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*– the Scandinavian Military Magazine –*

6/2019



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## EUROPE NEEDS TO BOOST THEIR DEFENCE BUDGETS, REGARDLESS OF WHO WINS THIS FALL'S PRESIDENTIAL ELECTION IN THE USA

The Munich Security Conference 2020 held in February clearly showed that security policy has become much more of a challenge. Not least, the relations between the USA and the NATO countries in Europe have taken on a new order of complexity.

Virtually every POTUS since the 1970's has said that Europe needs to carry a greater part of the financial defence burden of the NATO alliance. And even though Donald Trump has "modernised" the diplomatic language to quite an extent, the key message remains the same.

That said, many of the European nations have demonstrated reluctance to achieve the NATO goal of defence budgets to the tune of 2 % of the gross national product by 2024. For some of the countries, it is evident that this target will not be met. It may seem that many are hoping that Trump will fail in his re-election campaign, for the situation to revert to "normal", i.e. "USA pays for the security of Europe."

But even if Trump is replaced, the demand for bigger European defence budgets will not be going away.

The USA has other factors than Europe and NATO to relate to. The USA is also committed to countries along the Pacific rim, such as Japan, South Korea, Taiwan and the Philippines, and in these areas, China is stepping up to become a very challenging military power. For year 2000 the Chinese GNP was 1181 bn USD, while the USA produced a GNP of 10,147 bn USD. For the year of 2018 the Chinese GNP had grown to 13,184 bn USD, while the USA had grown to a GNP of 20,562 bn USD. The figures show that while the American GNP just over doubled in the period, the Chinese GNP went up by a factor of 11 times. For comparison, Russia had a GNP for 2018 of some 1501 bn USD.

The numbers show that in the current climate, it is China, and not Russia, that has the fiscal strength to build a military force to challenge the USA. And both the Chinese economy and its military capacity is expected to keep growing over the years to come.

It is easy for Europe to dismiss China as being too far away. But today, the security of Europe is heavily dependent on the American armed forces. And while the US military capacities are massive, they are far from infinite. When the areas in the Eastern Pacific region demand a greater share of the military resources, the US will need to prioritise. And for Washington, the answer is simple: The US allies will need to contribute more. Not just because the US taxpayers are no longer willing to pay indefinitely for other nations' security, but also because the USA on its own simply does not have the resources to be the security guarantor both in Europe and around the Pacific the way the world is developing today.

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**Two German Air Force Eurofighter Typhoons** deploying decoy flares on a training mission over Northern Germany. Eurofighter is one of the candidates for Finland's new fighter.

Photo: Dr. Stefan Petersen, Luftwaffe / Eurofighter



# FIVE CONTENDERS FOR THE FINLAND'S NEXT FIGHTER

**Finland's HX fighter programme to replace the Finnish Air Force's F/A-18 C/D Hornet has entered its evaluation phase. Five contenders are in the competition, with the country set to evaluate entrants from Eurofighter, Boeing F/A-18 Super Hornet, Dassault Rafale, Lockheed Martin F-35A and Saab Gripen. The contract is expected to be awarded in late 2021.**

In 1992, the Finnish government placed an order for 64 McDonnell Douglas F/A-18 C/D Hornet fighters, and the aircraft entered Finnish service between in 1995 and 2000. Finland selected the Hornet to replace its ageing Saab Draken and MiG-21bis. As of today Finland's Air Force has 62 F-18 Hornets in its inventory, 55 F/A-18 C and 7 F/A-18 D. The F/A-18C is the single-seat variant and the F/A-18D is the two-seat variant.

The Finnish two-seaters were built in the United States by McDonnell Douglas, which later merged with Boeing, while the single-seat aircraft were assembled at the Patria Finavitec facility in Finland.

## The HX fighter program

Finland started its HX fighter program in 2015, to find a replacement for the ageing fleet of F/A-18 C/D Hornets. The Hornets are set to start being phased out from 2025

and onwards. The new fighters are planned to enter service as the old Hornets are phased out, and will be delivered through until 2030.

The exact number of new fighters is not yet settled, but the goal of the project is to replace the ageing fighter jet fleet with up to 64 multi-role fighter jets that meet the requirements of the operating environment. Finland's government set in October last year a 10 billion-euro budget for the acquisition.

