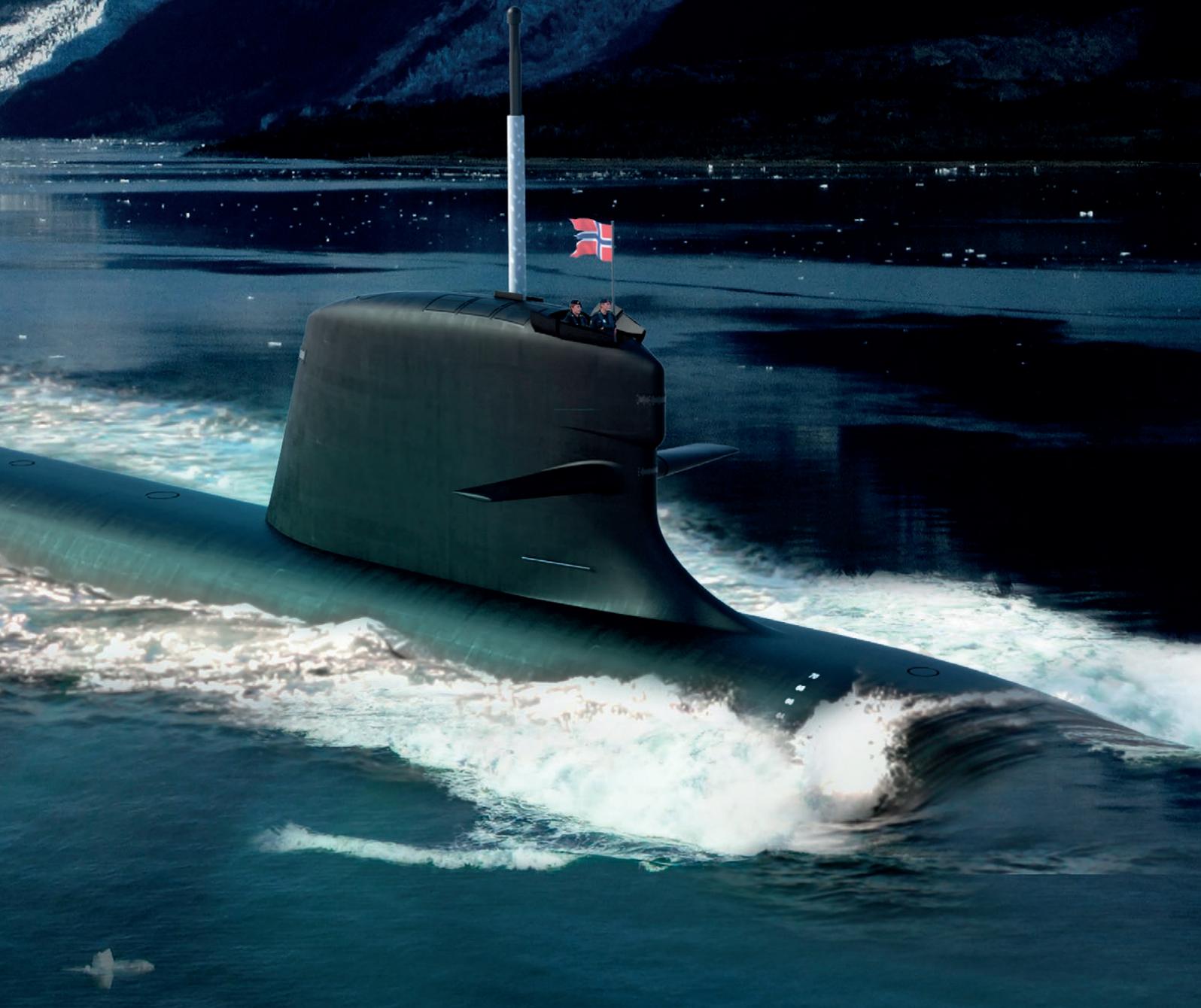


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NORWEGIAN DEFENCE AND
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FSi



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**SHIP CONTROL
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**FIRE CONTROL
SYSTEM**



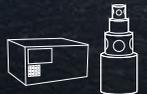
COMMS-ESM



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RADAR-ESM



CBRN



**MEDICAL CARE
SYSTEM**



**UNDERWATER
SYSTEMS**



USA; LESS DEPENDENT ON OIL IMPORTS, – LESS INTERESTED IN THE MIDDLE EAST?

With Donald Trump the president-elect of the United States of America, the question has been raised as to what will be the Middle East politics of the Trump administration.

So far, there has been no definite answer to that question.

In the decades after World War II, a steady Middle East oil export was crucial to the US economy, as well as the world economy. In the same era in time, the US Middle East policy was to keep the region as stable as possible, to make sure that the oil productions in the region is kept going.

But since 2005, the total US import of oil and gas has been reduced significantly. In addition to increased domestic US production, oil and gas production in Canada has grown significantly. Both in USA and Canada the increase in production is due to exploration of oil sand and shale gas recourses.

And even though the dream of US being energy independent seems to be a bit further into the future, the dream of North American energy independence is becoming more of a reality.

The Trump administration will certainly continue the US fight against global terrorism, and attack terrorist groups trying to establish free areas in the Middle East.

But keeping “old friends” in power, like the royal family of Saudi Arabia, is not that important to the US any more.

So when Donald Trump has declared “USA first”, and stated that Europe can no longer lean on US taxpayers and US soldiers for their military security, this might apply for several of the regimes in the Middle East as well. And without US engagement in the Middle East region, the collapse of regimes and states that we so far have seen in Libya, Syria and Iraq, is likely to be only the beginning.

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Art impression of a Norwegian Scorpene submarine under the northern light.

III. DCNS



PABAS

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FRENCH SUBMARINES FOR NORWAY?

The French shipbuilder DCNS is one of the candidates being considered for the supply of new submarines for Norway. The company has extensive experience from production of submarines, and prevailed in the competition to supply submarines for Australia.

According to Mr Hervé Guillou, Chairman and CEO for DCNS, the Norwegian submarine contract is very significant. The Norwegian decision in the choice of supplier is likely to have a bearing on both the Polish and the Dutch decision on new submarines, due to be made soon. – The way we see it, the winner of the Norwegian contract will be getting a significant grip on the submarine market in Northern Europe.

DCNS is the biggest maritime industry concern in Europe. This autumn, the company submitted its plans for industrial collaboration in the event that Norway should select DCNS as its supplier of submarines.

– We are offering a long-term relationship with Norwegian industry and the Norwegian Navy, says Guillou, adding that DCNS spends a full 10 % of its annual revenues on research and development. This opens up lots of possibilities for co-operation with a Norwegian industry that has developed a very high level of competence in its deliveries to the offshore, oil and gas sectors.

Is Scorpene the new Norwegian Submarine?

DCNS is offering a version of Scorpene, adapted to the Norwegian navy. The Scorpene class submarines have been provided to Chile (two units) and Malaysia (two units). It is currently under construction in the Indian Shipyard, MDL, through technology transfer (six units) and in Brazil (four units). The first Indian Scorpene, christened Kalvari, set afloat in October 2015, and is undergoing various sea trials at the moment.

– Even though DCNS is now making nuclear subs of the Barracuda class, we see no problems with building a series of smaller submarines like the Scorpene.

Up to about 80 % of the components found in a nuclear submarine will be the same in a conventional submarine. And DCNS has manufactured both conventional and nuclear submarines of various sizes for more than 100 years, says Xavier Mesnet of DCNS.

Navies around the world tend to wish that their submarines should be capable of “anything and everything”, but this just can’t be done. It is therefore essential to choose what properties are important now, as well as what will remain or become important for the future.

– In our view, there are several factors that a nation’s navy should consider when choosing a submarine, Mesnet continues. – Firstly, the navy should have a clear view of its operative requirements, – that is what tasks the submarines will be required to perform. For most navies, this will be a broad selection of tasks, ranging from fighting other submarines or surface vessels to intelligence and information gathering, serving as a platform for submerged launching of special forces, ROVs, sea mines et cetera. Further to this, we are seeing an increasing number of countries considering whether to give their submarines land attack capabilities. This entails equipping the submarines with missiles that can be fired from a submerged position against targets on land.

Compared to fighter-bomber aircraft, the submarine has an advantage with regard to attacks against land targets: The submarine can carry more and bigger missiles, which means that the missile can have longer range and a bigger or heavier warhead.

Navies usually have a clear concept of the main tasks of the submarine force in the near view, while it can be harder to know what the future may hold in terms of new or changing requirements. We

are therefore of the opinion that growth potential, i.e. the submarine’s ability to be adapted for future tasks and needs, should be an essential parameter when making a submarine choice.

The requirement of silent running while submerged is not all that hard to achieve; all modern diesel-electric submarines run very quietly, notably at fairly low speeds. But the way we see it, it is a very great advantage if the submarine is also capable of silent running at speeds of 7 to 10 knots.

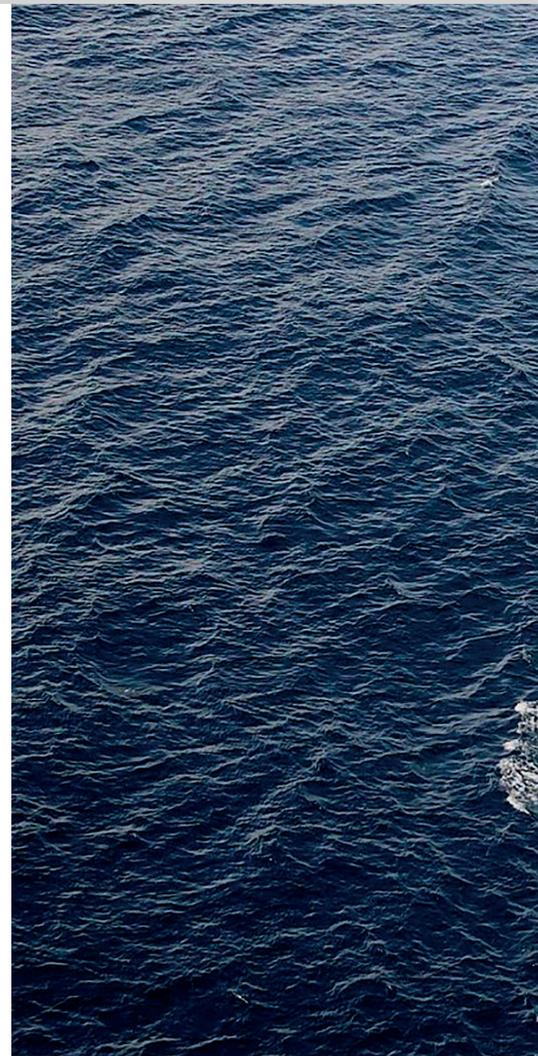
– From our standpoint, the submarine’s maximum speed while submerged is not all that important, but rather the highest speed where the sub can retain its silent running capabilities, says Mesnet.

Air independent propulsion: We skip a generation

DCNS is offering Norway the next generation of fuel cell based Air Independent Propulsion, AIP.

– In our view, the storing of large volumes of hydrogen on board a submarine is not an attractive proposition, Mesnet continues.

– Our AIP unit is based on the





A Scorpene submarine. French DCNS will offer Norway submarines based on the Scorpene design. DCNS recently won the contract for delivery of submarines to Australia, up against tough competition from the German ThyssenKrupp and a Japanese joint industry venture between Mitsubishi Heavy Industries and Kawasaki Heavy Industries. The Australian authorities mentioned better silent running properties as one feature that helped DCNS prevail against the rivals. Photo: DCNS

hydrogen being produced in tune with the fuel cells' need of the hydrogen gas. The basis for the hydrogen production on board is regular, commercial grade diesel fuel. The diesel advantage is its availability in every port in the world, be it military or civilian. This in stark contrast with methanol or ethanol for instance, both requiring dedicated tank and fuelling facilities on shore. And our process is based on regular commercial auto-diesel, as found in all modern countries. We do not require specially cleaned diesel, for example to prevent the creation of soot in the process.

– Our AIP unit is at this date not yet in operative use in any submarines”, admits Mesnet, while explaining that DCNS has been running a full-scale test unit in broad trials over many years, and confirms that their AIP technology is now mature and ready for operational submarine installation.

A shipyard with “Everything”

DCNS has today gathered all its submarine production into the shipyard in Cherbourg, on the French side of the English Channel, some 250 km (156 miles) east of Paris.

– DCNS has been a maker of submarines since 1899, and has since then built more than 107 submarines, says Mr. Alan Morvan, vice president of DCNS in Cherbourg, adding that the first nuclear submarine was finished in 1967.

DCNS has also gathered much of its research and development facilities in the field of submarine engineering into the shipyard at Cherbourg, which provides for a short physical distance between both development and production, and between the different development disciplines.

– In total, more than 500 engineers are employed here at the yard, Morvan continues.

The shipyard has at its disposal dedicated tanks for pressure testing of various components prior to their installation in the submarine. – Ours is probably one of the largest tanks for pressure testing submarine components in Europe, with the possible exceptions of what the Russians are doing.

– The yard furthermore comprises of tanks to test the properties of different steel grades in contact with saline water. Some of these tanks hold steel plates immersed in sea water for up to 20 years,

DCNS

▶ DCNS is the biggest maritime industry concern in Europe, with revenues in 2015 of more than 3 billion EUR, split half and half with one part in France, and the other half spread over 17 countries on all continents. DCNS employs about 13,000 persons.

so that we can know what steels are the best in the long term.

– Our own laboratories here at the yard are well equipped to perform chemical and various physical tests on the materials we produce, and to test components coming in from subcontractors. We have, for example, an electron microscope that we use to uncover weaknesses and flaws in welds, steel components et cetera.

– We also have a separate sound-proofed and acoustically damped research hall of several hundred square meters (several thousand square feet), a ceiling height pushing five meters (17 feet), with a vehicle access gate for bringing in large items. In here, we can perform controls on larger items with respect to noise, and develop components with the best noise cancelling properties possible.

