone among the American public.

The remark about US and her NATO allies is just such a statement. For years the European NATO countries have been cutting their defence budgets, far beyond the NATO target of defence budgets of at least 2% of the member states' gross national product. In short, this means that European security has become more and more dependent on US military power. Or, as seen in the perspective of an American voter – the bill for European security has for decades been sent to US taxpayers.

Of course, when Trump makes a statement that pinpoints this disparity, he gets an audience among many Americans. Especially lower middle-class Americans, who have for many years running experienced a significant decrease in income and standard of living, will sense the misconduct of their tax money being "shipped off" to subsidise European taxpayers.

At the same time that the USA has been paying more and more for European security, the US state debt has been growing to formidable amounts. For an average American, struggling to pay taxes and make ends meet, the paradox in this policy must seem near to insane.

So when Donald Trump came with his shocking statement about the European NATO allies, he probably said what many Americans are thinking. Hillary Clinton, on the other hand, being a professional politician, would of course never make such a remark in public. But still, she might certainly harbour the same thoughts as her loud opponent.

CONTENTS:

SUBMARINES

- 2 German Submarine for Norway

DANISH TRUCK COMPETITION

- 5 Only three contenders remain

BALLISTIC MISSILE DEFENCE

- 6 Opportunity in demark

FSI

- 9 Norwegian Defence and Security Industries Association

ARTILLERY

- 13 Korean or Swiss artillery for Norway

F-35

- 14 Denmark want full access to Lockheed Martin

BULLETIN BOARD FOR DEFENCE, TRADE AND INDUSTRY

- 17 Saab radar for US Navy
18 Refueling aircraft for Japan
20 US Army presents new drone concept
25 India test-fires Barak-8 surface-to-air ballistic missile

DRYTECH

- 26 Success with freeze-dried food for soldiers

TRAINING AMMUNITION

- 27 First toe-hold in USA for P-SRTA training ammunition

APEX

- 28 NAMMO develops ammo for three fighters

M72

- 30 Promising new developments
32 USS Zumwalt

Coverphoto:

A German Navy 212A class submarine.

Photo: German Navy/
Thyssenkrupp Marine Systems



PABAS

ARCHITECTS AND CONSULTING ENGINEERS AS

BÆRUMSVEIEN 375 - N 1346 GJETTUM - TLF 67546290
Mail: pabas@pabas.no
Member of: BuildingSMART Norge

GERMAN SUBMARINES FOR NORWAY?

Norway has a long-standing tradition with German submarines. The German thyssenkrupp Marine Systems (tkMS) is one of two remaining candidates for the supply of new submarines to Norway.

Thyssenkrupp Marine Systems (formerly HDW, or Howaldtswerke-Deutsche Werft) has been building submarines for more than 150 years. The submarine craft "Brandtaucher", built in 1850, was the first submarine in Germany, and the purpose of this undersea vessel was to force Danish ships to abandon the blockade of Kiel. When the submarine was completed, Danish spies in Kiel reported of this new threat to the Danish navy command. The reports caused Denmark to pull its navy vessels out of the bay of Kiel, thus ending the blockade. However, the Brandtaucher itself was shown to have significant construction flaws, mainly due to the German navy's wish to save on expenses. The boat submerged irreversibly as early as during one of the first sea trials in 1851. What the example shows, however, is that even the rumoured threat of submarines may call for a change in navy tactics.

Norway has also a long tradition with German submarines. When Norway took delivery of its first submarine, the "A" class, it had been constructed at the Germania Werft in Kiel, and a further trio of A-class subs (also referred to as the Kobben class) were delivered during the following years.

Except during the Great War and World War Two, when German submarines were not an option, Norway has always had its submarines built by yards in the north of Germany. The 15 submarines of the new Kobben class, which Norway procured in the period of 1964 to 1967, were built at the Rheinstahl-Nordseewerke in the city of Emden, and the current fleet of six Ula class vessels in the Norwegian navy were delivered from Thyssen Nordseewerke, Emden in the period of 1987 to 1992.

Fuel cell based AIP

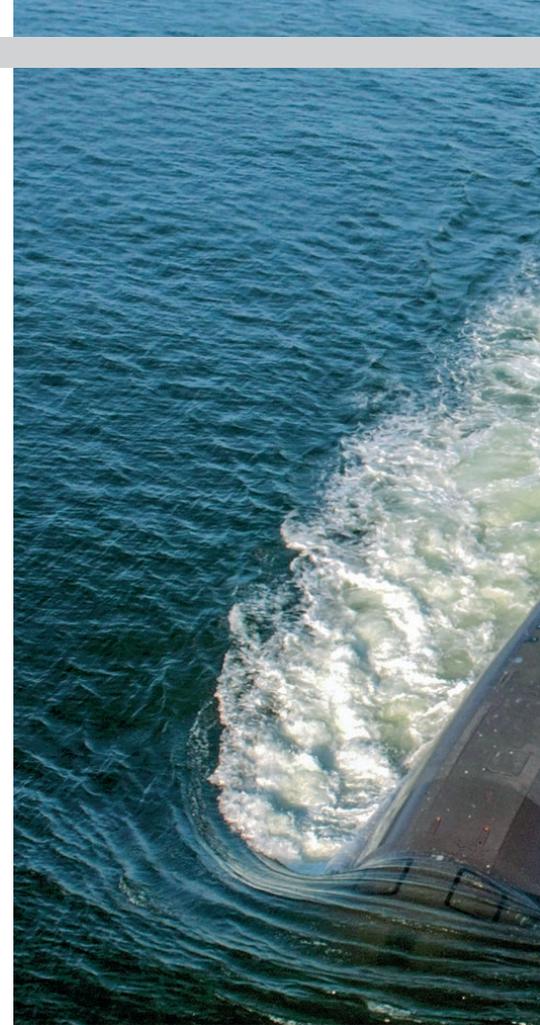
tkMS introduced its first Air Independent Propulsion Submarine (AIP Submarines) in the early 2000's. The German submarines are basing their AIP technology on fuel

cells. In the fuel cell, electrical power is produced through a chemical process. The German fuel cells are based on a reaction between hydrogen and oxygen through a thin proton exchange membrane. The process involves no movable parts, causing zero noise or vibration.

The fuel cells on board the German submarines have a reported efficiency of some 64%, and the temperature in the fuel cells is about 80 deg C at normal operation. The residue from the fuel cells is simply water, which is stored on board in order to maintain the weight balance of the vessel. The fuel cells are simple to maintain, and can be operated by a small crew.

Hydrogen is one of the components in the fuel cell process, and it may seem like a risk to store large volumes of hydrogen on board a submersible vessel. The German submarines, however, store the hydrogen safely in cylindrical containers lined with a metallic alloy (iron, titanium, and magnesium) which binds the hydrogen. While running, only the amount of hydrogen fuel that is required for the ongoing process in the cells is released. This ensures that the volume of free hydrogen in the submarine is kept at a minimum. In addition, the fuel cells are surrounded by a tank filled with nitrogen gas. The nitrogen is kept at a pressure that is higher than that of the hydrogen pressure in the fuel cells, meaning that in the event of a leak or a puncture in the cells, the nitrogen will seep in, rather than the hydrogen gas seeping out.

The drawback of keeping the hydrogen stored in metal containers, of course, is that these cylinders are relatively heavy. The metal alloy-lined cylinders can be replaced, while this would be quite a complex operation. Normally, the tanks will therefore be refilled with hydrogen in place, when the submarines are docked. The metal cylinders in a submarine of normal size have a capacity of up to two



tons of hydrogen, and a complete refill operation will take some 24 hours.

With full hydrogen cylinders, the submarine can stay submerged for a period in excess of 20 days.

AIP for Norwegian submarines

The Norwegian Navy has indicated that a suitable size for the new Norwegian subs will be about 1800 to 2000 tons. tkMS maintains that for this size class, i.e. relatively small submarines (1500 to 2000 tons), an AIP based on fuel cells with hydrogen stored in metal alloy cylinders on board will be the most appropriate solution. This is also where tkMS is in a position to offer thoroughly tried and proven technological solutions. As early as the 1970's, thyssenkrupp started the development of fuel cells for air independent propulsion of submarines. Since 2002, the German navy has operated a fleet of Type 212A submarines using fuel cell-based AIP. Type 212A is also in operation with the Italian navy, going under the name of the Todaro class, and a total of 10 vessels of the type have been built: six for the German Navy, and four for Italy.

Fuel cell based AIP can also be found on board submarines that thyssenkrupp has delivered or is delivering to Israel and Portugal



The German Navy's U-32 submarine. In April 2006, the German Navy's Type 212 U-32 sailed from the Baltic to Rota, Spain in a journey lasting two weeks, covering 1500 nautical miles (2800 km; 1700 mi) without surfacing or snorkelling. In 2013, while on the way to participate in naval exercises in U.S. waters, the same submarine, U-32, established a new record for non-nuclear submarines with 18 days in submerged transit without snorkelling. Photo: Bundeswehr

Looking ahead: Greater range, longer submerged time

– The work to develop the AIP technology further is ongoing, and it is our view that AIP submarines based on fuel cells will keep achieving longer range, with the ability to operate under the surface for longer and longer periods, says Director for Research and Development, Peter Hauschildt, of thyssenkrupp Marine Systems.

This will naturally offer huge operational advantages, both during battle operations at sea and in the fact that submarines can stay submerged over greater distances. A submarine in the snorkelling position is vulnerable, both because the snorkel is detectable by modern radars, and it can be spotted visually from surface or airborne craft. Almost in any seas where submarines can operate, a sub coming up towards the surface to snorkel will be dragging colder water from the depths along. With the ever-improving efficiency and capability of heat-seeking sensors, such cold water mass drawn to the surface may be easily detected, thereby revealing the submarine's position.

Lithium-ion batteries or lead acid batteries

Over the recent years there has been a tremendous development with respect

to lithium-ion battery technology. There can today be no doubt of the superiority of lithium-ion batteries over lead acid batteries across a broad range of criteria, including capacity, charge time and lower weight. Lithium-ion batteries are in widespread use today, particularly so in mobile telephones and electric vehicles.

Lithium-Ion batteries have also been under consideration for use in submarines. Peter Hauschildt says that lithium-ion batteries evidently offer a number of advantages for subsea use compared to the current state of lead acid batteries.

In a conventional diesel-electric submarine, the batteries power the electric propulsion engines when the vessel is submerged. The diesel motor is used to recharge the batteries, which is done in the snorkelling position, as the diesel engine requires huge amounts of air. In an AIP submarine, however, the batteries are being recharged even when the sub is fully submerged.

– In general, it is safe to say that lithium-ion batteries offer about 20% higher capacity at low speed, rising to some 200% more at high speed. At the same time, lithium-ion batteries deliver the same amount of electricity even when the state of charge is at a very low level. This is in sharp contrast to lead acid batteries,

where the electricity delivered by the batteries diminishes proportionately to the level of charge remaining in the batteries. Also, the lithium-ion batteries are capable of being recharged to close to 100% of the rated capacity at every single recharge. Again, this is an advantage over lead acid batteries, where the maximum capacity keeps dropping a little for every successive recharge. Lithium-ion batteries also have a very low rate of self-discharge when not used over any length of time, perhaps as low as down to 1 to 1.5% per month.

The overwhelming weakness of lithium-ion batteries, on the other hand, is the risk of fire. Both in electric cars and cell phones, there have been a disturbing number of incidents of fires erupting in the lithium-ion battery.

– Fires in lithium-ion batteries are practically impossible to extinguish, and must just be left to burn out until there is no more combustible material left, explains Hauschildt. The cell phone user will naturally and simply discard the burning phone, and the EV driver will just stop the burning vehicle and get out. In a submerged submarine, these options may not be quite so readily at hand. In the event of a fire in the lithium-ion batteries in a submarine at sea, the crew and the vessel will likely be lost altogether. Accordingly, despite the numerous advantages offered by the lithium-ion batteries, there are currently no submarines that have discarded the old lead-acid batteries entirely. Indeed, in our view here at thyssenkrupp, we hold that the proven lead-acid batteries remain the most appropriate technology for submarine applications, and we will currently not be offering our customers any alternative. We are naturally active participants in projects regarding new battery technology for submarines, however, and we are following developments very closely.

Making hydrogen on board the submarine

For larger, conventional submarines, that is the weight class over 2000 tons, thyssenkrupp Marine Systems is working on an AIP solution where hydrogen is being made on board the boat.

– We have worked on the making of hydrogen using methanol as the starting point, explains Hauschildt. The hydrogen production is done in a so-called reformer, where methanol and water vapour is reformed into hydrogen gas and carbon dioxide (CO₂).