The suppliers must put together a package that meets the performance requirements within the maximum budget set for the project. The package must include not only the aircraft, but also the other technical systems, training systems, necessary maintenance equipment, testing equipment and spare parts, as well as weapons, sensors and other type-specific support functions.

The supplier will be chosen based on five components: the military capabilities of the fighter jet, the security of supply, industrial co-operation, acquisition and life-cycle costs, and the security and defence policy ramifications of the acquisition. Of these five components, the military capabilities of the fighter will be the primary component of the evaluation.

## Five contenders

Following a Request for Information (RFI) sent to the UK, France, Sweden and the US, Finland now faces a choice between the Boeing Super Hornet, Dassault Rafale, Lockheed Martin F-35A, Saab Gripen and the Eurofighter Typhoon.

## Boeing Super Hornet

The Super Hornet can engage threats across air, land and sea, and is one of the world's most proven and affordable multi-role fighters.

As a Finland already operates the Hornet fighters, a large amount of infrastructure needed to support a fleet of Super Hornets is already in place. With many existing industry partners in Finland already up and running, it would be possible to perform assembly of the aircraft or components in the country.

Boeing offers Finland the latest Super Hornet version, the Block III Super Hornet. The Block III adds capability upgrades that include enhanced network capability and processor, longer range, reduced radar signature, advanced cockpit system, enhanced communications system, as well as the life of the airframe being extended from 6,000 hours to 10,000 hours.

In addition, Boeing also offers Finland the F/A-18 Growler, the electronic warfare version of the F/A-18.

## Dassault Rafale

In late January, two Rafale aircraft from the French Air Force arrived in Finland for its turn at evaluations in the cold.

The aircraft is the main fighter of the French Air Force and is also used by several foreign customers including India, Egypt and Qatar. The aircraft comes in a number of variants including a carrier



Boeing F/A-18 Super Hornet block III. The Block III adds capability upgrades that include enhanced network capability, longer range and reduced radar signature.

Ill. Boeing



Finnish F/A-18 Hornet Fighter (top) and a Swedish Gripen. The Finnish Hornets are set to being phased out from 2025 and onwards. Photo: Finland's Air Force

fighter. Finland has been offered the Rafale C aircraft; a twin-seater Rafale B is also available which can be used for training and more intensive missions.

According to Finnish media, Dassault has offered Finland the ability to operate the aircraft independently from France with the potential for the airframes to be assembled in the country if so desired.

### Lockheed Martin F-35A

Lockheed Martin describes the F-35A Joint Strike Fighter as the 'best choice for Finland' citing the fighter's advanced features and ever-decreasing price tag.

Lockheed Martin says that it will support Finnish security of supply for the fighter by establishing maintenance facilities in the country, and by maintaining an adequate level of 'materiel stock in country'.

Lockheed also touts the large international user base of the F-35 as a potential advantage of the fighter, increasing interoperability with several of Finland's allies both in Europe and across the world.

The company says use of the aircraft within Europe is a means to increase



According to Finnish media, Dassault has offered that the airframes can be assembled in Finland. The photo displays a French Rafale in Mali, 2013.

Photo: Capt. J Smith/ US Air Force

partnership opportunities and cost-sharing ability, which would also help to reduce through-life costs. The aircraft is set to operate long into this century, with its service life projected through to 2070.

### Saab Gripen

Saab points out that Gripen has been designed from the start for the challeng-

ing operations and threat scenarios very similar to those in Finland. It is built for road-base operations, harsh climate and easy maintenance by conscript mechanics.

A number of countries already use the Gripen, including Sweden, Hungary and the Czech Republic.

Saab is offering the E/F variant which features an advanced electronic

warfare package designed to detect threats before they locate the aircraft.

In addition to a substantial weapon and sensor package as well as the necessary equipment and associated services needed for operating the system, the offer to Finland includes the GlobalEye AEW&C system in which brings Finnish situational awareness to a whole new, strategic level.

The Saab offer includes transfer of maintenance, repair and overhaul capabilities to local industry, production of aircraft and an establishment of a Gripen and GlobalEye sustainment and development centre in Finland.

### Eurofighter Typhoon

Eurofighter has offered Finland the chance to join Europe's largest combat aircraft programme in an updated proposal to the HX fighter acquisition programme.

The proposal has been submitted by the UK Government with the support of the governments of Germany, Italy and Spain, the nations which are represented in the Eurofighter industry consortium.