– With our collaborating partners, we have among other innovations developed a type of cable that is softer and more pliable than standard cables for use in submarines. This may sound like not that much of a big deal, but we have found that stiff and hard cables develop and transport more noise than soft and flexible cables, such as when there are low-level vibrations in the submarine. Softer and more supple cables are also easier to work with, both when they are first installed, and when maintenance work is called for in the future.

3D Design

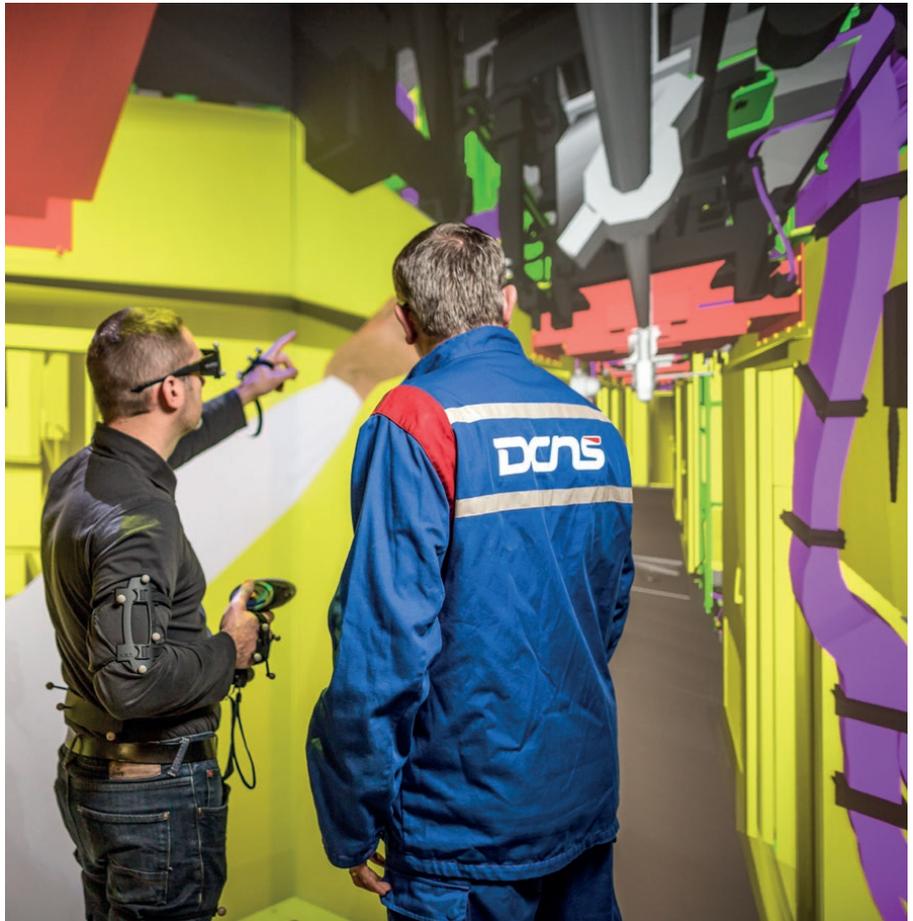
DCNS has developed a comprehensive computer-based tool for 3D design of submarine structures.

– There was a time when we built wooden boxed and scale models of different enclosures in the sub, Alan Morvan explains – but today, we are relying solely on the 3D tool.

– The 3D tool was originally used by the engineering team. In recent years, the production team too has seen the value of the 3D tool, such as for looking at interface connections when modules are joined. The same 3D tool also allows us, at an early stage of the design process, to test various aspects and areas of the submarine with respect to maintenance work. The 3D model lets us easily determine, for instance, whether a maintenance hatch can be opened easily, without other parts of the submarine needing to be disconnected, uncoupled or moved first. We can also introduce virtual persons into our 3D model, to find if they have the room they need to perform maintenance tasks through the hatch, if they risk injuries while performing tasks, or whether replacement components are easy to move in or out.

– We are even using the 3D model in training of personnel today. This means that both the submarine crew and maintenance personnel can get started with basic training before a new submarine is finished. The bonus this brings is that the time it takes to train the submarine crew and maintenance personnel upon delivery, can be cut back correspondingly. It can even mean that we who are designing the submarine can receive important feedback from the users, while still in the design phase.

– And this feedback is something we take very seriously indeed. All in all, we figure that some 75% of the recommendations and feedback we are getting, are taken into account, says Alan Morvan in conclusion. ■■



3D design. Extensive use of 3D design and modelling offers substantial advantages for the design and production teams, as well as for the training of future users and maintenance personnel. Photo: DCNS

LEAD ACID BATTERIES FOR THE NORWEGIAN SUBMARINES

Development is currently racing with regard to battery technology, and particularly regarding the development of Lithium-Ion batteries. The automobile industry and electric vehicles are strong forces driving this development forward.

It is clear that Lithium-Ion batteries offer a number of advantages, not least for submarine use, but at today's state of the technology, it is the opinion of DCNS that traditional lead acid batteries cannot yet be

replaced by Lithium-Ion batteries. This is primarily due to the safety on board, and to the fire hazard posed by Lithium-ion batteries.

– We are monitoring developments in batteries up close, and the subs we are building today, including the ones we are offering to Norway, will be designed for simple replacement of lead acid batteries with new technology at one point in the future, as soon as new battery technology is safe enough to be used under water, explains Hervé Guillou.

PUMP-JET PROPELLER

DCNS has developed a so-called pump jet propeller that is destined for the Barracuda class currently being built for the French Navy, and which is also planned for use on the Australian Barracuda submarines.

A pump-jet propeller is much less noisy than a regular open propeller. This is particularly challenging when speed is getting higher, and the propeller spins quickly. An enclosed propeller will at high speeds cause significantly less turbulence in the water, with less cavitations (forming of bubbles), for considerably more silent running.

– “If an enclosed propeller has a disadvantage, it would be that the open

propeller offers better manoeuvrability at low speeds. But we hold that this drawback is of minimal importance, in the light of the advantages brought by a pump-jet propeller,” says Hervé Guillou in closing.



A Barracuda class submarine with a pump-jet propeller
Ill. DCNS



The Norwegian SAR helicopters will be certified for a maximum take-off weight of 16,000 kgs. (Earlier versions were certified for a maximum take-off weight of 15,600 kgs). The picture shows one of the new Norwegian search and rescue helicopters taking off at a total weight of 16 tons during testing in Yeovil. Photo: Militärteknikk

NEW RESCUE HELICOPTER FOR NORWAY

The new Norwegian search and rescue helicopters have now entered production at the AgustaWestland (A Leonardo-Finmeccanica company) manufacturing plant in Yeovil, south-west England. The Norwegian helicopters will in all likelihood be the world's most modern SAR (Search and Rescue) platform.

The contract to supply Norway with its new search and rescue helicopters has been very important to us, says program manager Jon Clark. The contract is of a significant scope, comprising 16 AW101 helicopters and a 15-year agreement on support and training, as well as the establishing of a full scale simulator at the home base of the rescue services. The total contract value amounts to 1.15 billion Euro.

Furthermore, the contract contains an option for the supply of six more helicopters.

The new Norwegian SAR helicopters will have several newly developed sensors on board, making them probably the most modern and advanced SAR helicopters in the world, all of which gives us at AgustaWestland a firm

standing in the competition for future SAR helicopter deliveries, Clark continues.

The development of the EH 101 started in the early 1980's, and the helicopter took to the air for the first time in 1987. In 1998, the Royal Navy procured the EH 101 as a direct replacement for the Navy's ageing fleet of Sea King helicopters.

Today's current version of the helicopter, the AW 101, was introduced in 2009 with among other things a new airframe structure, increased engine power, new avionics suite and cockpit display system. Today there are more than 75 AW101 helicopters in service in maritime roles, and 62 of these are dedicated SAR helicopters.

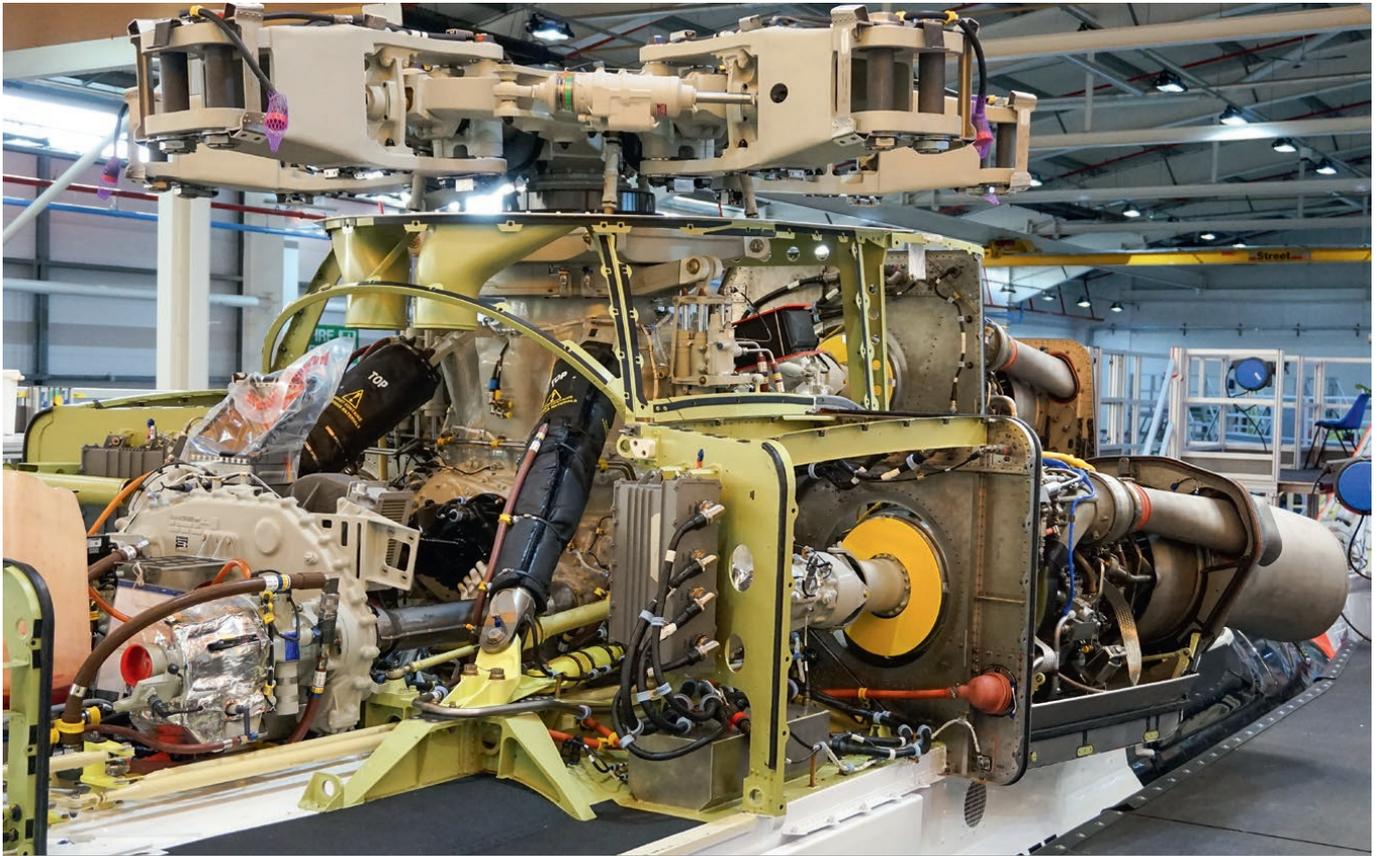
The basis for the new SAR helicopters for Norway is the AW 101-611 currently in use with the Italian air force for CSAR (Combat, Search and Rescue).

But the Norwegian helicopters have gained several new systems compared to the Italians. Most importantly, the console of the SAR operator has gained two additional displays, providing the rescue operator in the back of the helicopter with the option of getting information from the helicopter's mission system, such as digital maps and radar data showing the terrain around the helicopter as well as the location and the planned flight path of the aircraft.

Additionally, the Norwegian choppers will get an all-new digital automatic flight control system (CAFCS).

New Radar

In earlier versions of the AW101, the radar is located under the belly of the craft, in a cylindrical radar radome of some 4 feet 4 inches (130 cm) in diameter with a height of 16 inches (40 cm). This means that the underside of the helicopter is not quite flat, and this reduces the ground clearance. From the Norwegian viewpoint, a wish to avoid this placement was expressed, due to the foreseen possibility of having to land the Norwegian rescue aircraft in



Active vibration damping. The AW101 is equipped with an active vibration damping system. Through "counter vibrations" the vibrations from engine and rotor are lessened, improving the conditions for the on-board personnel, as well as reducing wear and tear on the helicopter and equipment. The principle corresponds in many ways to what is used in active noise cancelling in headsets, where 'opposite' sound is generated to cancel out environment noise. Photo: MilitärTeknikk

quite rough terrain, possibly also with the belly immersed in deep snow. Therefore, the Norwegian helicopters have gained an Osprey 30 ASEA (active electronically/ electrically scanned array) radar based on fixed panel arrays located integral with the aircraft fuselage – one antenna panel each side and one in front. Altogether, these radar panels are offering an area coverage of 360 degrees. The radar has significant surveillance capacity, while the ASEA technology also means that the radar can also be operated in Small Target mode, among others. The radar has very high resolution, and is particularly suited to operating in changing environments, such as found in coastal and littoral areas.

Mobile phone signal detector

The Norwegians early on expressed a wish that the helicopter should have the possibility to detect mobile telephones. A mobile phone, even when it is in an area with no cell coverage, will on a regular basis emit signals to see if there is a base station in the vicinity. The cell phone does this automatically, as long as it has power and is turned on.