The residual CO₂ is something the submarine must get rid of. The carbon

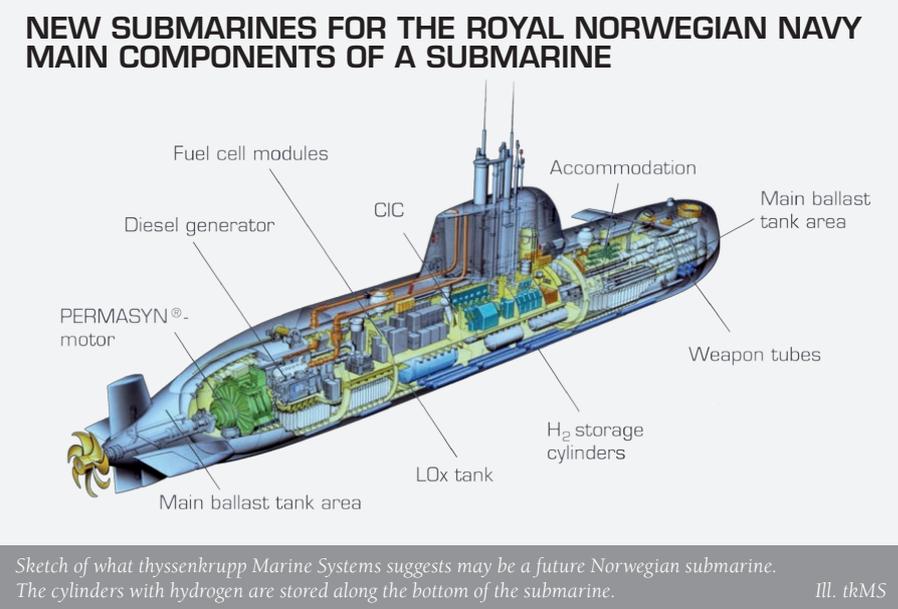
dioxide gas escapes from the sub under pressure, and this will of course produce bubbles in the water. This fizzy sea-water is a problem, as the bubbles are sonar detectable.

The production of hydrogen in a reformer is a proven process, used widely in the industry over a number of years. We also have a full-scale reformer in testing.

– There are several advantages to using methanol as a basis in our view. Firstly, methanol provides the greatest volume of hydrogen in relation to the carried weight, in relation to e.g. ethanol or diesel oil. We are achieving an efficiency of 90% in our reformers. In comparison, a diesel-based reformer will be hard pressed to achieve more than some 70 to 80 percent. Furthermore, the temperature in a methanol based reformer will reach about 250-300 deg C, while an ethanol- or diesel based reformer needs to reach about 800 deg C.

– Compared to diesel, methanol also offers a cleaner process, with reduced risk of soot creation, which we see as a potential problem should it occur on board a submarine, emphasises Hauschildt.

The other school of thought will point to diesel being easily available from any commercial port, while topping up



with methanol demands that the submarine visits a port with facilities for refilling with methanol.

Hauschildt says he is less than certain that this argument is completely valid. – The way we see it, regular commercial diesel will be difficult to use in a reformer due to the sulphur content. The sulphur is likely to damage or ruin the catalytic converter in the process. A

submarine with a diesel-based reformer will therefore require sulphur-free diesel, rendering the argument of easy availability invalid. Hardly any commercial ports offer this. Therefore, an AIP submarine with a diesel-based reformer is no less dependent on specialised tanking and refilling facilities from shore than a methanol-based reformer-equipped AIP submarine, argues Hauschildt in closing. ■■

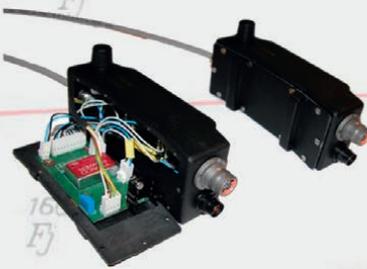
We solve Unique & Demanding Requirements

Custom Design & Engineering

- Small series Production
- Adaptive & Customized Solutions
- Interfaces & Integration

Obsolescence Engineering

- Obsolescence Handling
- Reversed Engineering
- Adaptation and Redesign of PCB







ELECTRONICON AS

INNOVATING ELECTRONICS

ELECTRONICON AS
 Holbergskaien
 5004 BERGEN, NORWAY
 Tlf: +47) 55 30 76 60
 web: www.electronicon.no



Mercedes Zetros1. Mercedes-Benz participated in the extensive testing of the vehicles in the spring of this year, but then pulled out of the competition.

Photo: Mercedes-Benz

ONLY THREE CONTENDERS REMAIN IN DANISH TRUCK COMPETITION

Mercedes-Benz has left the competition for up to 900 trucks to the Danish military. Still in the race are three companies.

By **Andreas Krog**

As a result of a surprise drop-out by Mercedes-Benz in July the contest for the delivery of between 700 and 900 trucks to the Danish Armed Forces now has only three participants.

In September of last year, a total of five truck manufacturers were pre-qualified to submit a bid. These were IVECO Magirus AG, MERCEDES-Benz Danmark A/S, Rheinmetall MAN Military Vehicles GmbH, Oshkosh Defense, LLC and Scania Danmark A/S.

Eventually, the American manufacturer Oshkosh Defence failed to respond to the request for information before the deadline in December last year and the Danish Acquisition and Logistics Organization (DALO) continued the evaluation process with only four candidates.

A natural decision

In July this year DALO issued a revised tender notification with minor changes in the requirements.

The revised tender made Mercedes-Benz leave the competition for a contract valued at between 1.5 and 2.0 billion Danish Kroner. The company doesn't want to specify what it was about the revised tender that made them leave the competition.

David Engstrøm, Head of PR and Communications at Mercedes-Benz Danmark A/S, says: *"Even though we have had a constructive and positive dialogue with DALO, there were some elements in the tender which were at issue with the way we do business here at Mercedes-Benz. Therefore, it was a natural decision to withdraw."*

The revision of the tender came after three months of testing trucks from the four remaining manufacturers. The original plan was to narrow it down to only three candidates having their vehicles tested, but the DALO decided to test all four.

MAN seen as favourite

The Danish Defence has defined 13 different configurations that they would imagine being built up on the trucks. The contract will consist of a seven-year

framework agreement for the procurement and a very attractive 20-year service and maintenance agreement. Sources estimate that about 40 percent will be ordinary commercial trucks, while 60 percent will be tactical trucks that pull on all four, six or eight wheels. A certain proportion of the tactical trucks must be armoured from the outset, or capable of being retrofitted with armour.

MAN is seen by several sources as the favourite due to the fact that about 1200-1400 of The Danish Armed Force's current 3000 trucks are MAN trucks. In 2007 to 2010, the German truck manufacturer delivered 300 tactical trucks similar to those that MAN is now offering to Denmark. Making MAN the choice ensures that many of Denmark's new vehicles will easily complement the existing vehicles.

The manufacturers have handed in their "Best And Final Offer" (BAFO) and a winner is expected to be announced in November this year. What follows then is up to one and a half year of development of prototypes. So the first trucks are set to be delivered in 2018. ■■

RADAR MANUFACTURERS EYEING AN OPPORTUNITY IN DENMARK

If Denmark joins NATO's ballistic missile defence, new radars are needed for the country's frigates. The defence industry is eager, but the politicians are more sceptical.

By Andreas Krog

Makers of radars for the tracking of incoming ballistic missiles have their attention directed towards Denmark these days, because Denmark might decide to upgrade the radars on the country's frigates to be able to track ballistic missiles.

At the NATO Summit in Wales in 2014 the then-premier minister, Helle Thorning-Schmidt, told the other heads of state that Denmark would equip at least one out of three new frigates with the radar capability needed to participate in the ballistic missile defence shield together with the US, Spain, the Netherlands and to some extent Norway.

The Danish Acquisition and Logistics Organization (DALO) is expected to issue a "Request For Information" (RFI) regarding a radar solution in the beginning of next year. The RFI shall be used to provide the Danish politicians with accurate information about technical solutions and prices, should the issue about ballistic missile defence and the necessary radar capabilities come up during the negotiations in the autumn next year in connection with a new defence agreement.

This is why companies like Raytheon, Lockheed Martin, Thales and the Danish company Weibel have their attention directed at the country with a defence budget half the size of Norway's.

Space for 32 missiles

Denmark has three frigates of the Iver Huitfeldt class. They were commissioned from 2013 to 2015, and are equipped with Sea Sparrow missiles, but not much more than that. The frigates have the advanced Mk41-launcher from Lockheed Martin with space for 32 missiles of various types. It could be a mix of SM-2 missiles for area air defence, SM-3 missiles for shooting down ballistic missiles, or cruise missiles like the Tomahawk missile.

But Denmark doesn't have any missiles to put in the launchers. And to be able to use the launcher, the frigates need a new radar. It can make the frigates able to defend itself, track incoming ballistic missiles, and shoot down the missiles.

Norwegian frigates

The frigates are currently equipped with the Smart-L radar from the Dutch company Thales. They are offering an upgraded version

of the Smart-L radar. Lockheed Martin is also expected to participate in the RFI-process with their AN/SPY-1 radar. This is the radar currently being used on the American cruisers of the Ticonderoga class and destroyers of the Arleigh Burke-class, as part of the AEGIS maritime missile defence system. The radar is also installed on Spanish, South Korean and Japanese ships. A smaller version of the AN/SPY-1 can be found on the Norwegian frigates of the Fridtjof Nansen class.

Another likely contender is Raytheon. They make both the SM-2 and the SM-3, while they are also developing the AN/SPY-6 radar. This is planned to replace the AN/SPY-1 radar on the US cruisers and destroyers over the years to come.

A dark horse in the competition is the Danish company Weibel. They have specialized in Doppler-radars that are able to see very small things. The US Navy is using a radar from Weibel to track when ballistic nuclear



missiles are being launched from American submarines. Weibel on the other hand doesn't have experience with area air defence. So the Navy would probably have to keep the existing radar for area air defence and install the Weibel radar on the helipad, if they were to choose the Danish solution.

Unnecessary provocation

The radar manufacturers, however, are looking at a very uncertain political environment in Denmark. The right wing Danish People's Party is normally a part of the defence agreements, and is also expected to fall in behind the next agreement to be negotiated in the autumn of next year. But the party is worried that Danish participation in the missile defence will be seen by Russia as an unnecessary provocation and military build-up.

The small Conservative People's Party is no longer part of the parties behind the current defence agreement. They stepped out in June when Denmark selected the F-35 as the country's next fighter aircraft. The party couldn't accept the financing of the procurement.

The conservatives would however like to be part of the next defence agree-



The existing Smart-L radar is placed on the roof of the frigates' helo-hangars.

Photo: Andreas Krog

ment - if the defence budget is boosted. The party sees participation in the missile defence as a high priority – but not the highest priority.

A Strategic target

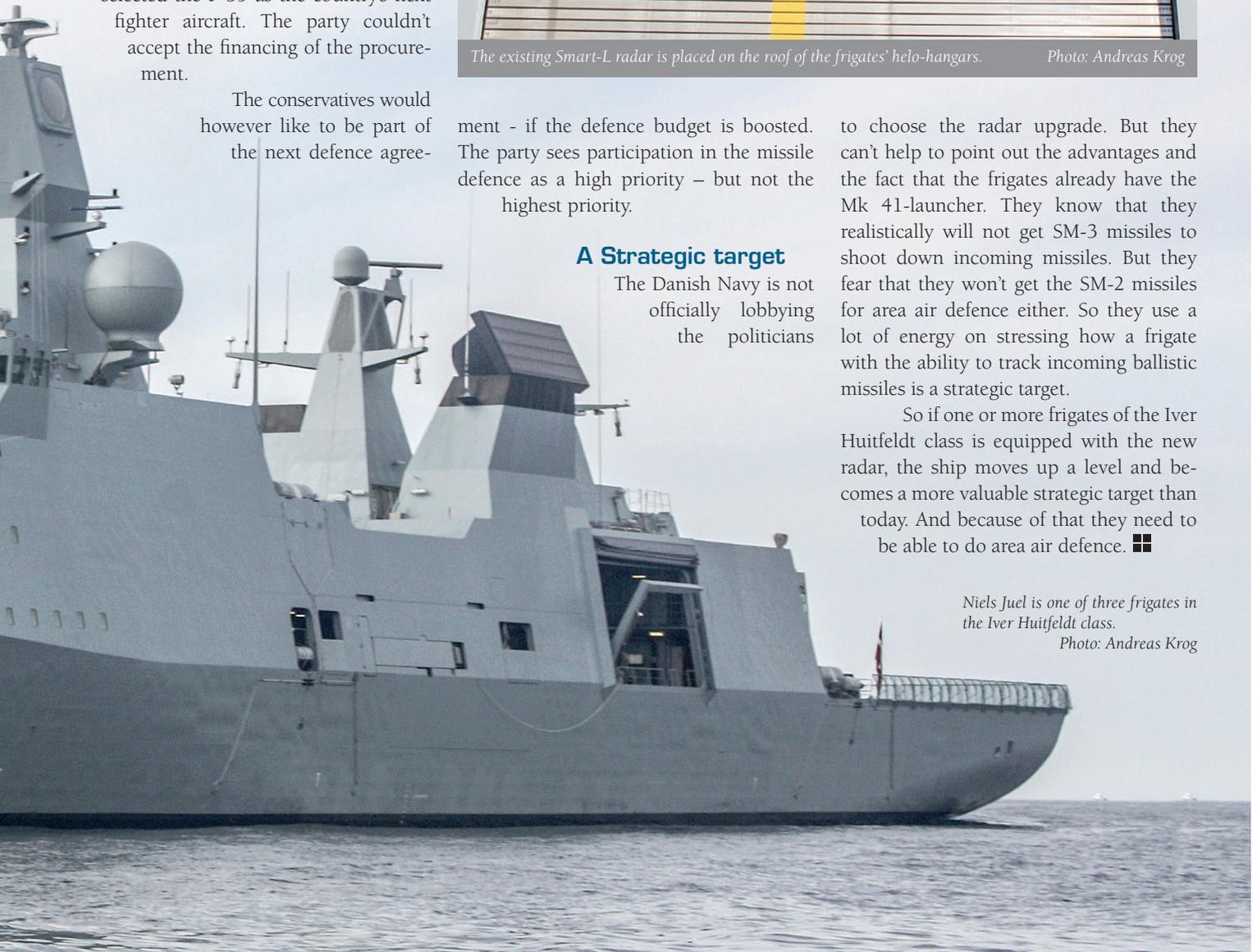
The Danish Navy is not officially lobbying the politicians

to choose the radar upgrade. But they can't help to point out the advantages and the fact that the frigates already have the Mk 41-launcher. They know that they realistically will not get SM-3 missiles to shoot down incoming missiles. But they fear that they won't get the SM-2 missiles for area air defence either. So they use a lot of energy on stressing how a frigate with the ability to track incoming ballistic missiles is a strategic target.