There are close to 500 Eurofighters in Europe, and the fighter has demonstrated its capability to operate in the most difficult and demanding of conditions. Finland has been offered the Eurofighter Tranche 3.

By choosing Eurofighter, Finland will gain sovereign control of its defence capability and security of supply as well as a combat proven, swing-role aircraft which will form the backbone of European defence for decades to come.

### HX Challenge

The HX Challenge testing and evaluation event for HX fighter candidates has been held in Pirkkala/Tampere Air Force base in Finland this winter. The HX Challenge has been held so that each candidate's per-

formance can be verified under Finnish conditions and through tests designed in Finland. This procedure guarantees that the performance of each candidate's systems and aircraft can be evaluated fairly.

This way, it will be possible to assess the performance of the aircraft, systems

and sensors in the Finnish operating environment. The testing event will evaluate the multi-role fighters and their systems on the ground and in the air, and at take-off and landing. Each candidate got five working days to demonstrate its performance in Finland. ■■



*A Gripen E during the HX Challenge. The Swedish Saab Gripen is designed for operations under harsh winter conditions*  
 Photo: Saab/M. Hult



*A Norwegian F-35 fighter. Norway and Denmark have both chosen the F-35 from Lockheed Martin*  
 Photo Torbjørn Kjosvold/FMS

### POLAND TO PURCHASE 32 F-35 AIRCRAFT

The Polish Defence Ministry has signed the formal letter of offer and acceptance with the US Air Force (USAF) to purchase 32 Lockheed Martin F-35 Lightning II fighter jets.

The signing of the deal to purchase the F-35 fighter jets for \$4.6bn was confirmed by Defence Minister Mariusz Blaszczak last month.

Poland is the ninth member of the European F-35 User's Group, and the first in Eastern Europe to shift to the F-35. The other partici-

pating nations are the US, Belgium, Denmark, Israel, Italy, the Netherlands, Norway and the UK.

At present, the Polish Air Force operates a fleet of F-16 Fighting Falcons and legacy Mig-29s and Su-22s.

The F-35 will replace the legacy aircraft, giving the Air force interoperability with NATO allies.

### THE TEST PERIODS FOR THE AIRCRAFT WERE AS FOLLOWS

- ▶ **Eurofighter Typhoon:** 9 – 17 January 2020
- ▶ **Rafale:** 20 – 28 January 2020
- ▶ **Gripen:** 29 January – 6 February 2020
- ▶ **F-35:** 7 – 17 February 2020
- ▶ **F/A-18 Super Hornet:** 18 – 26 February 2020

The HX Programme does not publicly comment on the performance, test results, special characteristics or specific details of the candidates.

# NAMMO BELIEVES IN HYBRID ROCKET MOTORS

The missiles of the future will fly a lot faster than those of today. The headache is that both Russia and China are developing and testing new, long-range and faster missiles. To meet the challenge, the NATO nations are working on the development of counter-measures in the form of new missile systems, but they need something to practice against in order to test whether the new Western missiles are up to the task. Almost as if on cue, NAMMO is ready with the newly developed hybrid rocket Nucleus. Originally developed as a scientific probe rocket, it may in due course find its way into the Western arsenals.

By [Tor Husby](#)

For defence purposes as a military practice target, the NAMMO hybrid rocket motor technology is ideally suited, says Onno Verberne, VP for NAMMO Business Development Space, to Militær Teknikk.

The advantages of missiles and rockets using hybrid fuels is that one can pre-program how fast or how far they should fly. With a technical term, this is called thrust adjustment, something that is hard to accomplish with missiles on solid fuels, which have but a single setting. Using hybrid rocket motor technology makes it possible to equip the rocket with new functions that can be adapted to varying tasks.

## Nucleus flies

Hybrid rockets are still some way short of the market. However, the demonstration firing of Nucleus from the Andøya test centre in September 2018 represented an



At the launch of Nucleus from the Andøya test centre in September 2018.

important step forward. Nucleus, which is a single-stage rocket, reached an altitude of 107,4 kms. The border against space is the *von Karman*-line, located 100 kms above the Earth surface. This was not just the first rocket propelled by a Norwegian motor design to reach into space; it was also the first European hybrid rocket motor to do so for more than 50 years. The Nucleus firing was an unmitigated success, and it carried a scientific payload that was successfully deployed at the right altitude, which meant the task was completed.