On board the new rescue helicopters, there will be equipment that can pick up the signals sent out from mobile



The first helicopter is due to be delivered in the spring of 2017, and the final helicopter in this Norwegian delivery is scheduled for delivery in 2020. AgustaWestland on the other hand says it will be possible to advance the deliveries somewhat if this should be called for by the Norwegian authorities. Photo: AgustaWestland

telephones, even to recording the mobile number the signal is coming from. This allows the rescue crew to register if the mobile signal being received comes from the cell phone of the subject of the search, and not from any other cell phones that might be within the search area. It is likely that the helicopter will be able to pick up the mobile signal at a distance of 20 to 30 kilometres (12 to 20 miles), and pinpoint the location of the mobile with an accuracy

of 200 to 300 meters. Some mobile phones also software applications installed with the capability of transmitting GPS coordinates. If this function is activated, the cell phone can be homed in on with an accuracy of 2 to 3 meters (less than 10 feet). Setting up the system to search for a Norwegian-based cell phone can be done in just a few minutes. A foreign cell phone may take a little longer, depending on the 'home' country of the mobile phone. ■

DCNS. Your naval partner.



your naval power®

The DCNS logo is displayed in a stylized, blue, italicized font.



DCNS is the European leader in naval defence and a major player in marine renewable energy. The Group's success as an advanced technology company with global reach is built on meeting customer needs by deploying exceptional know-how, unique industrial resources and an ability to develop innovative strategic partnerships. DCNS designs and builds submarines and surface combatants, develops associated systems and infrastructure, and offers a full range of services to naval bases and shipyards. The Group has also expanded its focus into marine renewable energy. Aware of its corporate social responsibilities, DCNS is a member of the United Nations Global Compact. The DCNS Group generates annual revenues of €3.04 billion and employs 12,953 people (2015 data).





Test flight with Norwegian F-35. Norwegian electronics manufacturing company Kitron has been selected as sub-supplier for the F-35. Photo: Lockheed Martin

NORTHROP GRUMMAN AWARDS CONTRACTS TO KITRON

Kitron has been selected by Northrop Grumman Corporation as an international source for manufacturing of a sub-assembly for the F-35 Joint Strike Fighter. The potential value for Kitron is more than NOK 1 billion over the lifetime of the agreement, which runs until 2036.

The sub-assembly, called the Dual Channel Transmit/Receive (DCTR) module, is part of the CNI (Communications, Navigation and Identification) system developed by Northrop Grumman. It was won by Kitron in a best value competition.

The contract covers the initial steps of transferring technical knowhow and manufacturing prototypes for testing and validation. This process will be on-going through 2017. Kitron will then be awarded production contracts with deliveries starting in 2018.

“The F-35 program is crucial for Norway, adding significant defense capabilities and important for Kitron and the region since the long-term program secures substantial employment. Winning this

type of contract reflects Kitron’s position as a competitive and trusted partner,” said Hans Petter Thomassen, Managing Director of Kitron Norway.

In September 2015 Kitron announced a separate agreement to supply different subassembly electronic modules for F-35 aircraft avionics; that production continues.

Northrop Grumman’s integrated CNI suite provides F-35 pilots with the capability of more than 27 avionics functions including voice and data communication. The CNI design uses advanced software-defined radio technology that allows the simultaneous operation of multiple critical functions while greatly reducing size, weight and power demands on the advanced fighter aircraft.

Norway is one of the international partner countries participating in the F-35 program. Under a manufacturing license agreement between Kitron and Northrop Grumman, Kitron will manufacture sub-assemblies for the F-35 Joint Strike Fighter.

Lockheed Martin Awards Contract to Kitron for F-35 Work

Kitron has received a multimillion dollar contract from Lockheed Martin for production of Integrated Backplane Assembly (IBA) for the F-35 Low Rate Initial Production program, LRIP 11. Deliveries start this year and end in 2018.

The IBA is an advanced and complex high-level assembly.

Kitron is one of Scandinavia’s leading electronics manufacturing services companies for the Defence, Energy/Telecoms, Industry, Medical devices and Offshore/Marine sectors. The company is located in Norway, Sweden, Lithuania, Germany, China and the United States. Kitron had revenues of about NOK 1.95 billion in 2015 and has about 1 250 employees. ■■



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:

NYE UTFORDRINGER – NYE MULIGHETER?

Brexit, Trump, EUs nye handlingsplan for forsvar, landmaktstudie og en sikkerhetssituasjon i konstant endring. Sjelden har det hersket større usikkerhet om hvordan forsvarsmarkedet utvikler seg enn ved utgangen av 2016.

Sett fra industriens ståsted er det selvfølgelig positivt at det nå tilsynelatende er økende vilje, både nasjonalt og hos våre nærmeste allierte, til å satse mer på Forsvar og øke investeringene. Alt tyder på at markedet vil vokse de nærmeste år og det kan gi nye muligheter for norsk forsvarsindustri.

Det som imidlertid ikke er klart er hvordan de politiske endringene vi ser både i Europa og USA vil påvirke markedsforholdene og ikke minst norske bedrifters markedsadgang internasjonalt.

Europakommisjonen har akkurat presentert sin handlingsplan for europeisk forsvar. Planen er på mange områder lite konkret og legger opp til ytterligere utredninger og analyser. Bl.a. er planene for hvordan det såkalte "forsvars-

fondet", som president Juncker lanserte tidligere i år, skal realiseres høyst uklare. Det er lite realistisk at et nytt rammeverk for felles anskaffelsesprosjekter, som legger til grunn at medlemsstatene frivillig skal finansiere og gjennomføre prosjekter innenfor rammen av EU, slik kommisjonen skisserer, vil gi de ønskede resultatene. Særlig ettersom Storbritannia, som står for om lag 25% av EUs forsvarsutgifter, og som er helt sentral i mange europeiske samarbeidsprosjekter, er på vei ut av unionen. Det er imidlertid liten tvil om at forsvar for alvor er satt på kommisjonens agenda og det er all grunn til å forvente at vi vil se nye utspill fra Brussel i tiden som kommer.

På ett område er planen konkret. Kommisjonen legger opp til

å iverksette et program for forsvarsforskning (Preparatory action) med en ramme på 90 millioner Euro frem til 2020, med ambisjon om at unionens neste rammeprogram for forskning som starter opp i 2021 skal inneholde 500 millioner Euro pr år til forsvarsforskning. Norge er som eneste tredjeland berettiget til å delta i programmet fra starten av. Derfor blir det svært viktig at norsk forsvarsindustri kommer med i noen av de innledende prosjektene, slik at vi er posisjonert dersom det lykkes å få på plass et stort europeisk program for forsvarsforskning fra 2021. Det vil også vise at Norge har til hensikt å bidra til å sikre en europeisk forsvarsteknologisk og industriell base.

USA er det største og viktigste markedet for norsk forsvarsindustri. Amerikansk forsvarsindustri er avgjørende viktig som partner og kunde for norske forsvarsbedrifter. Fortsatt adgang til dette markedet og samarbeid med amerikanske industripartnere er helt avgjørende

for videre utvikling og vekst for forsvarsindustrien. Utgangspunktet er godt. Norge og norsk forsvarsindustri er en viktig partner i F-35 programmet og industrien har etablert seg i USA og skaper arbeidsplasser og verdier i USA. I tillegg er norsk forsvarsindustri en svært viktig leverandør av kritiske komponenter og nisjeprodukter til det amerikanske forsvaret. Nylig foreslo regjeringen å anskaffe nye maritime overvåkingsfly for mer enn 10 milliarder kroner fra USA. I lys av de forestående endringene i den amerikanske administrasjonen er det av stor viktighet at norske myndigheter fortsatt gir de bilaterale relasjonene med USA høyeste prioritet. Rammebetingelsene for samarbeid mellom Norge og USA på forsvarsmateriellområdet må videreutvikles og styrkes slik at forsvarsindustrien kan opprettholde og videreutvikle sin posisjon i det amerikanske markedet. Det er både i Forsvarets og industriens interesse.



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INNOVATION DAY 2016; WHAT KIND OF ARMY WILL WE BE LEADING?

The “Innovation Day 2016” seminar was held at the War Academy in Oslo, early in November this year. This year’s issue was entitled “What kind of Army will we be leading”. Next to the seminar, there was an exhibition stand where a number of businesses were presenting their products.

As one of the keynote speakers at the seminar, Norway’s former Chief of Defence, Mr Sverre Diesen spoke about the overall picture when it comes to the future of the army. To begin with, Diesen addressed the societal frameworks for both the army and the Norwegian Defence in general. – In recent years, expenses have risen sharply across several facets of society. Most particularly, health and social expenses have gone up a great deal, and with the expected wave of pensioners and increasing immigration, we have to assume that the strong growth in the health and social budgets will continue. This means it is hard to conceive of a great deal of funds left over for substantial increases in

defence budgets over the next few years. We must accordingly prepare for a continued need for tighter prioritisation of defence spending.

At the outset, I am seeing two conflict scenarios in our neighbourhood. The first and obvious one is that of Russia engaging in a major conflict with the West, which must be seen as not very conceivable, and this scenario should not bear on the dimensioning of our defences.

The other scenario is one of limited bilateral conflict where Russia uses restrained military force against a smaller nation like Norway, for instance to push through a political demand against the Norwegian government. This military force does not need to be over-

whelming – just strong enough for Norway to be unable to oppose it. Should such a situation arise, the task of the Norwegian defence will be to shape or sharpen the conflict to a point where the NATO and the USA feel obliged to respond in kind, if only to maintain the credibility of the alliance. This, in my view, should be the dimensionally influencing scenario for our defence.

Today, however, we are seeing that the Army is ill equipped to face such a scenario. Army units that are very much concentrated in inner Troms county and at Rena, will not have the possibility to proceed quickly to a limited conflict area, such as the Varanger peninsula in Finnmark. Such a movement will take several days, and even this given the prerequisite that the roads are intact.

Sebastian Langvad based his address on other threats than those presented by Diesen, and discussed development traits indicating that we must be prepared for unrest in many areas in the world over the years to

come. Among other aspects, Langvad pointed to the population growth, and access to fresh water, as elements contributing to the rise of conflicts in many parts of the world.

Building up a strong governmental force in troubled and exposed countries, where the state comprises the strongest armed force by far, will in many cases be a prerequisite for establishing peace between conflicted groups in the country. Contributing to the building of a governmental system will be a factor in preventing civil war and division, and may prevent international terror groups from gaining a foothold in the country. By extension, state building internationally will contribute to the safety of Norway.

We should accordingly keep a defence that is relevant both to the threats we see on our doorstep, and to international threats where we may be called upon to participate. This means keeping a military force capable of facing up to an untold variety of threats in the future, said Langvad in conclusion. ■■



Lieutenant Sebastian Langvad, researcher Halvor Ajer (FFI), former Inspector General for the Army, Robert Mood, and former Chief of Defence, Sverre Diesen, presented their views on the Norwegian Army of the future.
Photo: MilitærTeknikk



The Defence Research Establishment used the occasion to show the research vehicle OLAV (Offroad Light Autonomous Vehicle). In the future, OLAV units will be able to operate autonomously off-road, and find the best route to the target all by themselves, say Magnus Baksaas (left) and Lars Erik Olsen.

Photo: MilitærTeknikk



Audun Lundgren from Thales exhibited equipment for night observations, currently being offered to the defence.

Photo: MilitærTeknikk



IPAS supplies extra high-resolution radars, capable of discerning between birds and the smallest drones, says Richard Norland.

Photo: MilitærTeknikk



Techni is located at Borre in Vestfold county. The company is active in research and development in a number of different market niches, including defence. The image shows Robert Qvist presenting some of the company's defence products.

Photo: MilitærTeknikk

PROGRAM CONFERENCE: LAND, LOGISTICS, AND SOLDIER SYSTEMS 2016

The final program conference for this year was held halfway through November, at the Holmen Fjordhotell in Asker, just south-west of Oslo. Approximately 90 participants from industry, defence and the Ministry of Defence attended the conference, which was entitled Land, Logistics, and Soldier Systems.

The Defence Research Establishment (FFI) has concluded that the defence can realise annual savings of some 150 MNOK (17 MEUR) through the use of so-called off-the-shelf software. This presents us with enormous possibilities, explained Lt. Col. Nils Inge Træen in his opening statement.

Træen described the process used by the Defence in determining requirements for deliveries, and the way in which offers from providers are evaluated, also with respect to the degree of completion of the performance.

– It is essential to us to clarify whether the product we are being offered is fully developed, perhaps even delivered to and proven in service for other nations, or conversely – whether further development or adaptations to the product are needed before it will fulfil our requirements. If additional

development work is needed, we must know what this will cost, explained Træen, adding that whenever it is possible, we want to procure materiel that is already fully developed, preferably also in proven use, since this means much lower risk. All this is naturally dependent on the material fulfilling our basic minimum requirements.

Colonel Torgeir Dahl is responsible for Soldier Systems in the Norwegian Defence Material Agency (FMA), and gave the presentation of this area.

The Defence is foreseeing an expenditure of some 10 BNOK (1100 MEUR) for soldier systems spread over a few years, so we are talking about significant amounts of money.

– In our view, we must regard soldier systems as one unified system, the way we look at systems like armoured vehicles and similar, said Dahl in his opening.

The starting point for soldier

systems is that we are placing the soldier in the centre. Then, we look at what the soldier needs in terms of clothing and personal equipment. Our next step is to feature in the soldier's needs for weapons, ICT systems, and base gear such as sleeping bags, tents, etc.

The important challenge here is that altogether, these elements should function as parts of a cohesive system, and this system must be able to connect and collaborate with other systems such as vehicles, vessels, weapons etc.

– Holistic thinking is crucial in this respect. We cannot be procuring a product that has outstanding properties when seen in isolation, but which doesn't fit into the soldier system as a whole, explains Dahl in conclusion.

Success stories

Norwegian defence industry has developed a number of quite successful products over the years, and many of these products have given spin-offs that have formed the basis for civilian-market products as well.

Comrod has for more than 50 years manufactured and delivered antennas and masts to defence and civilian markets across the world, and has by way

of these deliveries developed a very high level of competence in the field of composite materials. Now, the company is targeting a whole new market. Norway and many other countries have a considerable number of electricity pylons in creosote-impregnated wood, now due for replacement. Comrod intends to offer pylon replacements in composite materials, and has built a facility of 2800m² capacity in order to manufacture these pylons.