So if one or more frigates of the Iver Huitfeldt class is equipped with the new radar, the ship moves up a level and becomes a more valuable strategic target than today. And because of that they need to be able to do area air defence. ■■

Niels Juul is one of three frigates in the Iver Huitfeldt class.

Photo: Andreas Krog



Marine Systems

Proven solutions for Norway.



Super-silent, long endurance submarines made in Germany.

As invaluable national and naval assets, they are robust, invisible, undetectable and unpredictable. Fitted with proven fuel cell and diesel-electric propulsion systems, these boats are the manifestation of superior availabilities and low life cycle costs.

See the benchmark for conventional submarines at:
www.thyssenkrupp-marinesystems.com

engineering.tomorrow.together.



thyssenkrupp



NORWEGIAN DEFENCE AND SECURITY INDUSTRIES ASSOCIATION (FSi)

THE LEADING ASSOCIATION IN NORWAY ADVOCATING THE INTERESTS OF ITS SECTOR, AND THE PRIMARY INTERLOCUTOR FOR THE GOVERNMENT IN MATTERS OF IMPORTANCE TO THE INDUSTRY. AFFILIATED WITH THE CONFEDERATION OF NORWEGIAN ENTERPRISE (NHO) AND REPRESENTING MORE THAN 100 COMPANIES

LEDEREN HAR ORDET:

FORSVARSDINDUSTRIENS RAMMEBETINGELSER

For norsk forsvarsindustri er 2016 det viktigste året på svært lenge. Aldri tidligere har så mange viktige politiske prosesser som bestemmer forsvarsindustriens rammebetingelser vært gjenstand for politisk behandling på samme tid. Det er en sjelden mulighet til å styrke og å sikre forsvarsindustriens rammebetingelser.

Rett før sommeren behandlet Stortinget den nasjonale forsvarsindustrielle strategien.

Det er bred politisk enighet om viktigheten av en nasjonal forsvarsindustri og at eksport av forsvarsmateriell er en forutsetning for å opprettholde et forsvarsindustrielt miljø i Norge. Ved behandlingen av proposisjonen om investeringer i Forsvaret fulgte Stortinget opp med å tydeliggjøre de industrielle forutsetningene for anskaffelse av nye ubåter.

Norsk forsvarsindustri er en konsekvens av at Forsvaret har operative behov som ikke kan dekkes gjennom anskaffelser i det internasjonale markedet. Noen ganger er det helt nødvendig å utvikle materiell og systemer som sikrer at Forsvaret kan ivareta vesentlige norske sikkerhetsinteresser og forsvare norsk territorium. Dette blir ikke mindre viktig i fremtiden når fokus dreies fra bidrag i internasjonale operasjoner til å styrke den nasjonale forsvarsevnen.

Forsvarsindustrien har kritisk kompetanse og produksjonskapasitet som er viktig for beredskap og forsyningssikkerhet. Det krever imidlertid løpende investeringer i teknologi, kompetanse og infrastruktur og forsvarsindustrien er helt avhengig av forutsigbarhet for å kunne satse langsiktig på dette.

I de kommende ukene skal Stortinget behandle langtidsplanen for Forsvaret og stortingsmeldingen om eksport av forsvarsmateriell i 2015. Resultatet av den politiske behandlingen blir avgjørende for forsvarsindustriens rammebetingelser. Industrien trenger tydelige og konsistente koblinger mellom den forsvarsindustrielle strategien, langtidsplanen og eksportkontrollregimet. Da kan industrien fortsette å utvikle teknologi og produkter i Norge som både kommer Forsvaret og det sivile samfunnet til gode.

Forslaget til langtidsplan omhandler mange nye og store investeringer som er viktige for å videreutvikle og å styrke norsk

forsvarsindustri, som f.eks. ubåter, luftvern, maritime patruljefly, F-35, luftvarslingssensorer, kystvakt-fartøyer m.m. Det sivile samfunnets ressurser får økt betydning for å ivareta forsyningsberedskap og leveransesikkerhet i en endret sikkerhetspolitisk situasjon. Videre heter det i forslaget at samarbeid med sivile skal vurderes innenfor kompetanseområder som ikke er kjernekompetanse for Forsvaret.

Ved behandlingen av den forsvarsindustrielle strategien la Stortinget til grunn til at forholdene skal legges best mulig til rette for å videreutvikle og styrke norsk forsvarsindustri. Stortinget la til grunn at Forsvaret bør benytte nasjonal industri til anskaffelser der norsk industri kan levere kosteffektive løsninger som møter Forsvarets behov, når anskaffelsene er relevante for å opprettholde nasjonal teknologisk kompetanse som er viktig for Forsvaret. Videre merket Stortinget seg at eksport og internasjonalt samarbeid er en forutsetning for å videreføre en nasjonal forsvarsindustri som kan levere materiell og systemer til Forsvaret og understøtte Forsvarets virksomhet i fred, krise og krig. Samtidig ga et bredt flertall i komiteen sin støtte til at regjeringen viderefører dagens retningslinjer for behandling av søknader om eksport av forsvarsmateriell.

Gjeldende lover, forskrifter og retningslinjer, og måten disse håndheves og praktiseres på, sikrer god og tilstrekkelig kontroll med eksporten av forsvarsmateriell fra Norge. Samtidig er norsk forsvarsindustri en troverdig og pålitelig leverandør og partner i det internasjonale markedet. Derfor er det viktig og riktig at dagens retningslinjer for eksport og måten disse praktiseres på videreføres. Et stabilt og forutsigbart regime for eksportkontroll er helt avgjørende for å sikre Forsvaret tilgang til teknologi, kompetanse og infrastruktur i fred, krise og krig.

Når nå langtidsplanen og eksportkontrollmeldingen behandles i Stortinget forventer industrien at den forsvarsindustrielle strategien følges opp. Det innebærer bl.a. å legge til rette for en gjennomgang av Forsvarets eksisterende materiell og systemer, og planlagte og godkjente større anskaffelser, for å konkretisere på hvilke områder, og i hvilket omfang, det er aktuelt å innlede langsiktig strategisk samarbeid med norsk industri om understøttelse og forvaltning av materiell og systemer. Videre er det en forutsetning for norsk forsvarsindustri eksistens at eksportkontrollregimet ikke endres vesentlig og at praktiseringen forblir forutsigbar, slik det har vært de senere årene.



P.O. Box 5250 Majorstuen,
NO- 0303 Oslo. NORWAY

Tel: + 47 23 08 80 00
Telefax: + 47 23 08 80 18

E-mail: fsi@nho.no
Internet: www.fsi.no

SUPPLIER SEMINAR AND FSI EXHIBITION AT THE AKERSHUS FORTRESS

This year's supplier seminar and FSi exhibition was held on 14-15 September. Some 59 companies had put up exhibits, and this is the highest number of all time. This has firmly established the FSi exhibition as the leading defence supplier fair in Norway. The total visitor number for the two days probably exceeded 600, primarily coming from the defence community, public administration and defence industries. The fair was opened by State Secretary Øystein Bø, who used his opening address to underscore the importance of having this type of networking arenas.

Photos: MilitærTeknikk



Kongsberg has great potential in the market for the Joint Strike Missile, not just for use with the F-35 fighters, but also with other aircraft types. From the left: Lars Johan Fleisje, Lars-Emil Fladeby and Jørn Buø.



Norsafe AS has supplied Rigid Inflatable Boats to a number of countries. -We would very much appreciate the opportunity to deliver RIBs to the Norwegian defence as well, as this would constitute an important reference abroad, says Michel Saxlund (left) and Thomas Skaala.



ThyssenKrupp Marine Systems is one of the two candidates for new submarines for Norway. From left, Florian Lorenzen and Joachim Schönfeld from ThyssenKrupp, and to the right, Dag Kristensen from Bertel O. Steen, ThyssenKrupp's Norwegian representative.



Comrod AS exhibited a small sample of its antennas, installed on a HumVee vehicle. The company has sold more than 10,000 antennas of the type in the centre of the picture (without the red receiver dish on top) to the US Armed Forces. From the left, Tor Reidar Brekke, Mathias Dybvik, Stefan Nordgren and Yngve Hæreid.



Katrin Freier from the German company Blücher presented a lightweight protection shirt. The shirt protects against 2-gramme fragments hitting the person with a speed of 320 m/sec. In addition the shirt protects against cuts and slashes from a knife (not direct stabs). Blücher is represented by Lilltech in Norway.



AIM Norway has recently become a limited corporation. As of today, all stock is owned by the Ministry of Defence, who is looking for strategic partners to come in as owners. The purpose would be to strengthen the company in the international defence market. From the left, Ole Jørgen Sæther and Carl Morten Boine.



State Secretary Oystein Bø from the Ministry of Defence took the time to visit several of the businesses' exhibits. The picture shows Oystein Pedersen (left) from Radionor Communications AS enjoying the visit from the State Secretary. Radionor Communications has among other things delivered light, portable communication equipment to the Norwegian Special Forces.



HTS Maskinteknikk AS is located in Drammen, some 25 miles south-east of Oslo. HTS is a supplier of high quality mechanical precision components to the subsea, aerospace and defence industries. –We are today about 80 employees at HTS, says Lars Harvik (right), and adds that the number has been more than a hundred, but has been significantly reduced due to the drop in activity in the oil and gas industry. At left, Thea Lund.



DCNS is the other candidate for the Norwegian submarine contract. From the left, Guillaume Pateu and Aude Dufrene.



Kristian Røraas represents the company Sharkcage, providers of modular interiors for storage and transport. The company offers a wide selection of products for various purposes, including container interiors, use in stationary storage as well as transport with trucks, boats, aircraft or helicopters.

US FEDERAL CONTRACTS REGULATIONS

For many businesses, getting a government contract with the USA is like the ultimate dream come true, be it of a civilian or military nature. But the USA has a very strict and in part quite complex set of regulation to which potential suppliers must relate. On June 13-14 this year, the FSi conducted a seminar to provide Norwegian businesses with an insight into the regulations that apply to federal US procurement contracts.

The main regulations for public procurement in the USA is the so-called FAR (Federal Acquisition Regulation). Suppliers to the US Armed Forces will also have to come to terms with the so-called DFARS (Defence Federal Acquisition Regulations Supplement), was the opening message from Stephen D. Knight, partner in the Virginia-based law firm of Smith Pachter McWhorter, which has worked extensively on government contracts for many years.

Knight also presented the mandate of the two most important public agencies that suppliers will come up against; the DCMA (Defence Contract Management Agency) and the DCAA (Defence Contract Audit Agency).

The DCMA is a specific unit of the Defence Department tasked with working directly with contractors. Their primary responsibility is to insure the Government gets the best value for their dollar, the highest quality and on-time delivery.

DCAA is an agency in the Defence Department that performs all contract audits for the US Department of Defence. In addition, the DCAA's duties include financial and accounting advisory services in connection with negotiation, administration and settlement of contracts and subcontracts.

Knight went on to provide an insight into how American authorities tend to separate different contract types into fixed price contracts or cost type contracts. Knight noted that the regulations call for a "fair and reasonable price", albeit without providing any specific definition of what this entails.

-Here, we often experience that the DCAA maintain that when the supplier's estimate for time used and hourly cost are known, a surcharge of between 10 and 20% will constitute a "fair and reasonable price". Nevertheless, FAR and DFARS are both lacking a precise formula for how to calculate a fair and reasonable price, said Knight in conclusion.

Ove Norseth from Kongsberg, and Lonnie Myklebust and Mari Jeppestøl from NAMMO, represent businesses that are well acquainted with the FAR and DFARS regulations, and extensive experience from working with the DCMA and DCAA. The preparation of the business for this type of contracts demands both resources and competence, and may to some extent have influence on the corporate culture. A key element in this process is communication, both internally within the company as well as vs. the American authorities.

Kongsberg and NAMMO also have experience from DCAA and audits of their own companies, and presented several cases of what may take place when DCAA representatives come visiting in order to review the business.