Verberne adds: This means we have a fully new situation. At Andøya, NAMMO demonstrated that its hybrid rocket motor technology can compete on performance with solid fuel rockets, and can therefore replace these in scientific probe rockets and as a military target. The rocket engine design is completed, but there are still some improvements to the rocket vehicle design to be gained by refining some components that are somewhat over-dimensioned, and can be trimmed down to save weight. For today's version, an initial market has

already been identified as a military target and a scientific probe rocket. With the planned improvements, the price will also become more competitive.

**Hybrid joys are coming**

Mr. Verberne would like to see the NAMMO technology used in the development of tomorrow's missiles, while he is fully aware that there is still in general limited military interest in moving away from the well-known solid-fuel motor to the adoption of lesser-known hybrid missile technology. He is nevertheless a believer that there will be a great future for NAMMO's invention for tactical use. The Raufoss-based company is trying to persuade one of its strategic customers to finance a test firing of its hybrid motor on a tactical platform in order to prove this. But at any rate: If things proceed the way NAMMO wants, the company can start series production of hybrid rockets for scientific purposes and as a military target before long. His vision is to have the rocket production located in Norway. ■■



Onno Verberne is NAMMO's primus motor in the hybrid effort

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# NORWEGIAN DEFENCE AND SECURITY INDUSTRIES ASSOCIATION (FSi)

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## NORGE MÅ MED I DET EUROPEISKE FORSVARFONDET

**D**ersom Norge skal delta i europeisk forsvarsmateriellsamarbeid og norsk forsvarsindustri skal fortsette å være en del av den europeiske forsvarsindustrien, er det avgjørende at Norge deltar i det europeiske forsvarsfondet. Bli Norge ikke blir med, kan forsvarsindustriens posisjon i det europeiske markedet bli vesentlig svekket og våre muligheter til å delta i europeiske samarbeidsprosjekter forsvinne.

Regjeringen skal snart ta stilling til hvilke forskningsprogrammer i EU Norge skal delta i i perioden 2021-2027. EU legger opp til å sette av et betydelig beløp til det europeiske forsvarsfondet. Dette innebærer en satsning i EU på forsvar generelt og FOU på forsvarsteknologi spesielt. Det er en forutsetning at midlene som fondet skal bidra med kommer i tillegg til nasjonenes forsvarsbudsjetter slik at det blir en reell styrking av forsvaret i EU-nasjonene. Fondet vil dermed også bidra til de av EU-landene som er NATO medlemmer ytterligere nærmer seg NATOs mål om å bruke 2% av BNP på forsvar.

Etableringen av det europeiske forsvarsfondet er en realitet. Diskusjonen i EU dreier seg nå om størrelsen på fondet. Dette vil bli avklart i forbindelse med EUs langtidsbudsjett som vedtas til høsten. EU har bestemt at forordningen som etablerer fondet er EØS-relevant og legger til grunn at EØS-land skal kunne delta i fondet på tilnærmet samme betingelser som EUs medlemsland.

Det europeiske forsvarsmarkedet er viktig for forsvarsindustrien. Mer enn 30% av eksporten av forsvarsmateriell fra Norge går til EU. Det er bred politisk enighet om at eksporten av forsvarsmateriell fra Norge må økes dersom industrien skal kunne styrke og videreutvikle en nasjonal forsvarsindustri som er avgjørende for forsvarsevnen og som bidrar til verdiskapning, industriell utvikling og arbeidsplasser i hele landet. Å delta i EDF vil bidra til dette. En rapport utarbeidet av konsultantselskapet BDO på oppdrag fra Forsvarsdepartementet konkluderer med at norsk deltagelse i EDF vil være samfunnsøkonomisk lønnsomt. Dersom Norge

blir stående utenfor vil det vesentlig svekke vår posisjon i det europeiske markedet. Det vil være svært ødeleggende.

Virksomheter helt eller delvis kontrollert av forsvarslieferandører med hovedkvarter i Norge har om lag 5000 ansatte i EU. Disse virksomhetene omsetter for nærmere 1 mrd EUR pr. år. Dersom Norge ikke deltar i fondet er det også usikkert om, og i hvilken grad, disse virksomhetene kan delta i prosjekter som finansieres med midler fra det europeiske forsvarsfondet. Det kan ytterligere bidra til å svekke norsk forsvarsindustri.