– Our pylons will be much lighter than the existing issue, which makes them a great deal easier to fly in by helicopter to areas without road access, explains Arne Syversen from Comrod AS. The composite pylons do not conduct electricity, and can be installed in existing cable pathways without the need for power to be cut off. Furthermore, we have developed a very simple base for our composite pylons. We drill down a conical foundation in steel, providing a very stable foundation for the mast. Setting down the cones can be done with lightweight equipment, with no concrete casting or blasting. When the cone is in place, the pylon is slipped down onto the cone, in a process that takes two to three minutes, says Syversen in closing. ■



Arne Syversen of Comrod has high hopes for a brand new electrical power pylon that his company has developed. Photo: MilitærTeknikk

Lt. Col Nils Inge Træen and Colonel Torgeir Dahl from the FMA

Photo: MilitærTeknikk



BOGDAN: F-35 ON TRACK AFTER ROUGH TIME

The software problems are almost all solved and the life cycle cost is on track to be as low as the cost for the F-16, says General Bogdan, head of the F-35 Joint Program Office, in an exclusive interview.

By Andreas Krog

All software problems are almost solved on the F-35 Lightning II fighter jet and the total life cycle cost is coming down and will end up being on par with the F-16 life cycle cost. This was the key messages when Militær Teknikk met the head of the F-35 Joint Program Office General Chris Bogdan in Copenhagen in September when the Danish Defence and Logistics Organization (DALO) hosted the F-35 program's Joint Executive Steering Board (JESB) with representatives from all nine partner countries.

The general is very honest about the past. "We have had a very rough time in the development of software for this plane. It is a very smart aircraft with 8 million software code lines. This is probably 2-3 times more than any other plane in the world. It is very complicated and hard to develop it properly. And over the last year we have had some problems. No doubt about that," says general Chris Bogdan.

General Bogdan mentions some of the problems the program has faced.

"We have had problems with the radar turning off, with the screens turning off and the plane thinking there are several targets in the air when there is only one target. We have also had problems on the ground. We have had all the problems," admits the four-star general.

"We have fundamentally solved almost all software problems. US Air Force demanded that we solved all the problems before they could declare the aircraft combat ready. They declared it ready in August. So it should give an indication of the software fixes we have made," Bogdan underlines.

Fully developed aircraft in 2018

US Air Force and the US Marine Corps has declared the aircraft IOC (initial operations capability), but the aircraft will not be fully

developed before 2018. This is three years before Denmark receives its four first aircraft.

"When Denmark receives its first aircraft in 2021, all the capabilities that Denmark wishes for will be contained in the aircraft. A fully developed aircraft will be delivered to other countries in 2018," says Chris Bogdan. US Marine Corps, US Air Force, Australia, Israel, Japan and Norway has received their first aircraft.

Continuous updates

Discussions about the projects Follow-on Modernization Program was on the agenda at the JESB in Copenhagen. What new technologies shall be developed for the aircraft in the future, when should they be ready and how much will it cost? This was some of the topics at the two-day meeting at a conference center in Copenhagen.

The setup for the future modernization of the F-35 will be different than the setup in the past for F-16 with major midlife upgrades. The majority of Danish and Norwegian F-16 planes have undergone 5-6 midlife upgrades in the past 35 years. The countries' future F-35 aircraft will be updated differently.

"There will be the updates of the F-35 over its lifetime. We will continuously modernize the program and we will not do it with 10 or 20 year intervals. We will do it continuously through the life of the program," says Chris Bogdan.

Hardware upgrade in 2023

A modern fighter is more computer than an aircraft. The software development has challenged the project. But it also makes the future upgrades easier.

"It's easier today than it used to be to continuously modernize the aircraft. This is because the F-35 is very software intensive. You can change and modernize the software to get new skills. It is much easier than making hardware changes," Chris Bogdan explains.



Militær Teknikk met General Chris Bogdan, head of the F-35 Joint Program Office, in Copenhagen at the program's biannual Joint Executive Steering Board meeting
Photo: Lockheed Martin

The first hardware upgrade is actually planned in the near future.

"The first hardware upgrade, which takes place around the year 2023, will include new computers in the aircraft. There is no intention to change the structure, wings, undercarriage, fuel tanks, engine or stealth capabilities. But the inside technology of computers and screens quickly becomes better and better. Therefore, we will replace them in 2023 to get more software options and more opportunities to upgrade the aircraft," says the general.

A generation ahead

The development of the F-35 has taken many years and has been delayed again and again. For this reason, critics of the program have been worried that the F-35 will not be as superior to Russia's and China's stealth aircraft, anti-aircraft systems and radar technology as promised.

But according to General Bogdan there is no need to worry.

"We know that the technology inside this aircraft is leaps and bounds ahead of anything else in the world. It will take a long time and much technology to catch up with this plane. It does not mean that the Russians and Chinese do not try so hard they can to catch up with us. But what makes this aircraft special and creates

a gap between what we have and what they have, is the inside. And it will take them a long time to get where we are,” General Chris Bogdan underlines.

And on the outside the F-35’s stealth technology is a generation ahead of everyone else in the world, the general states. “We just have to make sure that we continue to have the lead and the advantage that we have. That’s why we want to continuously modernize the aircraft.”

Done differently next time

Critics have also argued that the idea of three aircraft in one has given a plane that is not very good at either one or the other thing.

Chris Bogdan admit that it should probably be done differently next time.

“If you were to start a joint program in the future, then you would probably find the things that may be similar. Everyone would work together to develop the capabilities, and then each customer would design their own unique aircraft structure.

The common cockpit and software would then be installed across the different customers’ aircraft. It will be a little difficult to manage, but it will probably create more efficiency and the customers will be a little more happy. Because when you have a common program, you will often have to go for the lowest common denominator,” General Chris Bogdan points out.

The F-35 is supposed to replace at least six aircraft. The conventional F-35A version shall replace aircraft like the F-16, A-10 and the Tornado. The short-takeoff-vertical-landing (STOVL) F-35B will replace the ageing Harriers used by UK and US Marines. And finally, over time, the F-35C carrier version will replace the F-18C/D Hornet and F-18E/F Super Hornet used by US Navy and Australia.

On par with F-16 cost

Over the years the major issue about F-35 have been the cost – production cost and lifecycle cost. According to General Bogdan the production cost is under control and going down.

“We have continuously driven down the price of the plane over the last five years. In 2019 we expect the F-35 to cost about 80-85 million dollars,” General Bogdan underlines.

Even though the total life cycle cost is still higher for F-35 than the F-16. But the general is optimistic. As a matter of fact, the higher life cycle cost makes him happy.

“F-35’s total life cycle costs are 12-15 percent higher than the F-16’s life cycle costs. It encourages me because I know that over the next 5-10 years we will invest in many, many projects to lower the F-35’s costs. As we receive more aircraft and learn to maintain them better, then the lifetime cost of the F-35 cannot do anything but go down. My promise to the F-35 partnership is that we will do everything we can to lower life cycle costs for the F-35 down to a point where it is on par with the cost of your F-16s. “

The lifetime cost includes the cost of buying, operating and maintaining the aircraft. ■■

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MILITARY SPIN-OFF FOR CIVILIAN AND GENERAL AVIATION AIRFIELDS

Advanced weapons technology from Kongsberg Defence Systems (Kongsberg) have found a civilian application in the optimisation of operational efficiency at fifteen small airfields in Northern Norway. From 2017, the air traffic will be controlled from a single central tower at Bodø Airport, rather than from individual towers at each airfield.

Text and photo: Tor Husby

The system operates under the designation of *Ninox Remote Tower System*. *Ninox* is the Latin name of an owl family. The first airfield to undergo the change is Røst, the wind-swept outermost island in the Lofoten archipelago. Following close are the airports at Mehavn, Berlevåg and several other of the more weather-exposed areas in Northern Norway. By the end of 2017, the centre in Bodø should be operational with the first remotely controlled airfield. The remainder of the 15 airfields will be rolled out in the period up to 2019.

All details

The technology builds on a swivelling camera capable of sufficient resolution to catch every detail that a human eye can

see at a distance of one kilometre (2/3 of a mile). This is reproduced in a 360 degree contiguous screen display. In addition, there is a powerful zoom feature to replace the mandatory and traditional binoculars. There is also an infra-red camera for night vision, a range finder and a signal lamp for pilots in distress situations. The air traffic controllers of today are rather less generously equipped.

- The tower in Bodø will have the same outlook as the local air traffic controllers in the old towers have. The ATCs in Bodø are monitoring traffic on a display covering the entire circumference of the horizon, while the new sensors are replacing the body in the tower. The infra-red camera at each small airfield constitute an important improvement. A further improvement is that digital information and a radar image is superimposed

on the tower visualisation in Bodø. And hey presto, the ATCs get a much clearer image of the situation on take-off and landing. One single air traffic controller can handle three small airfields at the same time. A further enhancement that can be expected is longer opening hours, which can be highly significant for the ambulance flights. New airfields building on the *Ninox* solutions can for the future escape the erecting of costly tower constructions. All in all, this will be a cheaper and more efficient way to operate, says General Manager Eirik Lie, acting head of Kongsberg Defence Systems, the primary supplier to the project.

Increasing benefits

- Avinor is looking at savings of some 30 per cent for each tower that is centralised in the first round, says Group Manager Dag Falk-Pedersen. He emphasises that the benefits will increase further if Avinor should include a further 10 to 20 other small airfields into this scheme, a move that is recommended by the Avinor board of directors. These airfields are located further south in Norway, in places like Røros, Haugesund, Molde, Rørvik, and so on.



Ninox Remote Tower System. The tower in Bodø will have the same outlook as the local air traffic controllers in the old towers have.

Ill. Kongsberg

Falk-Pedersen adds that Avinor has no intention of laying off the air traffic controllers, and is instead hoping they will join in the move to Bodø. The technical revolt will at the same time indicate the start of a new generation.

If Avinor had not gone in for new airfield technology now, chances are that Avinor would have been forced to close down some of the small airfields in the districts. Using the Kongsberg-based technology makes it possible to sustain the passenger air travel offering all round. The demise of the individual air control towers will not be representing any loss of security. On the contrary, a centralised tower in Bodø should raise the security levels.

Co-operation project

The Ninox technology, which has been under testing in Bodø for some time, is a co-operative project between Kongsberg, Avinor, and Indra Navia. The latter has provided the tower technology for some of the biggest airports in the world, while Kongsberg is leading the field within new solutions for sensors, visualisation, and secure data traffic over extended distances. Parts of the basis have been adopted from missile technology, air defence and weapons stations, some of which may be controlled remotely from inside armoured vehicles, for example.

The Avinor contract for the first fifteen small airfields is valued at 400 MNOK (44 MEUR) for Kongsberg Defence System, who is the primary contractor and supplier for the project. Avinor is the company's first customer for Ninox. Studies are in preparation regarding the market opportunities in Europe and the USA, where interest in Ninox has been expressed.

- Some countries are trying out a similar solution, but until today, the scope has been limited, says Director Eirik Lie. ■■



Acting Director Eirik Lie of Kongsberg Defence System holds high expectations for the Ninox technology in the future.

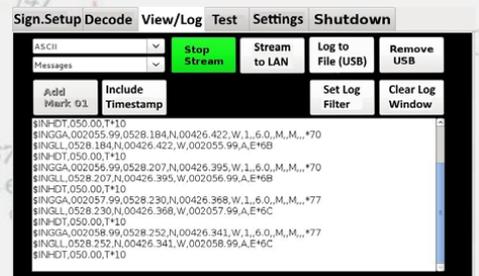
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– BULLETIN BOARD FOR DEFENCE, INDUSTRY AND TRADE –

France and UK form missile partnership

France and the UK have formed a partnership for missile technology development, under the Cross-Channel Centres of Excellence Strategy.

Franco-British defence company MBDA has been selected to develop missile technology in the UK and France.

The partnership includes the establishment of specialised centres of excellence for missile technology in MBDA's sites in Stevenage and Bolton, UK.

The new centres are

expected to support 400 skilled jobs at MBDA's UK sites.

The UK and France have committed to extending traditional interstate co-operation, by increasing the countries' military capabilities and competitiveness in exports.

Both countries recently launched the next phase of the £117m joint Franco-British Maritime Mine Counter Measures (MMCM) programme, in order to develop maritime mine warfare capabilities.

Two new Stan Patrol 4207 vessels to Jamaica

Damen Shipyard Group has been contracted by the Jamaica Defence Force (JDF) to deliver two new Stan Patrol 4207 vessels, as part of a fleet renewal programme.

To be renamed HMJS Cornwall and HMJS Middlesex, the two new vessels will replace the JDF Coast Guard Unit's three Damen-built County Class offshore patrol vessels, HMJS Cornwall, HMJS Middlesex and HMJS Surrey.

Damen is carrying out minor modifications on both of the vessels prior to finishing the outfitting process.

The 42.8m-long Stan Patrol 4207-designed vessels can accommodate 12 to 24 members and can operate at a speed of 30k.

The ships feature slender hull lines that facilitate better sea performance with low resistance.



A Stan Patrol 4207 vessel. In April the last of four Stan patrol 4207 vessels were delivered to Bahamas. Photo: Damen

First three AS565 MBe Panther to Indonesia

Airbus Helicopters has delivered the first three of the 11 AS565 MBe Panther helicopters to Indonesia.

This follows the contract signature in late 2014 with PT Dirgantara Indonesia for 11 AS565 MBe helicopters. The delivery of the remaining helicopters will run through to 2018.

Under the agreement, Airbus Helicopters will supply the AS565 MBe helicopters to its Indonesia industrial partner PT Dirgantara Indonesia, who will reassemble and outfit these rotorcraft in-country, acting as the design authority. This will notably cover the installation of the anti-submarine warfare

(ASW) suite which includes a dipping sonar and torpedo launch systems, allowing the Indonesian Navy to carry out its most demanding missions.