-It is our biased view that the DCAA is often looking for ways to "trip us up", so in our

experience it is best to provide the DCAA auditors with everything they want in terms of documentation. And another tip is that documentation should be kept in (or translated to) English. If they receive a document in Norwegian, they will pass it through Google Translate or a similar service, thereby ending up with a translation loaded with errors and misunderstandings that will take time and resources to clarify. ■■



Lonnie Myklebust reported on an increasing desire to learn more about the American public acquisition regulations among Norwegian companies. Photo: MilitærTeknikk



Businesses aspiring to make deliveries to American federal authorities or the American military, must be prepared to face up to a demanding set of regulations. From the left, Stephen D. Knight, Mari Jeppestøl and Ove Norseth. Photo: MilitærTeknikk



M109G

- ▲ **In production since:** the 1960's
- ▲ **Weight:** 27 tons
- ▲ **Length/height/width:** 11.3/3.1/3.1 metres
- ▲ **Crew:** 6
- ▲ **Top speed:** 60 kph (37 mph)
- ▲ **Range:** 350 kilometres
- ▲ **Power/weight:** 16.3 hp/tonne

Winter trials at Rena of the M109G by the Swiss company Ruag.

Photo: FMS/
Forsvarsmateriell/
Simen Rudi

KOREAN OR SWISS ARTILLERY FOR NORWAY

The Norwegian armed forces had four candidates for new artillery; the German PzH 2000 from Kruass-Maffei Wegmann and Rheinmetall, the French Caesar from Nexter industries, the Korean K9 Thunder from HanwhaTechwin, and the upgraded Swiss version of the M109 from Ruag.

Just before summer, the Norwegian armed forces down selected the number of contenders from four to two remaining contenders, Ruag and Hanwha Techwin.

- We have informed both the Korean and the Swiss companies that they

are still in the competition, says Simen B. Rudi, spokesman for the Norwegian Defence Material Agency, NDMA. We have also informed the German and the French groups that they are now "on hold" in the competition. This however, Rudi emphasizes, does not mean that the

offers from the companies offers are finally turned down.

-The down selection was made on the base of the offers and information given by the contenders, in addition to the evaluation of the results from winter test of the competing artillery systems held at Rena in January this year.

-As of today, we are awaiting a so called GO, or implementation order, from the MOD. In short, this is a decision so that we can go further on with the procurement.

Norway currently operates 14 ageing M109A3GN tracked 155 mm self-propelled artillery, which are in need of replacement by 2020 at the latest. According to the NDAM, Norway is planning to buy between 18 and 24 new SPAs to replace them. ■

K9 THUNDER

- ▲ **In operation since:** 1999
- ▲ **Weight:** 47 tons
- ▲ **Length/height/width:** 12/2.73/3.4 metres
- ▲ **Crew:** 4
- ▲ **Top speed:** 67 kph (42 mph)
- ▲ **Range:** 480 kilometres
- ▲ **Power/weight:** 21 hp/tonne

Test shooting of the K9 Thunder from Hanwha Techwin, South Korea.

Photo: FMS/Forsvarsmateriell/Simen Rudi



DANES WANT FULL ACCESS TO LOCKHEED MARTIN

The Danish Government wants the country's defence industry to have access to the whole Lockheed Martin cooperation in relation to the F-35 industrial program.

By Andreas Krog

In June, Denmark down selected the F-35 Joint Strike Fighter from Lockheed Martin as the country's new fighter jet. Contract negotiations are expected to last a year or a little more than that.

Parallel to the negotiations the Danish defence industry is gearing up to start cooperation with Lockheed Martin and leading sub-suppliers like Northrop Grumman, BAE Systems and Pratt & Whitney. After many years of waiting time the industry is looking forward to get to work and take advantage of the industrial program at a value of five billion dollars that Lockheed Martin has promised the industry.

Crucial to get access

Denmark's fighter selection was first supposed to be made in 2009, but it took seven more years for the Danes to make up their mind. This means that industry from other partner countries are ahead in the race for a lot of the work directly linked to the F-35.

So the Danes are very aware that they need to look at the whole Lockheed Martin portfolio. With a yearly revenue of 46 billion dollars and 98,000 employees, Lockheed Martin is the world's largest defence company and makers of military aircraft, helicopters, missiles and a lot of other things.

The awareness also exists on the political level.

Danish minister for business and growth, Troels Lund Poulsen, said: *"It is crucial that we get access across Lockheed Martin. We will make sure to put political pressure on Lockheed Martin to allow access to all parts of the company."*

Willing to open up

In September, the minister together with Danish defence minister Peter Christensen headed a delegation of 20 Danish defence companies travelling to Washington D.C. to discuss future cooperation with Lockheed Martin and the key sub-suppliers.

The two Danish ministers had meetings with high level Lockheed Martin officials to discuss how Danish companies could get the most out of Denmark's procurement of the F-35. And Lockheed Martin acknowledges the Danish needs, Troels Lund Poulsen told Danish industry at a meeting during the trip.

One partner for all missions





*Delegation. Danish Minister for business and growth, Troels Lund Poulsen (in the middle to the right), and defence minister Peter Christensen (in the middle to the left) in discussion with Danish defence industry.
Photo: Nanna Dyrbye Benting*

“Lockheed have told us that they are willing to open up access to the whole corporation.”

However, the minister is well aware that the opening up doesn't achieve anything by itself.

“I'm not naive. I know it will be tough. Therefore it is necessary to follow up and keep the pressure on Lockheed Martin.”

Troels Lund Poulsen had a concrete thought on how that can be done.

“We will work on setting up continuous meetings and keep pursuing Lockheed Martin, because this will draw a lot of attention in

Denmark. So I think it will be necessary get involved from a political level.”

The minister for business and growth suggested an annual meeting between the Danish Government, Lockheed Martin and the major key sub-suppliers.

No previous experience

At the meetings in Washington D.C. every Danish company got 15 minutes to present themselves to the large defence cooperations. The delegation consisted of companies like Terma, Systematic, and Falck-Schmidt Defence Systems,

who already have extensive experience from working together with the big guys. The delegation also consisted of smaller companies with no previous experience from selling themselves to the large corporations.

A number of companies have their eyes on work related to the sustainment of F-35. Lockheed Martin therefore have set up an industry day in Copenhagen in November to address sustainment.

Far more mature

Troels Lund Poulsen and Peter Christensen also visited the F-35 production line in Fort Worth, Texas.

“The production facility is far more mature than I imagined,” defence minister Peter Christensen said.

Almost 800 F-35 planes will have been produced when the first Danish fighter jet rolls off the production line.

Denmark has insisted on procuring almost half of the country's F-35 jets on a single 3-year block buy with delivery from 2021 to 2023 instead of 4-6 planes a year on single year block buys.

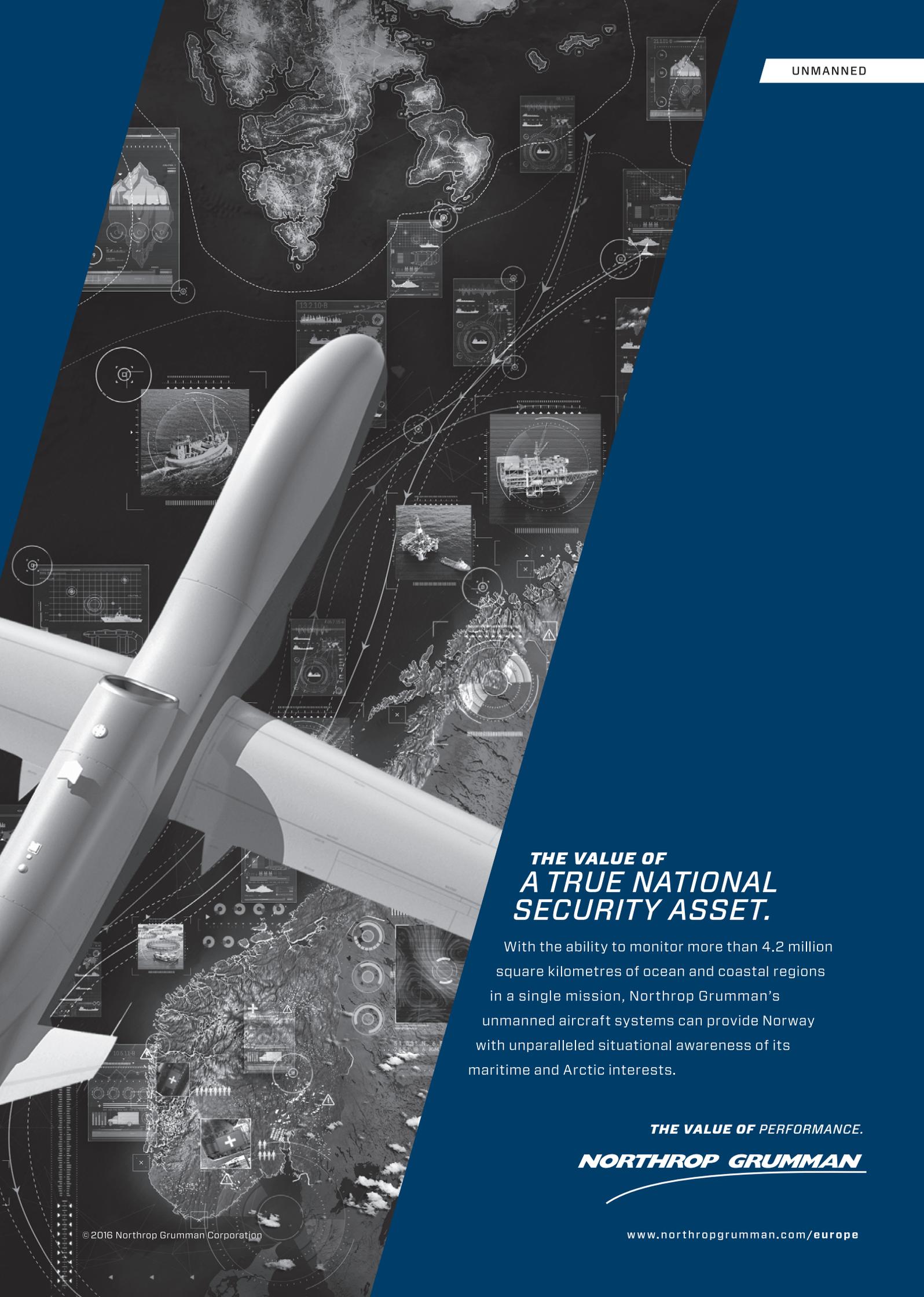
“Buying almost all of the airplanes in one block gives us increased certainty that the price will not increase,” Peter Christensen said. ■■

FORCE PROTECTION IS OUR MISSION.

Rheinmetall is a full range supplier and supports the Scandinavian Forces with its expertise in the fields of:

- Transport vehicles
- Recovery vehicles
- Engineering vehicles
- Combat equipment and ammunition
- Field communication
- Simulation and training
- Maintenance

www.rheinmetall-defence.com



**THE VALUE OF
A TRUE NATIONAL
SECURITY ASSET.**

With the ability to monitor more than 4.2 million square kilometres of ocean and coastal regions in a single mission, Northrop Grumman's unmanned aircraft systems can provide Norway with unparalleled situational awareness of its maritime and Arctic interests.

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

– BULLETIN BOARD FOR DEFENCE, INDUSTRY AND TRADE –

Saab radar for US Navy

The US Navy has placed an order with Saab for the procurement of an AN/SPN-50 (V)1 shipboard air traffic radar. The new radar will replace the existing AN/SPN-43C air traffic radar deployed aboard the US Navy's aircraft carrier (CVN) and amphibious assault (LH) class ships.

The SPN-50 system has been designed to support the deployment, sustainment and operation of aviation assets by providing aircraft position, radar signal, and weather data.

The data is used for air traffic control services, such as aircraft sequencing and separation, airspace identi-

cation and containment, safety alerts, traffic advisories, and landing guidance.



Part of a US Navy ship.
Photo: Saab, USA

FREMM frigate Bretagne floated out

The French Navy's newest Frégate européenne multi-mission (FREMM) frigate, Bretagne, has been floated out from the DCNS shipyard in Lorient, France.

Bretagne represents the seventh frigate in the FREMM programme and the fifth of the series ordered by OCCAR on behalf of the French defence procurement agency (DGA), for the French Navy.

FREMM is a joint programme between France and Italy, which aims to build 21 frigates for their navies.

The float out of Bretagne follows the delivery of the third FREMM, Languedoc, to the French Navy in March this year. The first two vessels, Aquitaine and Provence, were delivered in 2012 and 2015 respectively.

The navy's fourth frigate, Auvergne, was launched last

year from the DCNS facility, and is scheduled to start sea trials at the end of this month.

Assembly of the sixth French frigate, Normandie, is scheduled to start soon. All the six vessels are expected to be delivered by 2019.

With a displacement capacity of 6,000t, the 142m-long and 20m-wide Bretagne can operate at a speed of 27k, with a range of 6,000nm at 15k.

The frigate will be equipped with effective weapon systems and hardware, such as the Herakles multifunctional radar, the naval cruise missile, the Aster and Exocet MM 40 missiles, and the MU 90 torpedoes.

It has an accommodation capacity for 145 persons, and can operate with a crew of 108, including the helicopter detachment.