Utvikling av nytt forsvarsmateriell er svært ressurskrevende. Selv de største europeiske nasjonene er ikke lengre i stand til å ta frem de mest avanserte og komplekse forsvarssystemene på egen hånd. I økende grad går utviklingen i retning av at stadig flere typer materiell og systemer utvikles i samarbeidsprosjekter. Innenfor det såkalte PESCO-samarbeidet, der de fleste medlemslandene i EU deltar, er det nå oppnådd enighet om til sammen 47 prosjekter der medlemsland har forpliktet seg

til å samarbeide om utvikling av nytt forsvarsmateriell. Dette er en klar indikasjon på at Europa er i ferd med å legge til rette for at utvikling av forsvarsmateriell i fremtiden vil foregå i samarbeidsprosjekter. Mange av disse prosjektene, som i betydelig grad er relevante for Norge og norsk forsvarsindustri, er aktuelle kandidater for finansiering fra fondet. Uten norsk deltagelse i EDF vil i praksis Norges muligheter til delta i disse prosjektene være svært begrenset. Det betyr også at mulighetene for å påvirke ytelser og krav til nytt materiell slik at det er best mulig egnet for Forsvarets behov blir svært små.

Norsk deltagelse i EDF er avgjørende for Norges muligheter til å forbli en del av det europeiske forsvarsmateriellsamarbeidet og for norsk forsvarsindustri fremtid som en del av en europeisk forsvarsindustri. Å delta i EDF er derfor en investering som gjør det mulig for Norge å delta med påvirkningsmuligheter i europeiske utviklingsprosjekter og det vil være avgjørende for norsk forsvarsindustri fremtidig adgang til det europeiske forsvarsmarkedet.



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# PROGRAM CONFERENCE LAND SYSTEMS

The Program Conference for Land Systems was held towards the late November last year. As for previous years, also the 2019 conference was well visited, with much the same number of visitors as the 2018 event.

**B**rigadier Morten Eggen reviewed the investment plans of the Army for the next few years. In the course of 2019, some 1.8 bnok has been invested in land systems, and the investments will increase steadily through the coming years. Among the bigger projects in the pipeline, Eggen noted battle vehicles, long-range firing systems, as well as UAV's.

And Eggen emphasised that time is of the essence; we need these capabilities right now. This presents us with two challenges, namely the sourcing of new materiel and the disposal of the materiel being phased out.

Eggen also noted that from the Armed Forces' point of view, it would be preferable to avoid the extensive mid-life updates to the materiel. We would to a greater extent go for several smaller updates, so that we can maintain the capacities at an even and high level throughout the lifespan of the materiel.

Brigadier Ivar Omsted of the Ministry of Defence used his address to pick up the issue of faster procurement processes during his presentation of a new investment model for the defence. The goal for the new model is to achieve more rapid decisions and to speed up the implementation process. Among other issues, the Chief of Defence will gain a greater and more clearly defined area of responsibility for future investments. It will also fall to the Chief of Defence to propose which investments are to be prioritised. The Ministry of

Defence will assume a more overseeing function, with the responsibility for strategic planning and follow-through.

– We have tested the new model by way of simulation exercises together with the Defence Research Establishment FFi, and we are expecting to implement the new model during 2020. I believe it is realistic to simplify the procurement processes, so we can make them run more smoothly and efficiently than today. We should accomplish this if all parties contribute, said Omsted in conclusion, while noting that the new investment model

should not cause major changes for the industry.

The Program Conference Land also let some industry companies give a presentation of themselves. One of the companies that did so was Augmenti AS, a small, Trondheim-based technology company. Augmenti is a developer of so-called AR (Argumented Reality) solutions. AR blends reality and virtual objects using advanced visualisation technology.

– There are many promising areas in the defence sphere where AR can and should be utilised. For one thing, we are working on the visualisation of information from the battlefield directly into the aim of the Protector weapons station currently used in the CV 90 armoured combat vehicles for the Army. AR will provide the vehicle crews with enhanced situational grasp, and thereby added fighting power and improved survivability, says the General Manager for Augmenti AS, Lars Inge Solhaug, adding that work is currently going on to test out what we have developed. We are doing this in collaboration

with among others the FFI, Kongsberg and BAE systems.