As a light/medium anti-submarine warfare platform, the AS565 MBe is equipped with two Safran Arriel 2N engines, which enhance the helicopter's performance in high and hot conditions, while enabling it to achieve a top speed of 165 kt and a range of 780 kilometres. It also boasts a new main gearbox, the latest-generation tail rotor and a 4-axis autopilot that reduces crew workload and makes the most demanding missions easier to perform.



AS565 MBe Panther

Photo: Airbus Helicopters

New Zealand plans to spend \$20bn on military

New Zealand Defence Minister Gerry Brownlee has set out the government's new plan to spend \$20bn on military capabilities by 2030.

Under the plan, the Royal New Zealand Air Force (RNZAF) will procure new transport aircraft to replace existing C-130 and B757 fleets.

The proposed investment will see the procurement of high mobility vehicles for the

Special Air Service and an ice-strengthened naval tanker.

The government will also spend on modern combat vessels to replace the Anzac frigates that are currently in service.

The government has also approved upgrades to the underwater surveillance capability of the P-3 Orion and has requested tenders for a littoral operations vessel.

Minesniper MkIII conducts neutralization of sea mines

Kongsberg Defence Systems' (KONGSBERG) latest generation One-Shot Mine Disposal Weapon System, the Minesniper MkIII, is a result of fifteen years of operational experience and continuous evolution. It represents the latest technology within countermeasures of sea mines. The Royal Norwegian Navy (RNoN) has played an active role in the development of the latest generation of the Minesniper System.

The Minesniper MkIII has demonstrated its capabilities in front of a professional audience. KONGSBERG and the RNoN conducted a successful operation which was concluded by firing two Minesniper MkIII weapons, one against a moored

mine and one against a bottom-laid mine.

The live firing took place outside Ramsund Naval Base in northern Norway as part of the Sea Acceptance Test for the system. A RNoN MCM Vessel arrived to the test range in the morning and conducted the successful test within the planned time slot. The vessel returned immediately to base after concluding the test, thus demonstrating the rapid and flexible nature of the Minesniper weapon. The successful test has approved Minesniper MkIII for NATO Service.

A Minesniper operation is typically conducted within a fifth of the operational time compared to the use of classic ROVs.



Minesniper being launched

Photo: Kongsberg

World's first drone-based explosive detection sensor

Laser Detect System (LDS) has launched the world's first drone-based explosive detection sensor, SpectroDrone, at the HLS & Cyber Expo in Tel Aviv, Israel.

Launched after extensive testing, SpectroDrone is capable of detecting explosives, improvised explosive devices (IEDs) and chemical compounds.

The new sensor employs LDS's laser-based explosive detection system, which can identify explosives and other hazardous materials from several metres away.

SpectroDrone was displayed on the high-capacity, multi-mission Airobotics Optimus drone at the exhibition.

SpectroDrone detects dangerous materials over an operational radius of up to 3km, and remotely analyses materials in real time.

The SpectroDrone payload can also be mounted on ground robots, such as LDS' SPHERE vehicle inspection systems, the company said in a statement.

Order for Simulators

Saab has received an order for new laser simulators from the Swedish Defence Materiel Administration (FMV). The order value is MSEK 95 and deliveries will be made during 2017.

The Swedish Army is upgrading and modernizing its training system to meet future

functional requirements on a national level. The upgrade entails that the Swedish Armed Forces will be able to utilize the international standard, which is used by other Nordic countries as well as several European NATO countries and the US Army in Europe.

Saab and Embraer Inaugurate the Gripen Design and Development Network in Brazil

Saab and Embraer Defense & Security have today inaugurated the Gripen Design and Development Network (GDDN) in Gavião Peixoto, in the state of São Paulo. The GDDN will be the hub for the Gripen NG technology development in Brazil for Saab and Embraer together with the Brazilian partner industries and institutions, AEL Sistemas, Atech, Akaer and the Brazilian Air Force, through its research department DCTA.

The GDDN includes the development environment and simulators required to undertake the fighter development work. In addition, the GDDN is connected to Saab in Sweden and the industrial partners in Brazil, securing both technology transfer and efficient development.

The GDDN facility is located at Embraer premises in Gavião Peixoto, where also the

Gripen Flight Test Center and the Gripen Final Assembly will be based.

Between 2019 and 2024, 36 Gripen NG fighters will be delivered to the Brazilian Air Force. To accomplish the deliveries Saab has a strong collaborative partnership with Brazilian industry, such as; Embraer, AEL Sistemas, Akaer, Atech, Mectron, Inbra, and Atmos.

Embraer will undertake a large share of work in the production and delivery of both the single and two-seat versions of the Gripen NG. The company will also be responsible for extensive work packages in systems development, integration, flight test, final assembly and aircraft deliveries. Furthermore, Embraer and Saab will be jointly responsible for the complete development of the two-seat version of the Gripen NG.



Roll out of Gripen E

Ill. Saab

Technica secures \$224m global communications contract from USAF

Technica has received a NETCENTS – 2 Network Operations Small Business task order from the US Air Force (USAF) to support global communications.

Valued at \$224m, the contract requires the company to manage all communications networks and information technology services for the USAF's 844th Communications Group and National Military Command Center (NMCC).

Under the contract, Technica will support the Air Force District of Washington's no-fail mission in support of the Office of the Secretary of Defense, Joint Chiefs of Staff, Headquarters Air Force, the Pentagon, Joint Base Andrews, Joint Base Anacostia-Bolling, and other USAF sites

within a 300 mile radius, plus Ottawa, Canada.

The contract covers mission-critical communications systems engineering; enhanced IT services; strategic planning; and innovation which includes planning and implementation of the Joint Information Environment enterprise initiatives; data centre and infrastructure consolidation, modernisation and customisation; and improving cyber posture and delivery of information for senior DoD leaders.

Technica will maintain, manage and integrate more than 600 systems that support the communications of more than 10,000 mission critical users in the AFNCR.

KC-390 military transport aircraft receives IFI certification

Embraer's KC-390 basic vehicle has received provisional type certificate from the Industrial Fostering and Coordination Institute (IFI), a Brazilian Air Force organisation that is responsible for military certification.

The certificate was awarded after IFI confirmed that the basic configuration of KC-390 is in line with the certification basis requirements.

Flight testing of the KC-390 has begun in October last year and is currently underway.

Equipped with a cargo handling system, the KC-390

aircraft can transport large-sized cargo such as pallets, vehicles, helicopters, in addition to troops, paratroopers, medevac stretcher or mixed configurations.

The aircraft is fitted with an, integrated avionic system and a fly-by-wire flight control and it can be used to perform medical evacuation, search and rescue, as well as fight forest wildfires, among other missions.

The KC-390 with ballistic protection can also be equipped with an advanced self-defence system.



Embraer KC-390 prototype

Photo: Embraer

First A400M for Spain

The Spanish Air Force has received the first A400M four-engine turboprop military transport aircraft from Airbus Defence and Space.

The delivery follows successful maiden flight of the airlifter in Spain on 5 September.

Spain will receive 27 A400Ms in total and will become the sixth nation to have the aircraft in service.

The first 14 aircraft will be delivered by the end of 2022, and the remaining 13 are scheduled for delivery from 2025 onwards, Airbus said in a statement.

Called MSN44, the aircraft will replace the ageing C-130 aircraft type currently in-service with Spain and can be used as

a tactical air-to-air tanker for other transport aircraft, including other A400Ms.

The A400M's four engines and advanced aerodynamic design will allow it to travel at jet-like speeds and at altitudes over intercontinental ranges.

It is designed to operate repeatedly from short and unprepared airstrips close to the scene of military action or humanitarian crisis, according to the company.

The Spanish A400M fleet will be based at Zaragoza in North East Spain and will represent the heavy-lift element of a transport force that includes the medium C295 and CN235, and light C212 aircraft.



The first Spanish A400M in flight.

Photo: Airbus

India's Rustom-II MALE UAV conducts maiden flight

India's indigenously developed Rustom-II (TAPAS 201) unmanned aerial vehicle (UAV) has successfully completed its maiden flight at Chitradurga Aeronautical Test Range near Bangalore, India.

The flight tested the aircraft's take-off, banking, level flight and landing capabilities.

The new medium-altitude long-endurance (MALE) UAV was developed by Aeronautical Development Establishment (ADE), a lab managed by the Defence Research and Development Organisation (DRDO).

Hindustan Aeronautics

Limited (HAL) and Bharat Electronics Limited (BEL) served as production partners for the project.

The multi-mission UAV is capable of transporting medium-range electro optic (MREO) and long-range electro optic (LREO) equipment, synthetic aperture radars (SAR), electronic intelligence (ELINT), communication intelligence (COMINT) and situational awareness payloads (SAP).

Indian armed forces will use the TAPAS 201 to perform intelligence, surveillance and reconnaissance (ISR) operations.

New Radio System for Sweden

Saab has received an order for multi-national training from the Swedish Defence Materiel Administration (FMV). The order value is MSEK 103 and deliveries will take place during 2017.

The order includes a new radio system that increases the Swedish Armed Forces' capabilities in training and simulation. The system provides the ability to conduct larger military maneuvers and interoperate with several armies

from other nations, such as the other Nordic countries and most NATO nations in Europe, as well as with the US Army in Europe.

The radio system transfers data to and from each individual soldier and vehicle to a training command centre where things such as positions and status for each simulator system are summarized for evaluation. The delivery includes mobile base stations and radio systems for vehicles and soldiers.



Ill. IAI Ltd.

EC135T2+ for Australian military training program

Airbus Helicopters has achieved Factory Acceptance of the last six of the EC135T2+ for the Helicopter Aircrew Training System (HATS) for the Australian Defence Force (ADF), completing on-time deliveries of the full fleet of 15 helicopters.

Under the JP9000 Phase 7 HATS project, a new joint helicopter training program for Navy and Army aircrew will utilise 15 EC135T2+ helicopters, along with flight simulators and a new flight-deck equipped sea-going training vessel. Boeing Defence Australia is the prime contractor for the new training system, partnered by Thales Australia who supplies the flight simulators and synthetic training devices.

The EC135T2+ is a consummate military training helicopter, offering a glass cockpit with high visibility, a multi-axis auto-pilot, the performance and safety of a twin-engine helicopter replacing current single types, plus other advanced technologies to help instructors perform training missions safely and provide the ADF with the flexibility to undertake additional missions. The H135 family is part of training systems in Germany, Switzerland, Spain and Japan, and has recently been selected in the United Kingdom.

Airbus Helicopters has delivered around 1,200 H135s to customers around the globe who have logged a total of more than four million flight hours.



EC135T2+ for Australia

Photo: Airbus Helicopters

Prevents Mid-Air Collisions with Civilian Aircraft

Israel Aerospace Industries (IAI) is pioneering military flight safety with the introduction of its Collision Warning System (CWS), an innovative, lifesaving solution designed to warn combat pilots in situations when potential collision with commercial and civilian aircraft is imminent

Extending the collision-warning functions of IAI's EHUD range-independent air-combat maneuvering instrumentation (ACMI), the CWS system can now monitor non-military platforms and warn of the proximity and risk of collision with commercial aircraft. Monitoring is performed through integration of IFF (Identification Friend/Foe) and ADS-B (Automatic Dependent Surveillance – Broadcast). Increasing congestion in civil air space poses a growing challenge to flight safety in general and specifically for military operations in proximity to, or within civilian airspace.

The CWS provides a complete air situational picture with warnings visible only to the military pilot – no indications are provided to civilian aircraft. Warnings are provided in three ways – a voice warning, graphical indication on a tablet panel and symbols presented on existing cockpit displays (MPD/

MFD). The CWS is embedded in existing or new EHUD/RAIDS/FRP systems, or carried as a stand-alone pod, which requires only a single interface unit, and thus requires only minimal integration into the aircraft.

By plotting existing and projected flight paths of all aircraft flying in the area, the system identifies potential collisions and warns the pilot in advance of such events. Among the data processed are the flight characteristics and maneuverability of each fighter jet, which are profoundly different from those of civilian aircraft. Warnings are therefore generated only when a clear and imminent danger exists.

IAI Ltd. is Israel's largest aerospace and defense company. Since 1953, the company has provided technology solutions to government and commercial customers worldwide including: satellites, missiles, weapon systems and munitions, unmanned and robotic systems, radars, C4ISR and more. IAI also designs and manufactures business jets and aerostructures, performs overhaul and maintenance on commercial aircraft and converts passenger aircraft to refueling and cargo configurations.

Rheinmetall wins simulation technology contract

Rheinmetall has received a contract from an undisclosed country in the Middle East-North African (MENA) region to modernise and expand an existing live training facility.

Valued at around 10m Euro, the contract requires the company to supply hardware and software components, such as Legatus live simulation technology, to upgrade the country's Mobile Combat Training Centre.

The deal also covers new laser engagement simulators to enable the use of the latest combat vehicles and weapons in the tactical training process, Rheinmetall said in a statement.

With these expanded capabilities, the centre will be able to train infantry units in mechanised formations.

Rheinmetall is supplying 2,000 new Legatus laser transmitter units to the German Army, as well as 1,500 accompanying soldier target sets with laser sensors.



Soldier with Legatus laser transmitter
Photo: Rheinmetall

Destroyer "Paul Ignatius" launched

Huntington Ingalls Industries' Ingalls Shipbuilding division has launched the US Navy's future Arleigh Burke-class (DDG 51) guided missile destroyer, Paul Ignatius (DDG 117).

Christened after the Secretary of the Navy from 1967 to 1969, Paul Ignatius (DDG 117) represents the 31st ship in the Arleigh Burke (DDG 51) class of destroyers that Ingalls is building for the US Navy.

The Arleigh Burke-class destroyers are multi-mission ships with anti-submarine, anti-

air and anti-surface capabilities and can perform a variety of operations ranging from peacetime presence and crisis management to sea control and power projection.

Equipped with a number of modern offensive and defensive weapons, the DDGs are capable of supporting carrier battle, surface action, and amphibious and replenishment groups.