Taiwan continues to be an attractive destination for US defence exports

Taiwan receives 98% of its defence equipment imports from the US, reveals a report by Strategic Defence Intelligence (SDI).

Taiwan's defence imports reached an all-time high in 2014 due to increased procurement of air defence systems, missiles, and aircraft.

SDI forecasts that imports will continue to grow from 2016-2021 and be led by foreign military sales by the US, while other countries are reluctant to supply defence equipment due to pressure from the PRC.

Although the US dominates the Taiwanese defence industry, a number of European suppliers have recently entered the market through the sale of advanced defence systems.

Taiwan's defence expenditure is expected to grow from the current \$9.9bn to \$10.9bn by 2021, witnessing a compound annual growth rate (CAGR) of 2.38%, according to a report by Strategic Defence Intelligence (SDI).

Indian Navy launches second Project 15B guided-missile destroyer

The Indian Navy has launched the second Vishakhapatnam-class guided-missile destroyer of Project 15B at Mazagaon Dock Ship Builders Limited (MDL), in Mumbai, India.

Under Project 15B, the four destroyer ships are being indigenously designed by the Directorate of Naval Design, New Delhi, and built by MDL.

The contract for this construction was awarded in 2011.

In the last six years, the shipyard has launched an indigenous aircraft carrier and delivered three frigates, three destroyers and two corvettes.

Christened as Mormugao, the destroyer has a length of 163m and a beam measuring 17.4m, and displaces 7,300t.



INS Mormugao is the second Project 15B guided missile destroyer.

Photo: Indian Navy

Contract for RBS 70 NG air defence system

Saab has received a contract from an undisclosed customer to supply RBS 70 NG very short range air defence (VSHORAD) system.

The SEK378m (\$44.1m) contract includes the supply and long-term maintenance and support of the latest version of the advanced air defence missile system.



The order includes the supply and long-term maintenance and support of RBS 70 NG. Photo: Saab

Upgraded M109A5+ self-propelled howitzers to Brazilian Army

BAE Systems has received a contract to supply upgraded M109A5+ self-propelled howitzers to the Brazilian Army.

Under the \$54m contract, the company will overhaul and upgrade 32 self-propelled howitzers to the M109A5+ configuration.

The vehicle will be upgraded with navigation and weapons control systems, a commander's display unit, digital capable radios, and a remotely activated travel lock.

It is also expected to improve the time from receipt of mission to the firing of the mission by more than 80% over previous variants.

BAE Systems has been working on the Brazilian Army's upgrade of its M113B vehicles to the M113A2 Mk1 configuration for the past four years.

To date, the company has delivered more than 150 renovated vehicles and is now upgrading 236 additional M113B systems.



BAE Systems will upgrade Brazilian Army's self-propelled howitzers to the M109A5+ configuration. Photo: BAE Systems

Live Firing Of The New Carl-Gustaf M4 In The United Kingdom

Saab demonstrated the new Carl-Gustaf M4 during the British Army's Close Combat Symposium live firing demonstration at West Lavington, England on 20 July.

Saab's part of the demonstration used a tactical scenario in which Saab personnel acted as an infantry patrol carrying the Carl-Gustaf M4 and a selection of rounds for the weapon. Employing a wide range of ammunition types, the Carl-Gustaf system allows dismounted soldiers to defeat multiple challenges – from neutralising armoured vehicles to clearing obstacles and engaging enemies in buildings.

The Carl-Gustaf is a weapon system within the support weapon category. It has been constantly modernised and enhanced to meet users' changing needs. The latest version, the Carl-Gustaf M4, reduces the weight from 10 kg to less than 7 kg. Carl-Gustaf is a battle-winning system for soldiers operating in demanding environments.

Refueling aircraft for Japan

The US Defense Security Cooperation Agency (DSCA) has notified Congress of a \$1.9bn potential sale of KC-46A aerial refueling aircraft to Japan.

Under the sale, Japan has requested four KC-46A aircraft, as well as related equipment, training, and support.

The sale will also cover one additional spare PW4062 engine for the tanker aircraft.

Each aircraft will be delivered with GPS capability and defensive systems installed, as well as spares, such as Raytheon's ALR-69A radar warning receiver (RWR), Raytheon's miniaturised airborne GPS receiver (MAGR) 2000 (2K) and Northrop Grumman's AN/AAQ-24(V) large aircraft infrared countermeasures (LAIRCM) system.

Each LAIRCM system has three Guardian laser terminal assemblies (GLTA), six ultraviolet missile warning system (UVMWS) sensors AN/AAR-54, one LAIRCM system processor replacements (LSPR), a control indicator unit replacement, smart card assembly, and a high-capacity card.

The procurement will increase the country's capability to participate in Pacific region security operations and improves its national security posture as a key US ally.

Boeing Corporation will serve as the principal contractor for the sale.

The KC-46A is a multirole tanker that can refuel all US, allied and coalition military aircraft compatible with international aerial refueling procedures.



A US KC-46 refueling a C-17 Globemaster. Photo: US Air Force

Bren-Tronics to supply next-generation military-grade battery chargers for USMC

Bren-Tronics has been awarded a contract to deliver next-generation military-grade battery chargers, including the advanced battery charger (ABC), which will be used by US Marine Corps (USMC) to improve operational energy capabilities in the battlefield.

The \$38m contract has a duration of one year including four option years.

Deliveries of the battery chargers are expected to start in the fourth quarter of this year.

USAF grounds F-35 Lightning II fighter jets over technical issues

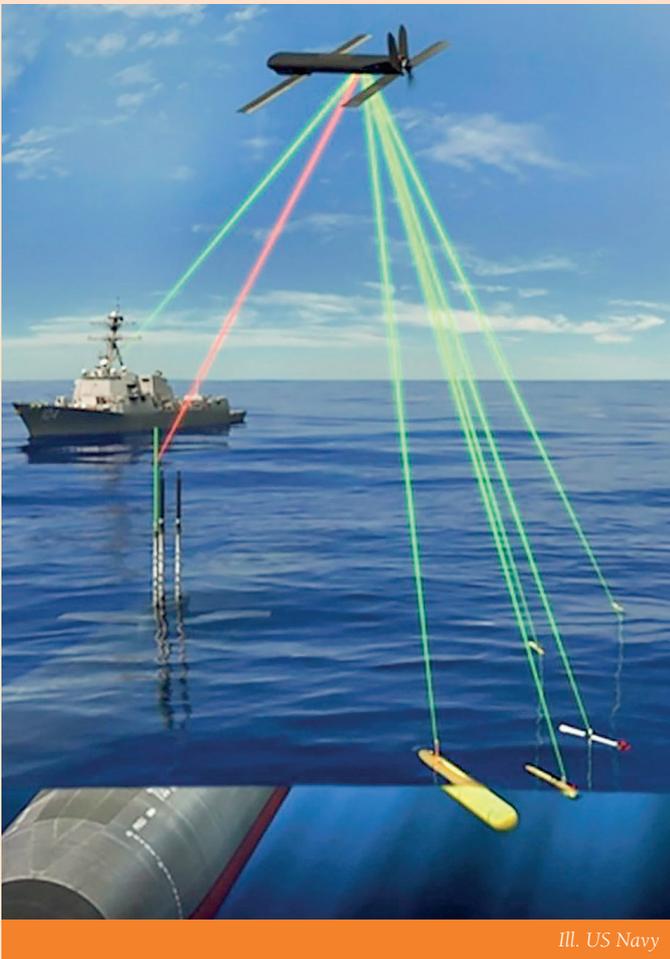
The US Air Force (USAF) has reportedly grounded 13 of its F-35 Lightning II joint strike fighter aircraft, following the discovery of peeling and crumbling insulation in avionics cooling lines inside the fuel tanks.

The decision comes within two months of declaring the initial squadron of the F-35A as combat ready.

Of the 15 aircraft grounded, 13 belong to the US and the remaining two to the Royal Norwegian Air Force.

Ten of them were declared combat ready, one was being used in testing, and the remaining four were being used for training.

Production of another 42 aircraft is currently underway.



Ill. US Navy

US to provide \$38bn in military aid to Israel

The US has reportedly agreed to increase military aid to Israel from the current \$30bn to \$38bn for a period of ten years.

The latest deal comes as the

previously signed agreement is due to expire in 2018.

Under the previously signed agreement, Israel received \$3.1bn every year.

Flight test of PAC-3 hit-to-kill interceptor

Lockheed Martin's Patriot Advanced Capability-3 (PAC-3) missiles have successfully intercepted incoming targets during a US Army flight test at White Sands Missile Range, New Mexico.

During the test, two Patriot systems tracked and destroyed two tactical ballistic missile (TBM) targets.

The hit-to-kill interceptor destroys threats through kinetic energy in body-to-body contact.

It can engage a wide range of incoming threats, such as tactical ballistic missiles, cruise missiles and aircraft.

Four additional nations, including Kuwait, Qatar, South Korea and Saudi Arabia, have contracted Lockheed Martin for the interceptor.



The PAC-3 Missile uses hit-to-kill technology to defend against incoming threats. Photo: Lockheed Martin

US Navy Demonstrates Cross-Domain Communication

Naval Undersea Warfare and communication relay Center, a global leader in unmanned aircraft systems for both military and commercial applications, today announced the United States Navy has successfully demonstrated the use of its submarine-launched Blackwing™ UAV to link with a swarm of unmanned undersea vehicles and communicate with the submarine combat control system during the Annual Naval Technology Exercise (ANTX) on August 16.

Along with providing a new and unique intelligence, surveillance and reconnaissance (ISR) capability to submarine commanders, the Blackwing UAV can also provide high-speed data

and communication relay for Command and Control (C2) between geographically separated vessels such as manned submarines, unmanned undersea vehicles (UUVs) and surface ships. Deployed UUVs collect large quantities of data while conducting diverse missions ranging from mine-hunting to wide-area oceanographic sensing. During the ANTX exercise, an AeroVironment developed, government-owned, secure digital datalink called DDLTM, integrated into all Blackwing UAVs, relayed real-time information from the surrogate manned submarine via the Blackwing UAV to and from multiple UUVs.

US B-1B bomber flies over South Korea

The US Air Force's (USAF) B-1B strategic bomber has flown over South Korea for the second time in show of force after North Korea claimed it tested a rocket engine.

The aircraft landed at Osan Air Base in South Korea after it performed a low-level flight

over the air base, which is 120km from the border with North Korea. The landing is the first in the past 20 years.

The B-1B can be fitted with both guided and unguided weapons and can deliver precision and non-precision weapons against any threat.



A B-1B Lancer flies over Osan Air Base in South Korea Photo: US Air Force

US Army presents new drone concept

US Army researchers have showcased a new rectangular-shaped quadcopter drone, called Joint Tactical Aerial Resupply Vehicle (JTARV).

Also called a hoverbike, the JTARV can be used by soldiers on the battlefield to quickly order and receive supplies within a matter of minutes.

Researchers seek to develop a future JTARV that can fly low to the ground, or at thousands of feet at speeds of around 60mph (100 km/h).

With a payload capacity of up to 300lb (140kg), the new UAV can enable resupplies at short ranges.

US Army Research Laboratory Protection Division asso-

ciate chief Tim Vong said: "Anywhere on the battlefield, soldiers can potentially get resupplied in less than 30 minutes."

While the current prototype is electric, researchers are exploring the use of a hybrid propulsion system that may increase the drone's range.

They are also planning to increase the payload capacity to 800lb (360kg) and extending the range to 125 miles (200 km)

Vong further added: "We're also looking to integrate advanced intelligent navigation and mission planning.

"We're looking to end up with a modular, stable platform that can be used for even more dynamic and challenging missions".



Researchers are developing a JTARV that can fly low to the ground or at thousands of feet in the air at speeds of 60mph. Photo: US Army

Spanish Army takes delivery of two NH90 helicopters

The Spanish Army has taken delivery of two Airbus NH90 tactical transport helicopters, as part of a deal to acquire 22 NH90s in total.

The NH90s, renamed as HT-29 Caimans by the Army, will operate as part of the Spanish Army Airmobile Force's (FAMET) Third Manoeuvre Helicopter Battalion (BHELMA III).

The first helicopter in the order was already delivered earlier this month, with plans to deliver two additional NH90s by this year end, bringing the number of aircraft delivered to five.

The Spanish version of the NH90, the GSPA, is designed to perform troop transport, search and rescue, personnel recovery and medical evacuation missions.

Egyptian Navy to receive second Mistral-class helicopter carrier

French shipyard DCNS has delivered the second Mistral-class landing helicopter dock (LHD) helicopter carrier to the Ministry of Defence of the Arab Republic of Egypt.

Named Anwar El Sadat, the helicopter carrier represents the final of two LHDs delivered to the Egyptian Navy by DCNS, under a contract signed in October last year.

The first LHD, Gamal Abdel Nasser, was delivered to the Egyptian Navy in June this year.

With a displacement capacity of 22,000t, the 199m-long vessel is propelled by an electric propulsion system that uses pods and can operate at a speed of more than 18k.

The LHD is equipped with a hospital that allows it to cater to

humanitarian missions as well as can be deployed for a range of missions such as transportation of troops, equipment, heavy helicopters, and landing craft.