The company is expected to begin construction on a new destroyer, Lenah H Sutcliffe Higbee (DDG 123), next year.



Paul Ignatius (DDG 117) during its launch. Photo: Huntington Ingalls Industries

Raytheon to provide almost 2,000 new jobs in Arizona

Raytheon is planning to hire almost 2,000 new employees in order to expand its business in Southern Arizona, US.

The new jobs will be added at Raytheon's Missile Systems'

business headquarters over the next five years.

Raytheon is currently employs 61,000 people and generated \$23bn in sales in 2015.

Sale of military aircraft to Qatar and Kuwait

The US Defense Security Cooperation Agency (DSCA) has notified Congress of a potential foreign military sale of F-15QA aircraft to Qatar for \$21.1bn and F/A-18E/F Super Hornet to Kuwait for \$10.1bn.

Under the sale, the Government of Qatar seeks to receive 72 F-15QA multi-role fighter aircraft and associated weapons package, while Kuwait has requested for 32 F/A-18Es, with F414-GE-400 engines; in addition to eight F/A-18Fs with F414-GE-400 engines.

Qatar also requested for continental US-based lead-in-fighter-training for the F-15QA, associated ground support, training materials, mission-critical resources and maintenance support equipment

In addition, the county asked for procurement for various weapon support and test equipment spares, technical publications, personnel training, as well as simulators and other training equipment.

It will also receive US Government and contractor en-

gineering, technical and logistics support services, and other related elements of logistical and programme support.

The sale to Kuwait includes 41 AN/APG-79 active electronically scanned array (AESA) radars; 44 M61A2 20mm gun systems; 45 AN/ALR-67(V)3 radar warning receivers; 240 LAU-127E/A guided missile launchers, and 45 AN/ALE-47 airborne countermeasures dispenser systems.

Kuwait also requested for ARC-210 radio (aircraft), identification friend or foe (IFF) systems, as well as aircraft spares, aircraft armament equipment (AAE), and other related systems.

The procurement will improve both countries' capability to meet current and future enemy air-to-air and air-to-ground threats.

Boeing will serve as prime contractor for the sale to Qatar, and Boeing, Northrop Grumman, Raytheon and General Electric are the prime contractors for the sale to Kuwait.



F/A-18F Super Hornet

Photo: US Navy

1-piece Light weight Pallets Net

Numerous Nations for many years have used the AmSafe Bridport (ASB) 1-piece Pallet Net as a modern alternative to the American Mil Specification 3-piece Pallet Net system. Recently the Norwegian Defence Logistic Organisation (NDLO) have made that same move, following the testing and certification of the AmSafe Bridport range of 1-piece Pallet Nets by the USAF ATTILA for use on; C-130, C-17, and C-5. The NDLO now have the ASB 1-piece Pallet Net in service. The NDLO use it on the Norwegian C-130j, but also the C-17 when they utilise the airlift capability provided by the NATO Airlift Management Programme out of Papa, Hungary.

The AmSafe Bridport 1-piece Pallet Net is also used by operators on their; C295,

CN235, A400M as well as the Chinook CH-47, and other similar fixed and rotary wing transport aircraft.



The AmSafe Bridport 1-piece Pallet Net offers several benefits compared other to other pallets net solutions; ease of use, quicker installation and removal of the pallet net on to the payload, logistics improvements with stocking of only one part, ability to secure irregular payloads with greater ease, potential to have a lighter weight pallet net, less moving parts so improved reliability and ease of repair when required.

\$536m F-22 services contract from USAF

Lockheed Martin has been awarded a \$536m contract modification by the US Air Force (USAF) to provide sustainment services on F-22 Raptor fighter aircraft.

Sustainment services will be provided as part of a performance-based logistics (PBL) contract providing weapon systems sustainment of the F-22 fleet at all operational bases for 2017, Lockheed said in a statement.

The 62ft-long, fifth-gene-

ration aircraft is capable of collecting and sharing tactical information with friendly assets, allowing the US and allied forces to engage targets with advanced battlespace awareness.

To date, the US has deployed F-22s to Asia and Europe to reinforce security commitments and bolster strategic partnerships with allies.

Currently, the F-22 Raptor aircraft are also deployed to the Middle East to support Operation Inherent Resolve.



Lockheed Martin to provide sustainment services on F-22 Raptor fighter aircraft. Photo: US Air Force

Patria invests in a new Airbus Flight Training Device

Patria has ordered from the Dutch manufacturer Multi Pilot Simulations an Airbus A320 Flight Training Device (A320 FNPT-II/MCC and FTD1). The device will be the first one of its kind to be installed in Finland.

Patria is the first training organisation in Finland to initiate pilot training according to the Multi-Crew Pilot License (MPL) program that integrates basic flight training to type rating training for the Airbus A320 fleet. The newly acquired device will enable the use of modern simulation technology in the training.

“MPL cadets will spend over half of their flight training time in Airbus cockpit environ-

ment and therefore will learn the systems of this modern airliner profoundly step by step. This device is a crucial tool to our MPL training,” says Mikko Paronen, Managing Director of Patria Pilot Training.

With the new device, Patria will be able to offer sophisticated Jet Operations training. Multi Crew Cooperation (MCC) training will also benefit from the real Airbus cockpit environment.

Patria will install the device initially in Helsinki. The final location will be at Tampere-Pirkkala Airport, where Patria’s training operations will relocate by early summer 2017.

Upgrade Orders for US Army Training Systems

Saab has received three orders from the U.S. Army Program Executive Office of Simulation, Training and Instrumentation (PEOSTRI). Saab will now provide OSAG 2.0 interoperability upgrades for the U.S. 7th ATC’s Deployable Instrumentation System – Europe (DISE) and the Combat Vehicle Tactical Engagement Simulation System (CVTESS) to meet U.S. Army and European forward deployment interoperability requirements.

These new orders, implemented as Mid-Life Service Upgrades, deliver a first of its kind fully interoperable solution to the customer. They will enable soldiers to quickly configure training system lasers to operate using either MILES Communication Code (MCC), primarily used in U.S. training environments or the OSAG 2.0 standard, used by most nations in Europe, for training engagements in any theatre and together with multinational units. OSAG 2.0 is a software code originally developed by Saab that enables true ballistic simu-

lation of ammunition used in anti-tank and vehicle weapons when firing with laser transmitters.

Originally delivered in 2001 for up to Battalion sized training, DISE provides deployable instrumented Live Training capability consisting of Tactical Engagement Simulation System lasers and detectors, exercise control (EXCON), battle tracking, data collection and rapid After Action Review (AAR) capability for Live Training events.

In addition to the OSAG 2.0 upgrade of the DISE infantry systems, Saab will also deliver OSAG 2.0 enabled CVTESS capability for the M1 Abrams Main Battle Tank, the Bradley Infantry Fighting Vehicle and brackets for OPFOR vehicles.

Saab has delivered similar Instrumentation Training and CVTESS systems around the world to U.S. Army CONUS and OCONUS locations for Home-station and Combat Training Center (CTC) warfighter readiness training, from Company to Brigade forces.

Upgrade the ULA-class submarines

Kongsberg Defence Systems has entered into agreement with the Norwegian Defence Materiel Agency (NDMA Naval Systems) to upgrade part of the main weapon system of the Norwegian ULA-class submarines. The contract value is 220 MNOK and will be delivered over four years.

KONGSBERG has supplied the Combat System to the

ULA-class and has conducted several upgrade programs over the last years which now also will include electronics and functionality for handling the submarines torpedoes. This upgrade program will contribute to keep the ULA-class operational until the New Generation Submarines are introduced.

New laser effector

MBDA Deutschland has successfully conducted tracking tests with its new high-energy laser effector under real environmental conditions for the first time.

Carried out at a military training facility on Germany's North Sea coast, the trials marked the next step in the system's progression from technology to product.

The trials were aimed to test the beam guidance and tracking system against a simulated engagement of preset airborne targets.

During the exercise, MBDA's laser effector used its laser target illuminator to scan and hold an aim point for an extended period on a quadcopter that served as an airborne target. The quadcopter performed different highly dynamic manoeuvres at a variety of ranges.

The system was capable of

tracking all the targets engaged in the trials, even in hostile weather conditions, including heavy rain and storms, as well as at night and in poor visibility scenarios.

In other experiments, such as a simulated defence against a swarming attack, the demonstrator showed the ability to rapidly switch between targets approaching from different directions.

Integrated into a standard container and equipped with a 360° beam guidance system, the effector features high-precision scalability of effect, with low logistics costs.

The system's advanced mirror optics is capable of using higher laser power levels and has been proven effective against a range of targets, such as rapidly manoeuvrable targets including mini-unmanned aerial vehicles.



Tracking tests with MBDA Germany's new laser effector.

Photo: MBDA

First P-8A for Australia

The Royal Australian Air Force's (RAAF) first P-8A Poseidon aircraft has arrived, it will be used to help Australia enhance its border and maritime security.

Built based on Boeing B737, the aircraft has been modified by adding latest maritime surveillance and attack capabilities.

The Australia Government has committed to procure 15 P-8A Poseidon aircraft in total, with 12 already contracted to be delivered by March 2020.

The P-8A Poseidon has been designed by the US Navy for use in anti-submarine warfare and it will work in collaboration with existing Australian Border Force assets to protect the nation's border.

Powered by two CFM56-7 engines, the aircraft can fly up to 41,000ft and travel up to 490k.

Designed for 25 years/25,000 hours in the harshest maritime flight regimes, including extended operations in icing environments, the P-8 can fly in all flight regimes and can self-deploy up to 4,500 miles from base without refueling, Boeing said in a statement.

The aircraft is capable of controlling unmanned air vehicles (level 2 control-receive) to extend sensor reach.

It can carry 30% more sonobuoys than any maritime patrol and reconnaissance aircraft currently flying, the statement said.



Australia's first P-8A Poseidon aircraft.

Photo: Australian Navy

Saab Acquires Nordic Defence Industries

Saab has acquired the Danish naval company Nordic Defence Industries (NDI). NDI, designs and manufactures mine disposal charge systems for the naval defence industry.

The acquisition of NDI, develops Saab's market leadership in the unmanned underwater domain when it comes to regional reach, technology and innovative solutions. This means customers can come to Saab for an end-to-end solution to meet their Mine Counter Measures (MCM) needs to detect, classify, identify and dispose maritime mines.

One of NDI's products is

DAMDIC, a mine disposal charge, carried to the mine by a remotely operated vehicle such as Saab's Double Eagle - the first choice for many navies when it comes to Mine Counter Measures.

The company will be integrated into Saab's business area Dynamics within its Underwater Systems business unit. The combination of Saab's experience and knowledge from the AUV/ROV (Autonomous Underwater Vehicle/Remotely Operated Vehicle) market and NDI's innovative mine disposal solutions will create a unique MCM house within Saab.

Anti-drone protection and neutralisation

Elbit Systems has expanded its Elisra's family of electronic warfare systems with the introduction of a new advanced anti-drone protection and neutralisation system, called ReDrone.

The move comes in response to the growing demand for affordable airspace protection against hostile drones.

The new ReDrone has the ability to detect, identify, track and neutralise different types of drones that are flown within a range of radio frequency communication protocols and it can also deal with a number of different drones simultaneously.

It can separate a drone's signals from its operator's remote control signals, as well as pinpoint both the drone and the operator's directions, according to the company.

Equipped with passive detection features, the system provides 360° perimeter protection and complete, up-to-the-minute situational awareness.

Upon detecting a target, the ReDrone system disrupts the drone's communication with its operator, blocks its radio and video signals and GPS positioning data, and sends it off track, preventing it from carrying out an attack.

The ReDrone's infrastructure is designed for easy and rapid installation in different application areas and terrains, and is suitable for operation in all weather conditions.

Its digital control unit, which is based on Android, features an easy-to-use, intuitive user interface.



*Elbit Systems ReDrone illustration
Photo: Elbit Systems*

CSL completes refit of Indian Navy's aircraft-carrier INS Vikramaditya

Cochin Shipyard Limited (CSL) has successfully completed the refit of the Indian Navy's aircraft carrier, INS Vikramaditya, one month ahead of schedule.

The aircraft carrier was drydocked in September this year at CSL to undergo repair work scheduled for 70 days.

CSL appointed IIT Chennai to conduct a detailed dock floor strength analysis to verify the feasibility of CSL dock to accommodate the vessel.

Commissioned into the Indian naval fleet in 2014, the short-takeoff arrested-recovery (STOVAR) aircraft carrier was procured from Russia for \$2.33bn.

Powered by eight new-generation steam boilers, the 44,500t carrier has a length of 284m, a 60m beam and can

operate at a speed of 32k, with a range of over 7,000nm.

The aircraft carrier is equipped with sensors and launch and recovery systems, eight SS-NX-26 Yakhont anti-ship cruise missiles, a new 130mm gun mount system and Medvedka-2 ASW, in addition to Hurricane medium-range air defence missile systems.



*Indian aircraft carrier INS Vikramaditya
Photo: Indian Navy*

New patrol ship for Lithuanian

The Lithuanian Navy is set to take delivery of a new Flyvefisken-class patrol ship, P15, from Denmark. In September 2016, the Lithuanian Armed Forces and the Danish Defence Acquisition and Logistics Organization (DALO) signed an agreement, under which Lithuania purchased the P15 vessel and two anti-submarine detection sonar systems for patrol ships for 6.5m Euro. The P15 patrol boat will be christened in January 2017. The P15 patrol boat will represent the fourth Flyvefisken-class or Standart Flex 300 type multirole ship in the Patrol Ships Division of the Lithuanian Naval Flotilla.

The first three ships of the division, Žemaitis (P11), Dzukas (P12) and Aukštaitis (P14) entered service with the Lithuanian Navy in 2008-2010.

Built by Danyard A/S Olborg, the 54m-long patrol boats have a displacement capacity of 450t, are propelled by two MTU diesel engines with three auxiliary engines, and can operate at a speed of 18k.