It also features communication system that makes it suited to act as a command vessel within a naval force.

DCNS is also contracted by the Egyptian Ministry of Defence to deliver four Gowind-class corvettes, and last year handed over the FREMM multi-mission frigate Tahya Misr to the navy.

Additionally, the shipyard is scheduled to deliver seven combat vessels to the Egyptian Navy by 2020, as part of efforts to modernise the country's defence system.



The two LHD vessels were built for Russia, but due to international sanctions, the Russian Navy could not take delivery of the vessels. The Egyptian Navy is now receiving the LHD ships from DCNS. Russia has been paid back the amount the Russian Navy paid for the ships. Photo: DCNS

CV90 Makes Australian Debut

BAE Systems, in partnership with Patria, offered the CV90 in response to the Commonwealth's request for information for the LAND 400 Phase 3 program.

CV90 is a family of tracked combat vehicles designed by BAE Systems in Sweden, with more than 4.5 million engineering hours contributing to the development of this advanced IFV. The CV90 family offers high performance and unique operational advantages.

Combined with the E35 turret, the CV9035 — a variant of the vehicle with a 35mm gun system — provides superior lethality with a high level of commonality with the

AMV35 offered for Phase 2. With proven operations around the globe, CV90 will bring the Commonwealth a mature, low total-ownership cost, sustainment program.

Like the AMV35, CV90 for Phase 3 is well positioned to support and integrate Australian Industrial Capability to deliver jobs and sovereign capability.

There are nine different CV90 variants in service, with a total of more than 1,280 vehicles sold to seven European nations, including four NATO members. The latest variant is currently in production for Norway.

Security scanner contract from German Federal Ministry of the Interior

The Procurement Office of the German Federal Ministry of the Interior signed a framework agreement with Rohde & Schwarz for 300 R&S QPS200 security scanners. The new instruments can be now be used everywhere that the German Federal Police Force performs security checks. The primary application will be for security at German airports.

Rohde & Schwarz was awarded a contract by the Procurement Office of the German Federal Ministry of the Interior for the latest generation of R&S QPS200 security scanners. The three-year framework agreement encompasses 300 systems plus accessories and service.

This makes the R&S QPS200 the security scanner of choice for security checks based on millimeter-wave technology within German federal facilities. The instruments will be the preferred selection for the Federal Police for security checks at airports throughout Germany. The scanners can also be used for security access control in other places, such as in ministries, for example.

The millimeter-wave technology is based on the company's many years of expertise in developing globally leading test and measurement equipment. The security scanner automatically detects potentially dangerous objects under clothing or on the body, whether they are rigid, flexible, fluid, metallic or non-metallic. If the scanner reports an alarm, the location of the object is marked on an avatar, a symbolic graphic of the human body.

There is no health hazard associated with the R&S QPS transmit power, which is hundreds or even thousands of times lower than that of a mobile phone. It operates in the frequency range between 70 GHz and 80 GHz. A scan takes just a few milliseconds to complete.

Scanning comfort is also improved since the individual being scanned simply stands in front of the scanner with their arms held slightly away from the body. The neutral graphical display preserves privacy.

NanoMech to develop new technology-based combat uniforms for US Army

NanoMech has been contracted to develop and test advanced multi-functional textiles for the US Army to protect soldiers.

The contract will see the company develop combat uniforms using its patent pending technology platform, called nGuard, which is a cost-effective coating finish and additive for a wide variety of textile fabrics.

The technology can be used future for next-generation army combat uniform (ACU), as well as other military equipment and clothing items, NanoMech said in a statement.

The nGuard multi-functional nanoengineered chemi-

cal finish has been designed to offer substantial improvements to ACU textiles. Improvements include advanced vector protection to safeguard soldiers against vector-borne diseases and repellent for infected arthropod species insects, while maintaining low toxicity and increased safety.

NanoMech said that the next-generation combat uniforms will resist a broad range of flash flame and thermal threats, while reducing the auxiliary load carried by the soldier, improving wearable comfort, and increasing fabric durability and breathability capabilities.

Boeing and Saab launch two new T-X training aircraft for USAF

Boeing, along with its partner Saab has presented its first two T-X aircraft for the US Air Force (USAF), which has been developed for use in training missions.

Designed especially for the USAF, the training aircraft features the latest technologies, tools and manufacturing techniques.

Powered by a single engine, T-X will replace the USAF's ageing fleet of T-38 Talon aircraft.

The Boeing T-X aircraft features twin tails, stadium seating and an advanced cockpit with embedded training.

The system also offers advanced ground-based training and a maintenance-friendly design for long-term supportability, Boeing said in a statement.

The aircraft is expected to achieve initial operational capability in 2024.

Through the T-X programme, the USAF will be able to acquire new two-seat jet trainer for fast-jet training to replace the Northrop T-38 Talon, which is in service for more than 43.5 years.

More than 350 aircraft are expected to be ordered to replace the T-38, with plans to increase the overall purchase to more than 1,000.



The T-X aircraft

Photo: Boeing



EA-18G Growler tests 100% alternative biofuel.

Photo: US Navy

EA-18G Green Growler flight tests 100% biofuel

The US Navy's EA-18G Green Growler aircraft has flight tested 100% advanced biofuel at Naval Air Station Patuxent River, Maryland.

Air Test and Evaluation Squadron (VX) 23 project officer and test pilot lieutenant

commander Bradley Fairfax claimed the transparent biofuel resembled petroleum JP-5 used in the aircraft.

The fuel programme supports the US Navy's goal to increase the incorporation of alternative fuels by 2020.

France to acquire Heckler & Koch's HK416 assault rifle

France's Direction Générale de l'Armement (DGA) has awarded a contract to Heckler & Koch to provide HK416 assault rifle for the French Army.

Heckler & Koch's HK416 will replace the FAMAS assault rifle that is currently in service with the French military, and is no longer produced.

Known initially as the 'Arme Individuelle Future' (AIF), the HK416 is a variant of the battle-proven HK416 A5 assault rifle, Heckler & Koch said in a statement.

The HK416 A5 features a tool-less gas regulator for suppressors, as well a redesigned, user-friendly lower receiver that allows ambidextrous operation and optimises magazine compatibility.

Selected after a technical evaluation, the weapon will be available in two variants with different barrel lengths for army, navy and air force personnel.

The HK416 is produced in Oberndorf am Neckar, Germany, using specialised French steel that enhances the weapon's robustness, according to Heckler & Koch.

The 15-year contract will see the company supplying up to 102,000 5.56mm x 45mm Nato rifles, 10,767 40mm x 46mm grenade launchers, ammunition, spare parts, support services and accessories.

The assault rifle can be fitted with a 40mm grenade launcher to increase its firepower.

Deliveries by Heckler & Koch are expected to begin in 2017.



Norwegian soldier with HK416. More than 40 000 HK 416 has been in service with the Norwegian armed forces since 2008. So far, Norway is the only country that has chosen the HK 416 as "standard assault rifle" for all military units. Now the HK416 will be the new "standard hand weapon" in the French armed forces. Photo: FMS

Final Seahawk helicopter to Royal Australian Navy

Lockheed Martin has delivered the 24th and final MH-60R Seahawk helicopter to the Royal Australian Navy (RAN).

In June 2011, the MH-60R was selected by the Common-

wealth of Australia to fulfill the Australian Defence Force's requirement of a fleet of 24 multi-role naval combat aircraft.

These aircraft will replace the RAN's existing fleet of S-70B-2 SEAHAWK helicopters.



L-39NG

Photo: Aero Vodochody

L-39 users from all over the world met in AERO Vodochody

AERO Vodochody AEROSPACE and its business partner Omnipol invited representatives of many countries to the 1st L-39 Users' Group Conference to celebrate the legendary jet aircraft.

Austria, Bangladesh, the Czech Republic, Estonia, Georgia, Hungary, Lithuania, Mozambique, Nigeria, Slovakia, Thailand, Tunisia and Uganda – representatives of these countries arrived in AERO to share their experience with the L-39 Albatros jet trainer. The 1st L-39 Users' Group Conference was held under auspices of the Czech Air Force. The former Air Force Commander Brigadier General Libor Štefánik as well as the representatives of AERO and Omnipol held a speech during the conference.

The aim of the meeting was not only the celebration of past successes of the aircraft, but also the future outlook of the program. The attendees discussed the sustainment services and possible further development of the aircraft, but they have also been introduced to the project of a new military aircraft currently driven by AERO – the L-39NG.

About the L-39

The L-39 and its successors L-59, L-139 and L-159 became the most successful jet training family worldwide ever. Over 3,000 aircraft of this type were manufactured up to now and the jet trainer has been historically used by 45 military operators. Today, the aircraft is operated also by civil customers in at least 15 countries.

About the L-39NG

The L-39NG aircraft is a modern and effective trainer designed as a unified, comprehensive training system for modern air forces. The L-39NG is based on the aerodynamic concept of the current L-39, but utilizes the latest technologies and equipment. About AERO

AERO Vodochody AERO-SPACE a.s is the largest aviation manufacturer in the Czech Republic and one of the oldest aerospace companies in the world. Its current focus is on the support of its final products, the L-39, L-59 and L-159 aircraft, and on the development of the new generation of its legendary jet trainer aircraft, the L-39NG.

First flight test of Legion Pod aboard F-15C aircraft

Lockheed Martin has completed the first flight test of its multi-function sensor system Legion Pod aboard an F-15C aircraft.

The test validated the multi-function sensor's ability to provide long-range detection and tracking of airborne threats for the US Air Force (USAF).

Legion Pod was integrated onto the F-15C without any modifications to the aircraft. It tracked multiple airborne targets in representative scenarios during the flight.

The sensor has been designed to support collaborative targeting operations in radar-denied environments, according to Lockheed.

The Legion Pod is in line with the requirements of the USAF's F-15C infrared search and track programme of record, which include long-range detection and tracking in a wide field of view.

This multi-function sensor offers high-fidelity detection and tracking of airborne targets using an IRST21 infrared sensor and advanced networking and data processing technology.

The system is also capable of accommodating additional sensors without the need of costly systems or aircraft modifications.

It will also be available to provide a wide range of capabilities for other fighter and non-fighter aircraft.

Raytheon to build Naval Strike Missile launchers in the US

Raytheon Company has received an initial contract to produce Naval Strike Missile (NSM) launchers at its production facility in Louisville, Kentucky. The deal ushers in U.S. manufacturing of the Norwegian-developed weapon system.

Kongsberg Defence Systems awarded the initial contract for qualification units. The award follows a July announcement that Raytheon will produce NSM launchers in the U.S. The company also plans to perform final assembly, integration and test of the Naval Strike Missile at Raytheon's Tucson, Arizona facility.

Raytheon already produces Close-in Weapon Systems including Phalanx, SeaRAM, and Rolling Airframe Missile launchers in Louisville.

The companies are also teamed on the development of the Joint Strike Missile and National Advanced Surface-to-Air Missile Systems also known as NASAMS.

Raytheon Company, with 2015 sales of \$23 billion and 61,000 employees, is a technology and innovation company specializing in defense, civil government and cybersecurity solutions.



With a range of more than 100 nautical miles, NSM is a long-range, anti-ship missile that provides strike capability against land and sea targets. Raytheon and Kongsberg believe NSM is an ideal solution for navies around the globe and the best over-the-horizon missile for the U.S. Navy's Littoral Combat Ship. The photo displays a Norwegian Skjold-class corvette test firing NSM.

Photo: FMS/Norwegian Navy

Lightweight Li-Ion battery for Main battle tanks

Norwegian company Gylling Teknikk presents a new Li-Ion battery, Xcelion 6T, special designed for use in main battle tanks and heavy military vehicles.

The new 21 kg battery delivers 24 volt, and can replace two of the current BB10/N lead acid batteries of 40kg each, often found in military vehicles.

The Xcelion 6T provides power for engine ignition and starting, lights, fans, etc, besides silent watch capabilities,

and meets all cold temperature requirements. The new battery is maintenance free, and can replace old batteries without fitting, giving a significant reduction in overall life cycle cost of the vehicle.



The new ruggedized Xcelion 6T battery is developed by French company SAFT.

KONGSBERG CROWS orders valued MNOK 235

The orders with the U.S. Army are for delivery of Low Profile CROWS configuration for the M1A2 Abrams Main Battle Tank.

The orders are related to the CROWS contract signed in August 2012.



Abrams Main Battle Tank.

Photo: US Army

ØKOKRIM drops the corruption case against KONGSBERG

The Norwegian National Authority for Investigation and Prosecution of Economic and Environmental Crime (Økokrim) announced today that the corruption charges against Kongsberg Gruppen ASA and Kongsberg Defence & Aerospace have been dropped.

In February 2014 Økokrim charged Kongsberg Gruppen ASA and Kongsberg Defence & Aerospace AS with allegations of corruption related to deliveries of communications equipment to Romania in the period

2000-2008. Økokrim today announced that the charges have been dropped.

As the charges have been dropped, KONGSBERG is no longer under investigation or under suspicion of corruption.

Økokrim has however decided to prosecute a former employee of KONGSBERG with charges of fraud against the company. As a consequence of information the Økokrim investigation revealed, the former employee was dismissed in 2015.

Saab Receives US Order for Carl-Gustaf Ammunition

Saab has received an ammunition order from the US Department of Defense (DoD) for the Carl-Gustaf man-portable weapon system, known in the US as M3 MAAWS (Multi-role, Anti-armor Anti-personnel Weapon System). The order value is USD 5.4 million (MSEK 46).

The order comes under the terms of Saab's framework contract announced with DoD in August 2014 for the 84-mm recoilless rifle system.

The Carl-Gustaf is a world-leading weapon system within the support weapon category. It has been regularly modernised and enhanced to meet users' changing needs. The latest version, the Carl-Gustaf M4 (called M3E1 in the U.S.), reduces the weight from 10 kg to less than 7 kg.

Saab Receives Order from Latvia for RBS 70 Missiles

Saab has received an order for RBS 70 missiles from the Ministry of Defence of the Republic of Latvia. Deliveries will take place during the period 2016-2017.

Latvia has been an RBS 70 customer since 2004, and in 2015 Saab signed a contract with the Latvian Ministry of Defence for deliveries of RBS 70 missiles. This order is a call-up of an option as part of the previously signed contract, which was announced by Saab on 22 October 2015.

In June 2016 the Latvian Air Force test-fired the RBS 70 and the latest generation RBS 70 NG during the air defence exercise "Baltic Zenith 2016" held in Šķēde, Latvia. Approximately 90 soldiers and national guards from Latvia's Air Defence Wing of Air Force Aviation Base and 17th Air Defence Battalion of the National Guard, as well as soldiers of the Air Defence Unit of Lithuanian Armed Forces, took part in the exercise.

The Saab portfolio of short-range ground-based air defence missile systems includes the RBS 70 and the latest version, RBS 70 NG. The RBS 70 system has an impressive track-record on the market with more than 1,600 launchers and over 17,000 missiles delivered to nineteen countries.



RBS 70

Photo: Saab

India's L&T wins contract to build high-speed patrol vessels for Vietnam

Larsen & Toubro (L&T) has won a contract from the Vietnam Border Guard to design and build high-speed patrol vessels in India.

Under the \$99.7m contract, the company will also provide transfer design and technology, as well as supplying equipment and material kits to construct follow-on vessels at a Vietnam shipyard.

The patrol boats will be designed at L&T's dedicated Warship Design Centre, with the vessels being built at L&T's Kattupalli Shipyard, near Chennai, India.

The 35m-long high-speed patrol vessels will be built using aluminium alloy and will be fitted with navigation and surveillance equipment, and self-defence capabilities.

Currently, L&T is under an Indian MoD contracts to design and build 54 interceptor boats for the Indian Coast Guard and has already delivered 28 boats.

Additionally, the company is building seven offshore patrol vessels for the Indian Coast Guard and a floating dock for the Indian Navy.

Land 400 RMA contract signed

BAE Systems Australia and Patria have been selected to take part in the 12-month Risk Mitigation Activity for the Australian Army's Land 400 Phase 2 combat reconnaissance vehicle program. The contract between Australian Defence Department and BAE Systems Australia was signed on August 19.

The offered AMV35 is Patria's modern, agile, highly protected Armoured Modular Vehicle platform integrated with the combat-proven E35 turret and weapon system from BAE Systems Hägglunds.

BAE Systems and Patria are committed to embed as much Australian industry con-

tent in this vehicle as possible and to support the development of local industrial capability, with the manufacturing, technology and intellectual capability transitioning to an Australian industry. Both Patria and BAE Systems Hägglunds have successfully transferred technology and the production of the AMV and the E35 turret to several other countries, delivering considerable in-country economic advantages including long term local sustainment and upgrade activities.

AMV35 will be shown at Land Forces 2016 conference 6-8.9.2016 in Adelaide, Australia.



Patria AMV

Photo: Patria

India test-fires Barak-8 surface-to-air ballistic missile

India has test-fired a Barak-8 surface-to-air ballistic missile from a test range at Chandipur, off the coast of Odisha state.

During the trial on 20 September, the medium-range missile was successfully launched from a mobile launcher at the integrated test range (ITR).

The Defence Research & Development Organisation (DRDO) of India and Israel Aerospace Industries (IAI) jointly developed the Barak-8 missile.

Weighing around 3t, the 4m-long missile has a payload capacity of 70kg, according to the Indian TV news channel.

Designed to defend against any airborne threat, the missile has the ability to hit targets within range of 70-90 km.



Barak-8 missile
Photo: Georges Seguin

MBDA Deutschland submits proposal for TLVS/MEADS

On 28th September 2016, MBDA Deutschland GmbH submitted its proposal for the development of TLVS, Germany's future ground-based air defence system, to BAAINBw (the Federal Office of Bundeswehr Equipment, Information Technology and In-Service Support).

TLVS, based on MEADS technology, will provide unprecedented protection for both civilians and soldiers on operations either at home or abroad. Special system features include: 360-degree coverage, open

system architecture and a "plug & fight" capability. This latter feature allows the attaching and detaching of additional sensors, effectors and weapon systems during uninterrupted operation, as well as rapid deployment. In addition, the TLVS air defence system can be operated at a significantly lower cost to the user than existing systems and with fewer personnel and will provide the German Air Force with a level of interoperability with allied forces that has not been available up to now.



Photo: MBDA

First AS565 MBe Panther to the Mexican Navy

The Mexican Navy yesterday took delivery of the first of the ten AS565 MBe Panther helicopters it purchased in 2014, becoming the first customer in the world to receive the new version of this multi-role, medium-class military rotorcraft. The Navy will receive three other units before the end of the year and the remaining six by early 2018.

The helicopters will be operated by the Naval Aviation in the Gulf of Mexico and on the Pacific coast, where they will perform a range of missions including Search and Rescue (SAR), disaster relief transportation and evacuation, drug enforcement and coastal protection.



Photo: Airbus

Nato fighter aircraft intercept Russian military aircraft over Baltic Sea

Nato fighter aircraft were scrambled seven times to intercept Russian military aircraft over the Baltic Sea between 19 and 25 September.

The aircraft, conducting the Nato air policing mission in the Baltic States, first intercepted an IL-18 and one AN-12 aircraft from Russia on 19 September.

The Russian aircraft were flying towards Kaliningrad without using onboard transponders, but maintained communication with air traffic control centres.

An AN-26 from Russia bound for Kaliningrad was identified and escorted away from mainland Russia.

On 22 September Nato aircraft identified and escorted one AN-12 and one AN-26 flying away from Kaliningrad and towards the mainland in

international airspace over the Baltic Sea.

An NA-27, with the onboard transponder on, maintained radio communication with air traffic control centres and was intercepted on its way to the mainland of the Russian Federation.

On 23 September, Nato air policing aircraft intercepted an IL-18 flying from Kaliningrad towards mainland Russia.

The aircraft maintained communication with air traffic control centres and had a flight plan pre-filed, but its onboard transponder was switched off.

Nato routinely conducts air policing using national aerial surveillance systems, air traffic management, interceptor aircraft or other air defence measures to provide security to its member states.

SUCCESS WITH FREEZE-DRIED FOOD FOR TOUGH SOLDIERS

Tromsø: Drytech has for a quarter of a century been making freeze-dried food for soldiers in Norway and several other countries. The company specialises in developing high-nutrition value as well as tasty field rations intended for soldiers in demanding arctic areas. US Navy Seals and other foreign special forces are among the well-fed users of the field rations from the far north of Norway.

Text and photo: Tor Husby

Freeze-dried food weighs next to nothing, and has a service life of 4-5 years before expiry. Just add boiling hot water, wait a few minutes, and the soldier has a solid meal. The field rations from Drytech are non-allergenic, and can be used from the Arctic to the tropics with equal success. Rolf Hansen, the father of

the current proprietor, Trond Hansen, started experimenting with freeze-drying technology in his own garage in 1989. A trickle of deliveries to Norwegian military units came under way in close collaboration with Innovation Norway and the Defence of North Norway, both of which would contribute to the onward product development. Before very long, bigger orders were coming in. During the 1990's, the revenue

of Drytech took giant leaps, passing the milestone of 100 MNOK. The first foreign stronghold was in Sweden, in the city of Strömstad in 2016, and new production facilities in Tromsø are in planning for 2017. The company takes pride in a stable work force of some 50 people, who have developed strong ties and good relations among themselves. There has been a rush of 10th year anniversaries, and some of the veterans are coming up towards their 20th. The local newspaper "Nordlys" in Tromsø has described Drytech as an ongoing success story.

A bit like Fort Knox

– In Drytech, the chefs hold the secrets behind the great taste, and our unique freeze-drying technology that has never been the subject of a patent application.

For more than 25 years, Drytech's freeze-dried food has been highly appreciated by Norwegian soldiers. The photo displays as Norwegian Home Guard soldier taking well deserved break during an exercise in the rugged scenery of Northern Norway.

*Photo: Marte Brohaug/
FMS*



Accordingly, only the Norwegian Food Safety Authority and the veterinarians from the Defence are allowed access to the inner sanctum of the company, which is guarded to a degree on a par with that of the US gold deposits in Fort Knox, says Key Account Manager Monica Mathiassen with a smile.

The people are the most important business assets. The kitchen scrutinizes the vegetables carefully, and the only acceptable quality standard for the ingredients is excellent. A gentle freeze-drying process ensures that the ingredients retain the nutrients that will provide the energy, and even more importantly - maintain the taste and texture of the meal throughout the preparation process. There are no additions in the form of E-substances, palm oil or glutamate; most of the fresh produce is Norwegian bought, and many hands display affection and love for the process. Drytech is continuously engaged in projects to develop anything from new new technology to new meal products, as often as not in collaboration with sub-suppliers of up to 20 years' standing. New this year is the drive to develop freeze-dried salmon-based dishes. The cooks know what rugged soldiers in tough conditions need to function at their best, and have devised a gentle, unhurried freezing/drying process.

The Drytech brands include Real Field Meal, Real on the Go and Real turmat. The Real Field Meals are designed

for soldiers in need of a hot meal with balanced nutrient proportions of fats, proteins and carbohydrates. The Real on the Go category contains products that are easily pocket-carried, offering soldiers energy on the way during field operations. The Arctic Field Ration of 1300 kcal per menu is meant for regular days in the field. The Arctic Field Ration of 2000 kcal per menu is intended for those extra strenuous and long days in the field. The company is now in the process of visiting the units for a bit of show-and-tell about the new concepts, which are developed in close co-operation with the Defence.

European military customers

The Norwegian Defence has been the primary customer all along. The company is also selling the arctic field rations to the Finnish, Swedish, Swiss and French special forces. The French army is buying the main meal in bulk, and packaging portions themselves. One goal is to introduce even more products into this segment. And when Dutch, German and US special forces are exercising in North Norway, they are treated to the same arctic field rations. A targeted approach is under way to get the Danish defence back into the fold, and to broaden the footing among the Alp nations with the new field rations. This ambition is the background for the establishing of the Strömstad facility just north of Gothenburg in Sweden. Said move would cut the delivery times to customers in Europe by half. The military



"It is not rocket science. It is what slow cooking means to us". We have incredibly high requirements for our products, says Monica Mathiassen, Key Account Manager at Drytech.

customers pick up some 70 percent of the total production in revenue terms.

It has served Drytech very well to be listed in the NATO Support Agency. Having the NATO stamp of approval carries a lot of weight, and was probably instrumental in signing up the Swedish Defence as a customer. The FSI membership adds significantly to the company's network, of particular importance at events such as conventions and trade fairs.

The 100 percent family-owned company is efficiently managed, and shows healthy profits from year to year. Owners and employees alike work steadily and hard together to build sustainability with new and better products and processes, Monica Mathiassen concludes. ■■

FIRST TOE-HOLD IN USA FOR P-SRTA TRAINING AMMUNITION

Several units of the US Army have during 2016 been testing the 5.56 mm short range ammunition (P-SRTA) from NAMMO Bakelittfabrikken. It is hoped that many other divisions will do likewise. The contract value is not all that significant. The main target is to gain an entry into a huge market, says General Manager Trond Bergerud talking to MilitærTeknikk.

Text and photo: Tor Husby

The cartridge is a relatively new design, which was developed in co-operation with the Defence, and qualified in 2012. The Norwegian Defence uses it extensively, and the feedback is generally positive. Special Forces of many countries are also showing keen interest in 5.56 mm short range ammu-

munition. Bergerud is hoping for new delivery contracts towards the end of 2016.

The short range ammo is primarily used for training in shooting galleries and at short range. The advantages of this type of ammunition is that the danger of ricochets is minimal, it is low cost, and units can therefore practice more at lesser expense. Furthermore, it offers low to no barrel wear, the danger to the soldier is very



Trond Bergerud, General Manager of Bakelittfabrikken, showing the new 5.56mm cartridges.

low, and an added plus is the possibility to train in scenarios where wide safety zones limit the use of regular live ammo.

The Bakelittfabrikken company has a complete training portfolio of short range ammunition in many calibres: 5.56mm, 7.62mm, 12.7mm, and 30mm. Demand is on the rise, and Bakelittfabrikken started working double shifts in parts of the production facilities in 2016. ■■

NAMMO DEVELOPS AMMO FOR THREE FIGHTERS

Raufoss: The development of fighter aircraft ammunition for the F-35 Lightning is rapidly approaching its closing stages. The F-35 needs ammunition for its 25 mm GAU-22 Gatling cannon. In a parallel effort, ammunition for the 27mm Mauser BK-27 cannon used on the Gripen and Eurofighter is under development. NAMMO is convinced that they have the most effective ammunition in the world.