The patrol boats will be deployed for surveillance in the territorial waters and exclusive economic zone of the Republic of Lithuania and will be tasked to block trespassers, convoy, search-and-rescue operations and other missions.



The Lithuanian Navy's new P15 patrol boat purchased from Denmark. Photo: Lithuanian Navy/Vytautas Drejeris

Berger Bullets joins Nammo Group

Nammo is proud to announce that California based company Berger Bullets, a global leader in the manufacturing of premium rifle bullets, has joined the Nammo Group.

For over 60 years Berger Bullets has produced the highest quality rifle bullets for varmint hunting, target shooting, game hunting and tactical use. Berger Bullets' products have established many of the existing national and world records among the top precision oriented rifle shooting events.

Morten Brandtzæg, President and CEO of the Nammo Group says, "Having Berger Bullets on board is the perfect match for Nammo. Their products, which are complementary to our other premium brands, will strengthen our group's strategic position in the US commercial ammunition market."

Berger Bullets joins an existing family of premium Nammo commercial ammunition components and ammunitions brands – SK, Vihtavuori and Lapua. The addition of Berger Bullets to Nammo unifies

four brands that all share one common goal, which is producing the ultimate in precision performance. The four brands will continue to operate as unique brands servicing precision rifle shooters, while working together to enhance their collective offerings and services.

Eric Stecker, President of Berger Bullets said, "Supported by Nammo, Berger will continue to produce the highest quality rifle bullets in the world. Written words fail to describe how excited we are about the future of Berger Bullets and the growth of the other premium Nammo brands within the US market."

Berger Bullets will continue to operate as they have providing a leadership role in the sponsorship of significant shooting events for the discerning rifle shooter. Walt Berger and Bryan Litz, along with the rest of the existing Berger team, will continue on as part of Nammo's US growth plan going forward.

The completion of the acquisition will be subject to regulatory approvals by US governmental authorities.

Update of Fridtjof Nansen class frigates

Kongsberg Defence Systems has entered into agreement with the Norwegian Defence Material Agency (NDMA) to update the Combat Management System and the Active Sonar System of the Fridtjof Nansen class frigates. The contract value is 313 MNOK and will be delivered over four years.

KONGSBERG has supplied

the anti-surface and anti-submarine warfare systems based on KONGSBERG's Combat Management System architecture and integrated with the Aegis Combat System. KONGSBERG has conducted update and maintenance activities regularly since the class was introduced. This contract extends the life-time of the systems.



HNoMS Roald Amundsen is sailing through Ofotfjorden in northern Norway.
Photo: Johan Ludvig Holst/Forsvaret

Successful Firing of RBS15 by the Croatian Navy

Saab announces another successful customer live firing of the RBS15 surface-to-surface missile system. On 19 October the Croatian Navy fired an RBS15 missile from the RTOP-42 Dubrovnik fast attack craft during the military exercise HARPUN 16.

The military exercise HARPUN 16 is held in the waters of Dugi Otok and Žirje from 16 to 23 October, and is the main training event of the Croatian Navy this year and one of the main activities in the process of implementation of

the Navy's capability goals. On 19 October the Croatian Navy successfully fired one of their RBS15 missiles from the RTOP-42 Dubrovnik fast attack craft, as part of the exercise.

The HARPUN exercise is being conducted in order to increase the operational capabilities in planning and implementation of joint naval operations in a complex maritime environment, with the focus on the implementation of firing an anti-ship missile and maritime assault.



Firing of RBS15 by the Croatian Navy

Photo: Saab

Patria contract with Airbus

Patria has signed a contract with Airbus for the manufacture of Airbus A320 Vertical Tail Plane components. The agreement covers the re-industrialization activities and the manufacture of the A320 VTP Ribs during the life of the aircraft programme.

"These successful negotiations with Airbus demonstrate Patria's credibility and performance in ever-increasing global competition, especially in Airbus' best-selling A320 Family. Also Patria has invested

strategically in the Automated Tape Laying technology earlier this year in order to improve the portfolio of available composite processes," says Petri Hepola, Managing Director of Patria Aerostructures business unit.

Patria's Aerostructures business unit develops and manufactures composite structures for Airbus A380, A330 and A400M aircraft as well as for various Saab platforms and NH90 helicopter programme.

Rohde & Schwarz Military symposium

Every second year, for more than 10 years, Rohde & Schwarz Norway has arranged their Military symposium. This year's symposium was held in late October and gathered more than 35 guests from both the armed forces and civilian industry.

The overall purpose of this year's symposium was to present technology and development trends within fields of electronic warfare, like for example IT security, radar systems, electronic intelligence (ELINT) and communication jamming.

One of the speakers, Volker Max from Rohde & Schwarz presented some of the IT-megatrends that really are changing the world.

-Today more than 40% of the working population in the world has access to mobile internet, and more than 80% of US companies are entrusting key data to the Cloud, Max stated. This has created a "market" for cybercrime.

Since 1995 the numbers of "old fashion" bank robberies has shown an 80 % decline, while cybercrime has increased, and already in 2013 German Federal Police estimated cybercrime to be approximately at the same dimension as drug trafficking.

Another cyber threat is industrial, economic and government espionage. Within this field, state financed agencies are becoming more and more active.

The last threat, which probably everyone that uses a computer has been in touch with, is collateral damages due to cyber attacks. Most common is computer viruses, and it is estimated that within the DAX index companies listed on the German Stock exchange, there is a need of disinfection and reinstallation of more than 1000 computers every month.

The presented figures illustrate the importance of cyber security, both in the civilian and military domain.



At the symposium, Rohde & Schwarz also presented a number of their products. The photo displays dual use receivers and direction finders from Rohde & Schwarz.

Photo: Rohde & Schwarz

Field troubleshooting with new Serial Data Analyzer

Electronicon AS is presenting the newly developed Serial Data Analyzer *SDA605*; an all-in-one battery operated portable field and desktop tool. The *SDA605* is specially designed to assist in troubleshooting and analyzing of UART (Universal Asynchronous Receiver/Transmitter) based serial data transmitted via RS232, RS422 or RS485 interfaces. It is especially suited for analyzing NMEA 0182 data messages. It can be used with any type of UART based serial data protocols such as binary or ASCII based.

The *SDA605* is simple to use, and eliminates the need for a complex setup of multiple traditional test tools for testing of serial data interfaces.

Before this tool a typically setup would include computers, software terminal tools, interface adapters, oscilloscope and baudrate detectors. The *SDA605* as a single tool replaces the need for all additional tools to be able to fully analyze the interface.

SDA605 has a 7" touch screen as human machine interface. The unit is menu operated and data is presented in several optional windows.

Interface data can be presented as a data stream in either HEX or ASCII format or presented as a decoded signal.

In addition to interface data, in-depth analyses can be performed on the actual interface signal such as baudrate, data rate and voltage level. Data from these are presented with maximum, minimum and average/actual values.

There is also an oscilloscope display which can present the signal to show level and correct parity.

There are many available options for logging the serial data. Storage of logged data (standard text file format) can only be performed by connecting any type of USB

based storage device (Flash Drive). This design ensures that no sensitive data can be stored locally in the *SDA605* unit.

Logged data will be presented on the display, but the operator can also select to transmit live log data via a LAN connection or to a USB storage device. The operator can also select how the logged data is to be presented, such as adding marks for point of interest during logging, turn on/off timestamping and select what data to log (filter based on message types).

A previously logged data file can be retransmitted (Playback) via a RS422 interface at a selectable frequency and transmission setup, making the *SDA605* act as a simple simulator for almost any serial data source.

There are several NMEA message display and filtering features which makes it easy to find and verify specific logged data.

Additional features are a built-in calculator tool for quick calculations and a NMEA library for quick references are included in the standard model.

The *SDA605* standard model can be customized to additional features based upon customers' requirements. Typically needs for added features are interfaces using a binary coding. This type of binary data can typically be very difficult to analyze. It can also be hard to find specific data of interest in high data density interfaces.

The *SDA605* can be tailor made to display such interfaces as decoded data (readable format), create log files with decoded data (CSV text format files for easy review) and to filter data in order to ease the field engineer's ability to test, debug and verify interfaces.

The development of the *SDA605* is based upon long experience in debugging, testing and proving of serial



The new SDA 605 can for instance monitor and analyze the data stream from GPS or Gyro navigation sensors, or data from an AIS (Automatic Identification System) satellite or base station. The SDA605 is a tool for debugging and documentation of interfaces between different systems. The instrument has been developed by Norwegian company Electronicon, and with the SDA605 Electronicon aims for both military and civilian marked. Photo: Electronicon

interfaces. Trials and usage of almost any serial interface. In the test instrument has already addition, this is archived easily proven how easy it is to verify and quickly saving considerable and document the status of field engineering time.

Integrated Combat System for new Australian replenishment ships

Saab has signed a contract with Spanish shipbuilder Navantia for the delivery of an integrated combat system for the two new Royal Australian Navy replenishment ships. The contract value is SEK 226 million.

The integrated combat system includes procurement of combat system equipment including the helicopter control radar and decoy system. Saab will also provide combat system engineering services including system design, integration and integrated logistic support.

Saab will deliver an inte-

grated combat system based on the latest Saab 9LV Combat Management System. The Saab 9LV system is already in service with both the Anzac and Canberra Class ships and the selection of this capability for the two new replenishment ships further cements 9LV as the combat management system of choice for the Royal Australian Navy.

The majority of the combat system engineering work will be undertaken in Adelaide with installation and acceptance testing of equipment to be completed in Spain.



Illustration of one of the two the new Australian replenishment ships Ill. Navantia.

BOEING CONSIDERING TAKING DENMARK TO COURT

Boeing believes Denmark's selection of the F-35 was based upon a flawed evaluation process. The company is considering a legal challenge of the decision.

By **Andreas Krog**

In September Boeing took the first step toward bringing a formal legal challenge to the Danish Ministry of Defence's evaluation regarding the country's next fighter jet.

Boeing on September the 14th submitted to the Ministry of Defence a Request for Insight, which requires the Ministry to provide all materials related to the fighter procurement evaluation and down selection announced in June. The Ministry of Defence and its New Fighter Program Office did not recommend the Boeing F/A-18 Super Hornet for the politicians to down select. Instead they recommended Lockheed Martin's F-35A Lightning II (Joint Strike Fighter). This advice the Danish defence politicians followed.

Too much at stake

Boeing believes that the down selection was the product of a flawed evaluation process. "As we said when the decision was announced, we believe the Ministry's evaluation of the competitors was fundamentally flawed and inaccurately assessed the cost and capability of the F/A-18 Super

Hornet," said Debbie Rub, vice president and general manager, Boeing Global Strike.

"We're taking this step because there's too much at stake for Denmark and, potentially, other countries considering the Super Hornet."

Boeing is participating with the F/A-18 Super Hornet in fighter procurements in Belgium and Finland. Besides that, Canada is very close to announcing a competition in which the Super Hornet stands a good chance of winning since Canada is using the older F-18 Hornet today. A fourth competition is probably coming up in Switzerland soon.

It is therefore important for Boeing to signal that they do not agree with the Danish Ministry of Defence's estimates regarding total life cycle cost.

Cost twice as much

Boeing presented its concerns with the evaluation process to the Danish Parliament Defence Committee prior to the award decision earlier this year, taking particular issue with the Ministry's estimate that the Super Hornet would cost up to twice as much as detailed in U.S. Department of Defence budget documents.



Debbie Rub, vice president and general manager at Boeing Global Strike, believes Denmark's fighter jet evaluation was fundamentally flawed and inaccurately assessed the cost and capability of the F/A-18 Super Hornet. Photo: Boeing

"Denmark deserves to know beyond a shadow of doubt that a fair and transparent process was used to select the country's future fighter fleet," Rub said. "Our action underscores our belief that the Ministry's evaluation of each of the four selection criteria fell short of these objectives and must be reviewed to the fullest extent allowed under Danish law."

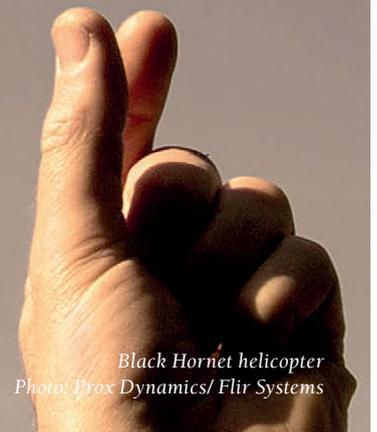
In the middle of November, Boeing had not yet received any material from the Danish Ministry of Defence. ■■

FLIR SYSTEMS ACQUIRES PROX DYNAMICS

FLIR Systems, Inc. announced today that it has acquired Prox Dynamics AS, a leading developer and manufacturer of nano-class unmanned aerial systems (UAS) for military and para-military intelligence, surveillance, and reconnaissance applications, for approximately \$134 million in cash.

Based in Oslo, Norway and founded in 2007 by pioneers in nano helicopter technologies, Prox Dynamics develops, manufactures, and distributes aerial sensors that are revolutionarily small, light, and covert surveillance systems. Prox Dynamics' Personal Reconnaissance System (PRS) features their Black Hornet aerial sensor and a hand controller, a system that is pocket sized and hand-launched by a soldier in the field, enabling a significant advantage in situational awareness and mission planning. The Black Hornet

aerial sensor utilizes FLIR's Lepton micro thermal camera, visible spectrum cameras, advanced low-power rotor technology, and proprietary software for flight control, stabilization, and communications. The Black Hornet helicopter is one of the lightest, stealthiest, and safest drones in the market, offering a highly advanced, lifesaving surveillance solution for traditional military forces and special operations forces. Weighing less than one ounce, the Black Hornet helicopter can fly for up to 25 minutes at line-of-sight distances of up to one mile. ■■



*Black Hornet helicopter
Photo: Prox Dynamics/Flir Systems*



The T-14 Armata main battle tank presented at the Victory day parade in Moscow this year

ARMOURED VEHICLE PROTECTION IS BECOMING A HOT TOPIC

Russia and Israel are the current leaders in the introduction of Active Protection Systems (APS) for armoured vehicles. During the war in south Lebanon a few years ago, the Israeli Army lost some 30 tanks, against no such losses in the Gaza war. Several western countries are in the process of getting APS, or considering it. A panel of researchers and officers were unanimous in concluding that Norway should be pursuing APS, during a seminar held in Oslo Military Society in October.