Text and photo: Tor Husby

NAMMO has after an extended development phase come up with new 25 mm APEX ammunition (Armour Piercing with Explosives) especially for the F-35. The company has also developed a very cost effective training ammunition.

–The Gatling cannon in the F-35 can fire 3000 25mm APEX grenades per minute – with four pipes in the Gatling – against a broad spectrum of targets. This is our most powerful selling point, says Eva Friis, programme manager for APEX ammunition since development began in 2004.

16,000 rounds

Friis ensures us that the 25 millimetre has been thoroughly tested. 8500 shots were fired during the first development phase. This was followed by a further 6000 rounds during qualification. In 2015, it was determined that the tests fulfilled all requirements. In the autumn of 2016, the final 11 complements were tested in Vermont. This raised the total by another 2000 rounds. The final shot was fired in September.

What remains now, if firing from the F-35. This is planned to take place in China Lake in California, in January. NAMMO is expecting full certification in 2017.

– We will be standing by for customers, says a smiling Eva Friis.



Ill.: NAMMO



Picture text: Programme executives Eva Friis and Jan Hasslid have high expectations from the APEX ammunition for the fighter aircraft.

Norway and Australia have decided upon 25 mm APEX for their F-35 fighters. Norway has placed an order for more than 50 aircraft, and Australia has twice this number on order. Australia paid half the integration cost for the ammunition for the F-35. Hopes are high that the USA as well as other countries will go for the same version. Eight countries have decided on this fighter type. The Norwegian air force will have the ammunition for the Gatling cannon ready in 2018.

The US Navy, which will operate two versions of the F-35, has conducted qualification firings with the 25 millimetre. The certification process is not yet completed, but early reports indicate that the APEX ammunition is "very good". ■■

GRIPEN AND EUROFIGHTER IN LACK OF EXPLOSIVE GRENADES

In the spring of 2016, NAMMO delivered a complete package of 27mm APEX to the Swedish Defence Materiel Administration (FMV) in Stockholm, for testing with the Gripen fighters that need explosive grenades for their Mauser cannon to provide close support to the Army.

The results of the test firings are very positive, having demonstrated great effect against thick and thin iron plating at different angles. The test results have been submitted to the defence research establishment (FOI), for comparisons with other types of ammunition. A conclusion is expected in the autumn of 2016, says Jan Hasslid, global sales and marketing director for military ammunition and shoulder-fired systems.

The NAMMO production facility at Raufoss needs another two years for ground qualification, followed by aircraft certification for the Gripen. This might happen in the first quarter of 2019, which

would make it the fastest qualification in the world.

NAMMO is building a modern production line for medium calibre ammunition: 20, 25, 27, and 30mm, and it is presumed that series production can start in 2018. -Production of 25mm and 27mm ammo will be important for NAMMO in the years to come, says Eva Friis.

-With many customers, the total volume goes up while the price comes down. With the APEX ammunition, the air forces will get the world's most effective ammunition, combining all the desired properties in just one explosive bullet. This is something all manufacturers are striving to achieve, Jan Hasslid emphasises. ■■

34 COUNTRIES ATTENDED NAMMO'S MULTI-PURPOSE SEMINAR

NAMMO's Multi-purpose seminars increase their attraction. Military industry and officers from 34 nations were present at the 14th seminar in the middle of September, vs. 22 countries the last time. Among the newcomers was a small army delegation from New Zealand. The total participant count came to well over 300, which was an increase of about 100.

Text and photo: Tor Husby

Morten Brandtzæg, the new General Manager of NAMMO, stated that when the company launches the development of an ammunition project, this happens in a 30-year perspective, from the first conception and development through service, the final product, and to the demilitarisation at the end. But where the best-seller is concerned, the shoulder-fired M72, it has been manufactured for 50 years, and development is still ongoing, in the USA as well as in Norway. The company is eager to equip the soldiers with the best possible tools to accomplish their mission and return home safely.

Among the results that Brandtzæg was particularly proud of, was the development of Airburst ammunition from 40mm through different calibres up to 120mm and 155mm, as well as armour-piercing and multi-purpose technology across all calibres.

One of the most popular items at the multi-purpose seminars is always the demonstrations of various new ammunition types, fired from anything from stout battle tanks to handguns. Participants were lining up eagerly to try the latter.

NAMMO was established in 1998, when the governments of Norway, Sweden and Finland joined their respective ammunition production facilities together.



Morten Brandtzæg, the new General Manager of NAMMO

The intent was to uphold the capabilities and competence of the Nordic countries, as well as the important supply assurance with regard to ammunition. This has proven to be a sound decision. Over the past 18 years, NAMMO has grown steadily, and particularly since 2005, when the company started strategic acquisitions abroad. ■■

PROMISING NEW DEVELOPMENTS OF M72

Raufoss: The best-selling M-72, which is celebrating its 50th anniversary this year, is not an unchangeable weapons system. The system, whose effectiveness was proven in Afghanistan, Iraq and other battle fields, may through the NAMMO development programme get “airburst” ammunition, perhaps as early as 2018. But NAMMO has achieved even further strides in the development of so-called FFE ammunition for the shoulder-fired weapons system. Airburst and FFE are packing about the same explosive punch, but with different warheads adapted to different scenarios.

Text and photo: Tor Husby

FFE (Fire From Enclosure) took its first leap from the starting blocks in 2012, when testing began at NAMMO Tally (Meza, Arizona). All requisite testing is now completed, and production of the qualification lot has started. The system is expected to have

completed qualifications by the beginning of 2018. The FFE, which has also gained a more effective warhead, has been developed for firing from the inside of enclosures with little flash, making the firing less visible to the enemy. The warhead can also be varied from “extremely lethal” to warning shots. It is suitable against various armoured vehicles, buildings and other materiel.



Enemy beware! Quoc Bao Diep in battle mood, with his M72 ready to blast off.

Special forces, the Navy Corps, the US Army and NATO customers will benefit greatly from this version.

Airburst!

The Airburst development began in 2014. Achieving airburst is no piece of cake in the park. There is a need for communication between the aiming unit and the missile in order to take out hostile personnel hidden behind houses, structures or similar. Airburst will also prove to be effective against buildings and vehicles. The distance to target is measured by a laser rangefinder.

Earlier, the M72 LAW (Light Anti Weapon) has gained a dramatically improved launcher and new fuzing, and with a newly designed warhead it can penetrate 450mm steel armour. The weight of the weapon is merely 3.4 kgs.

An M72 ASM RC (Anti-structure Munition Reduced Calibre) has gained qualification in co-operation with the Norwegian special forces. This is better suited to warfare in urban environs, using a carbon fibre non-fragmenting warhead, while the explosive force is sufficient to take out the target and not the surroundings. This is also called “low collateral damage”.

– The special forces appreciate the light, shoulder-fired launcher of just some 3.7 kgs, says Quoc Bao Diep, programme supervisor for the system.

Since production started half a century ago, the M72 has provided its makers with about 1 billion dollars in sales revenues. ■■







230V FRA BILEN
TIL PC, LADING,
LYS ETC.

LADERE OG INVERTERE TIL INDUSTRI, FORSVAR OG FRITID

- Ladere fra 6-200 ampere 12-48 volt
- Kombinerte ladere/invertere
- Invertere opp til 10.000 watt ren sinus som igjen kan parallellkobles
- Overvåkning og varsling med SMS eller logging av data via GPRS med Victron Global Remote.
- Til båter, ambulanser, brannbiler, servicebiler, hytter, stasjonære anlegg og forsvar

GYLLING TEKNIKK AS, Rudssletta 71, Postboks 103, 1309 Rud • Tel: 67151400 • Faks 67151401 • post@gylling.no • gylling.no



Norwegian soldiers firing M72s. Due to continuously development, the M72 is still in demand by armed forces around the world, more than 50 years since the introduction of the first version of the weapon. Photo: FMS

**CHOOSE SAMPT/
THE UNIQUE EUROPEAN
EXTENDED AIR
DEFENSE SYSTEM**

**ATBM PROVEN
06TH MARCH 2013**

**ATBM PROVEN
14TH NOVEMBER 2011**

**ATBM PROVEN
18TH OCTOBER 2010**

eurosam
Innovative air defense

www.eurosam.com

USS ZUMWALT SAILING FOR SAN DIEGO

The US Navy's newest and most technologically advanced surface ship, future USS Zumwalt (DDG 1000) is now on her the 3-month journey to its new homeport in San Diego.

DDG 1000 will be the first U.S. Navy combatant surface ship to utilize an integrated power system (IPS) to provide electric power for propulsion and ship services. The IPS generates approximately 78 megawatts of power, nearly what a nuclear-powered aircraft carrier generates, to meet the total ship electric power requirements and provide extra capacity to accommodate future weapons and computing systems.

The Zumwalt-class destroyer is a class of United States Navy guided missile destroyers designed as multi-mission stealth ships with a focus on land attack.

Originally 32 ships were planned, but the quantity was reduced to 24, then to 7, and finally to 3.

The Navy plans for Zumwalt to reach initial operating capability (IOC) in 2016. The second ship, Michael Monsoor, is to reach IOC in 2018, and the third ship, Lyndon B. Johnson, is to reach IOC in 2021. ■■

USS Zumwalt. Despite being 40% larger than an Arleigh Burke-class destroyer, the radar cross-section is more akin to that of a fishing boat. Overall, the destroyer's angular build makes it "50 times harder to spot on radar than an ordinary destroyer.

Photo: US Navy

FACTS ZUMWALT CLASS

- ▲ **Cost:** \$22.5 billion program cost, \$3.96 billion/unit
- ▲ **Displacement:** 14,564 long tons (14,798 t)
- ▲ **Length:** 600 ft (180 m)
- ▲ **Beam:** 80.7 ft (24.6 m)
- ▲ **Speed:** In excess of 30 kn (56 km/h; 35 mph)
- ▲ **Complement:** 140

ARMAMENT:

▲ **Missiles:** 20 × MK 57 Vertical Launchers modules, with a total of 80 launch cells. RIM-162 Evolved Sea Sparrow Missile (ESSM), 4 per cell. Tactical Tomahawk, 1 per cell. Vertical Launch Anti-Submarine Rocket (ASROC), 1 per cell

▲ **Guns:**
2 × 155 mm (6 in)/62 caliber Advanced Gun System; 920 × 155 mm rounds, 70–100 LRLAP rounds.
2 × 30 mm (1.2 in) Mk 46 Mod 2 Gun Weapon System

▲ **Aircraft carried:**
1 × SH-60 LAMPS or MH-60R helicopter.
3 × MQ-8 Fire Scout VT-UAVs

▲ **Aviation facilities:** Flight deck and enclosed hangar for up to two medium-lift helicopters



Ill. US Navy

■ ■ militærTeknikk®

ISSN 0806-6159

Publisher/Utgiver:

Norsk Militærteknisk Forlag
Prinsens gate 22, N-0157 OSLO

Administration/Administrasjon:

Castra AS
Org.nr. NO 971 161 531 MVA

Editor-in-Chief/Ansvarlig redaktør:

M.Sc./Siv.ing.
Bjørn Domaas Josefsen
E-mail: b.josefsen@mil-tek.no

Editorial Office/Redaksjon:

Prinsens gate 22, N-0157 OSLO
Tel. (+47) 22 41 60 77

Denmark: Andreas Krog,
E-mail: post@andreaskrog.dk

Marketing Director/

Markedsansvarlig:

Knut Berg
E-mail: knut.berg@mil-tek.no

Advertising Office/Annonser:

Prinsens gate 22,
N-0157 OSLO
Tel. (+47) 22 41 60 41

Subscriptions/

Abonnementsservice:

Tel. (+47) 22 41 60 77

Design/Layout:

X-IDE

Printed by/Trykkeri:

X-IDE - www.xide.no

A soldier in camouflage gear is shown aiming a shoulder-mounted launcher at a concrete wall. The launcher is a compact, shoulder-launched munition system. The soldier is wearing a helmet and gloves. The background is a concrete wall with some damage. The overall scene is in a military or combat environment.

TRUST WHAT YOU CARRY

WHATEVER THE MISSION

Nammo gives you the edge in any situation, in any environment. The Nammo M72 LAW combines decades of innovation and Nammo expertise to deliver a world-leading close combat weapon. Easy to operate, lightweight and powerful, this compact shoulder-launched munition offers precision and power in a single system, covering a range of different targets.

Nammo

SECURING THE FUTURE

B ØKONOMI
ÉCONOMIQUE

NORGE P.P. PORTO BETALT



Returadresse:

MilitærTeknikk,
Prinsens gate 22,
N-0157 OSLO
Norway



KONGSBERG

KONGSBERG

KONGSBERG creates and delivers high technology solutions for people that operate under very challenging conditions – on the oceans, in the deep subsea, in defence, in space.

**EXTREME
PERFORMANCE
FOR EXTREME
CONDITIONS**

www.kongsberg.com