Text and photo: Tor Husby

The year of 2016 is also the 100th anniversary of the first entry of battle tanks on the Western front during the Great War, or WW1. The development of the new battle vehicle came on the initiative of Winston Churchill, and the armoured behemoths contributed a great deal to the eventual victory of the western

allied forces over the Axis Powers. Since then, it has been an ongoing race in the balancing of offensive against defensive properties: protection and fire power, thicker armour and more effective armour-piercing ammo, special armour and guided missiles, weight versus mobility. And now, the APS.

- But now, space is at a premium in the armoured vehicles. For APS to enter

the scene, something else has to leave. The problem is that the armoured vehicles are putting on ever more weight. The downside of this is that heavier battle vehicles will suffer from reduced mobility, said Øivind Heier, department director for Norwegian Defence Material Agency (NDMA). If the weight problem can be resolved through the introduction of APS, this would facilitate lighter vehicles and greater operational freedom. But we are finding it difficult to integrate the system on existing platforms.

Commercially available

Active Protection Systems have progressed from the prototype state to maturity, and elements are now available over-the-shelf. Still, investing in them is a costly business, and the development time is protracted for many types of protection solutions. This is driving the price skywards. The toughest



Photo: Vitaly V. Kuzmin/vitalykuzmin.net

challenges for an operative APS system will include frost and snow, mud and sand. The digital connection ranks up there too. When APS becomes commonplace, counter-measures will surely come to light as well.

Senior Researcher Arild Skjold, Norwegian Defence Research Establishment (FFI), emphasised that APS consists of three elements: **Sensor systems** to detect threats, **processors** to calculate the appropriate response and trigger the **counter-measure**, which will be either designed to destroy (hard kill) or jam (soft kill) the threat.

Colonel Tomas Beck of the Army Staff underscored that conflicts are settled on the ground. Victory or defeat will depend on the effectiveness of mechanised platforms, and these will in the near future have active protection. This is accordingly something Norway will have to explore. A key issue will be to stay abreast of developments, and make contacts with international partners.

- While upgrading to APS will be expensive, all indications are that it will be



From left, colonel Tomas Beck, Senior Researcher Arild Skjold from FFI and director Øivind Heier from NDMA.

prioritised. Russian missiles tend to have longer effective ranges than the NATO units. But with active protection of our armoured vehicles, we can approach closer to the enemy, said Col. Tomas Beck.

Israel is in the lead

Being surrounded by enemies as she is, and full of bitter experience from years of Arab wars, Israel has pushed the development of Active Protection the farthest. The US have woken up to the new possibilities after, among other things, studying the goings-on during the hostilities in the Ukraine. For a first try-out, the US Marines has cast their eyes on the Abrams tank in the role of guinea pig. It is even conceivable that the US might purchase an Israeli system as a first effort. Within the NATO alliance, some 4 or 5 countries are conducting tactical trials to narrow down the choice to the best of the AP systems. Some of these tests are being held at the Rena encampment. Colonel Beck is expecting all-new solutions to appear shortly after 2020. Before any procurement decision is made, it is crucial to decide precisely what is to be protected, and what units will be left without benefit of APS. In the Norwegian Army, the hot candidates include the Leopard, the CV-90, M113 and bridge-laying vehicles, alongside any other vehicles operating in the combat zone.

Russia's Armata battle tank

In 2015, the first of the new Armata class of armoured vehicles (T-14) entered service with the Russian Army. The Russian tank manufacturer Uralvagonzavod has been favoured with an order to supply 100 units of the Armata. The Russian Army is planning to procure in excess of 2300 units of the T-14, and enough material to equip 70 per cent of the tank forces with

the Armata. The manufacturer has the capability of making some 500 units each year. Russia is setting up a new motorist rifle division near Rostov, and it is likely that this will be equipped with Armata tanks. The first of the new Armatas have been shown to the public on the Red Square. It is more than likely that the West will be face to face with the Armata for a long time to come. It has been developed with a new design, and with room to grow over several decades.

The gross weight of the T-14 is 50 tons, compared to 70 tons for the Abrams and Challenger II; it comes with 900 mm armour, and is built in a new steel alloy that is supposed to be significantly stronger than ordinary steel. It is crewed by three soldiers, has an unmanned turret and a 125 mm cannon that is supposed to be the most powerful of its ilk in the world. Further to this, a 12,7 mm machine gun sits on top. All the weapons are controlled from the inside of the vehicle. The top speed is said to be more than 50 mph (80 kph). The explanation for the Armata being so much lighter than the American tanks is supposedly that the Russians have reduced the armour thickness, depending instead on APS of the Afganit type to knock out RPG's, missiles and sub-calibre projectiles.

The panel participants from Oslo Military Society Panel noted that they had observed five launcher pipes for APS on each side of the vehicle, with probable options of soft kill as well as hard kill. The Russians claim that they are able to knock out kinetic energy penetrators, for example APFSDS (Armour-Piercing Fin-Stabilized Discarding-Sabot) ammunition.

Some doubt was expressed regarding the number of Armata units that will enter service. ■■

HEAD-TO-HEAD WITH THE BIG PLAYERS

A small Danish company wants to challenge the major international radar manufacturers in the race for the sale of maritime radars to Denmark.

By Andreas Krog

Denmark has promised the other NATO countries to contribute to NATO's ballistic missile defence program with new radars on one or more frigates of the Iver Huitfeldt Class. Major international radar producers like Thales, Lockheed Martin and BAE Systems have indicated that they are interested in delivering radars to the Danes.

The small Danish company Weibel Scientific is ready to challenge the major players for the order. Weibel Scientific is the leading global producer and exporter of Doppler radars for use in space research, the aerospace industry, the defence and forensic-science sectors.

More detailed picture

Weibel believes the Doppler radar can give the Royal Danish Navy an advantage compared to other radars.

Peder R. Pedersen, CEO of Weibel Scientific, explains: "Doppler radars can provide a more detailed picture of the incoming ballistic missile and the surrounding debris. It will make it easier to identify exactly where the warhead is and hit it."

The CEO underlines Weibel Scientific's experience.

"For over fifty years, we have been designing, manufacturing, and delivering cutting-edge velocity and position measuring instruments based on continuous wave Doppler principles and the latest radar computer and software technologies, to customers around the world. On a daily basis, Weibel radars are used to protect lives on the ground, in flight, and in space," says Peder R. Pedersen.



Weibel Scientific is the world leader within Doppler radars.

Photo: Weibel

The company's radars have been securing safety for the astronauts on board NASA space shuttles and rockets since 2005. Over the years the company has invested more than 50 million dollars in research and development in Denmark. Weibel Scientific's headquarter has 90 employees and is located in Allerød, Denmark.

Dual strategy

However Weibel Scientific knows it can be hard to challenge the major producers with Weibel's own radar system, since it has not yet been used for detecting and tracking ballistic missiles. The company therefore has a dual strategy when it comes

to securing the order for one or more new radars to the Danish frigates. It will both offer its own Doppler radar-solution and participate with one of the major players.

In August 2015 Weibel Scientific therefore entered into a strategic partnership with Lockheed Martin. The purpose of the long-term strategic partnership is to integrate Weibel's radar technology with Lockheed Martin's missile defence systems. Together the two companies will further develop the radars Weibel has supplied to NASA, so they can be used for missile defence around the world, including Europe.

Through this cooperation, Weibel hopes to be lifted up into the absolute

world elite as a supplier of missile defence in the U.S. and Europe. The agreement is historic for Weibel and has potential to double the turnover for the company, within the next five years.

Double its turnover

With the partnership, Weibel expects to double its turnover within the next five years. In recent years, Weibel Scientific has invested considerably in insourcing the entire development and production in Allerød about 30 kilometers north of Copenhagen. This means the agreement with Lockheed Martin and the significant expansion of the market, will create new jobs in Denmark.

"The ground-breaking partnership is a milestone in Weibel Scientific's history, which will create business for more than DKK 2 billion, and has the potential of doubling our turnover, over the next five years. The partnership is the perfect example on an industrial cooperation, that boosts Danish business and creates new Danish jobs," says Peder R. Pedersen.

The cooperation will take place in Weibel Scientific's test- development and production facilities in Denmark and Lockheed Martin's ballistic missiles defence development centre, in Moorestown NJ, in the U.S.

Family stepped out

Weibel Scientific has been engaged in technology since 1936, when Marius Peter Weibel founded the Danish electronics company M. P. Weibel. In 1977, the Weibel family stepped out of the business, and Erik Tingleff Larsen founded Weibel Scientific, gradually moving from the production of optical detectors into the pioneering work with radar systems. The success of this venture allowed Weibel Scientific to expand beyond the Danish borders with the opening of Weibel GmbH in Germany in 1989 and Weibel Equipment Inc. in the U.S. in 1993.

From 1992, Erik Tingleff Larsen ran the privately owned, independent corporation jointly with current CEO and President Peder R. Pedersen. In 2002, Ped-



Peter R. Pedersen has been head of Weibel Scientific since 2002. Photo: Weibel

er R. Pedersen assumed sole responsibility for Weibel Scientific's day-to-day management, with Larsen remaining sole shareholder and chairman of the board. ■■

BRAZIL PLANS TO INVEST \$5BN IN GRIPEN

Brazil has revealed plans to invest nearly \$5bn in the Gripen NG project, which has already secured BRL1.5bn (\$413.2m) as part of the 2017 budget.

The project includes the procurement of 36 Gripen NG fighter aircraft to equip the Brazilian Air Force. Delivery of the aircraft will begin in 2019 and will continue throughout 2024.

Brazilian Defense Minister Raul Jungmann said: "The resources are guaranteed for the project to follow its schedule, which is going very well.

"The understanding of the Brazilian Air Force was that the best project for Brazil, for the defence of Brazil, was the Gripen. "Today, we can prove that, in fact we have taken the best option."

Saab and Embraer Defense & Security have recently inaugurated the Gripen Design and Development Network (GDDN) in Brazil.

The GDDN is the first in the 60 offset industrial, technological or commercial compensation projects valued at \$9bn.

Development, testing and verification projects, as well as the storage of support systems for the Gripen NG, will be carried out at GDDN.

Early next year, the GDDN is anticipated to receive half of the total of 300 engineers and technicians planned for when it is in full operation.

Brazil will send 350 engineers to Sweden by 2024. ■■

TECHNICAL DETAILS GRIPEN E

▲ Length over all:	15.2 meters
▲ Width over all:	8.6 meters
▲ Maximum take off weight:	16 500 kg
▲ Max thrust:	98 kN
▲ Hardpoints:	10
▲ Maximum speed:	Mach 2 (Supercruise)
▲ Combat turnaround air-to-air:	10 minutes



Art impression of a Brazilian Gripen.

Ill. Saab



A US Navy P-8 Poseidon dropping three Harpoon missiles.

Recently the UK Defence Secretary Michael Fallon and Norwegian Defence Minister Ine Eriksen Søreide announced a new cooperation on maritime patrol aircraft (MPA) and exercises. UK is planning to procure nine Boeing P8 Poseidon aircraft, to be based in Scotland.

Photo: US Navy

NORWAY IS LOOKING TO BUY FIVE NEW P-8A POSEIDON MARITIME PATROL AIRCRAFT

– To sustain a maritime surveillance capability that can meet the challenges of today and the near future, the Norwegian Government is suggesting the procurement of five P-8A Poseidon maritime patrol aircraft for the Air Force.

The P-8A Poseidon is a formidable platform for monitoring our ocean areas, and will provide both Norwegian and Allied, civilian and military authorities with a sound basis for decisions. With modern sensor equipment and weapons, the new Poseidon aircraft will continue and enhance this ability, says Minister of Defence, Ms Ine Eriksen Søreide.

In its work on the long-term plan for the defence, the Storting has joined in supporting the Government's proposal to procure new maritime patrol aircraft as replacements for the current fleet of six P-3 Orion and three DA-20 Falcon jets. In order to sustain and continue a Maritime Patrol Aircraft (MPA) and Intelligence, Surveillance, Reconnaissance (ISR) capability to meet the challenges of today and

the future, the Government has advanced its proposal to procure a fleet of five P-8A Poseidon aircraft for the Defence. Next to the aircraft themselves, the delivery will comprise modern sensors, surveillance systems, new anti-submarine weapons and support systems. The purchase will be made as an ordinary procurement from the United States authorities, with deliveries to Norway to be made in the period of 2021 to 2022. The suggested funding framework is up to MNOK 9825 (1230 MUSD), not including the purchase of equipment from the budget of the maritime intelligence services.

The maritime domain has always played a key role in the Norwegian security politics. Norwegian ocean interests are spread over a sea area seven times the

size of Norway, and distances are huge. Norwegian and adjacent ocean areas have gained increased security political importance, and there is little to suggest this importance will be lessened over the coming years.

– The new security-political picture places increasing demands on the situation perception and understanding in our own local sea areas. We therefore have a need to enhance our ability to handle the challenges we are meeting today, and those of the future. The introduction of five P-8A Poseidon aircraft in the period of 2021 to 2022 will ensure this, says Eriksen Søreide.

– The Norwegian maritime patrol aircraft have since around 1960 stood for a visible and regular military activity in the North, and this activity is a vital contribution to stability and our predictability. The P-8A Poseidon will therefore represent a continuation of a well-known and established pattern of operation. The continued pursuit of this activity, using aircraft under the Norwegian flag will contribute to the continued stability and calm predictability in the area, while serving the needs of our allies and ourselves, the Minister of Defence concludes. ■■

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2–3/2017	Int. operations	May 20th	June
4–5/2017	Protect./Mobility	September 15th	October
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