Even though what we can offer will be valuable to the users, we have also experienced how hard it can be for a small business to break through the barriers. Since our start-up in 2007, we have managed to secure some development funds, while our chief challenge has been to achieve financing for something the world has never yet seen, said Solhaug in conclusion. ■■



Brigadier Ivar Omsted from the Ministry of Defence presented the new investment model for the Armed Forces. Photo: MilitærTeknikk



The program conference also afforded some businesses the opportunity to show themselves off. From the left, Christian Aalborg of the NFM Group, Lars Inge Solhaug from Augmenti AS and Rune Johansen from Alfa Solution AS. Photo: MilitærTeknikk

# POLISH-NORWEGIAN DEFENCE INDUSTRY SEMINAR

For quite some time, Poland has been one of the NATO countries to show the greatest increase in their defence budgets. In December, the FSI joined forces with their counterparts in the defence administration of Poland to arrange a seminar on collaboration between Poland and Norway. More than 40 delegates came to the Oslo Military Society to gain extra insight into Polish defence policies, defence industry, and the opportunities for defence industry cooperation between Norway and Poland over the years to come.

As early as 2016, Poland achieved the expressed NATO target that the member nations should have a defence budget corresponding to 2 percent of the gross national product. But the growth of the Polish defence budget has continued steadily, and in 2020, the Polish defence budget will amount to about 2.1 percent of the GNP. By 2030, the defence budget is planned to reach 2.5 percent of the GNP, said Brigadier General Karol Dymanowski, Director of the Armament Policy Department in the Polish National Ministry of Defence. Dymanowski added that out of this budget, some 20 % is targeted at materiel investments, and at least 2.5 % will go to Research and Development.

The Polish Defence is also conducting a very extensive modernisation programme and is planning for the time leading

up to 2035 to spend no less than 135 billion USD on renewals and upgrading.

- The modernisation encompasses every part of the Polish armed forces, said Colonel Robert Frommholz, also from the Polish National Ministry of Defence, citing projects such as the procurement of F-35 fighter aircraft, battle helicopters, artillery modernising, missile defence, anti-armour weapons, upgrading of their Leo 2A4 main battle tanks, procurement of new battle tanks, patrol vessels, mine clearing vessels and submarines.

- Even though we are expecting to have a stable and relatively solid financing over the coming years, there is no denying that several of the projects in planning are both challenging and complex. On top of the requirements for the products to be delivered, there

are naturally demands of costs, delivery schedules and timing. Also, Frommholz adds, there will be a further requirement that Polish industry must be involved in the projects.

## Polish Defence Industry

Poland's defence industry consists of some 60 key businesses using a total of about 800 subcontractors, and the Polish defence industry offers a wide and sophisticated portfolio of services and products. The industry has seen considerable development over recent years, not least as far as exports are

concerned, and in 2018, the Polish export of defence products represented a value of some 487 million Euros. The most important export markets include the USA, EU, South America and the African countries south of the Sahara, with the most significant product areas including aviation technology, vehicles and protective equipment.

During the Polish-Norwegian seminar, both Norwegian and Polish businesses had the chance to present themselves. A total of 24 companies availed themselves of this opportunity. ■■



Brigadier General Karol Dymanowski (left) and Col. Robert Frommholz presented Poland's ambitious plans for the modernisation of the country's armed forces.  
Photo: MilitærTeknikk



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## DANISH-NORWEGIAN DEFENCE INDUSTRY SEMINAR MANY TIES JOIN NORWAY AND DENMARK TOGETHER

Towards the late January this year, the FSi in collaboration with its Danish sister organisation, the FAD, arranged a Danish-Norwegian Defence Industry Seminar. A total of close to 70 delegates had signalled their attendance, and 37 companies took the opportunity to offer a five-minute presentation of their business.

The seminar spanned over two days, with the seminar and business presentations on day one, and B2B meetings on day two.

The opening statement for the seminar was given by State Secretary Tone Skogen from the Norwegian Ministry of Defence, who started her address with emphasising the long-standing and close relations between Norway and Denmark. Skogen went on to note that both nations are in the middle of making huge investments in new materiel, and much of it of a similar nature. For one thing, both nations are procuring new F-35 stealth fighters. The State Secretary further underscored the need for a competent and

competitive defence industry in order to support the national security needs.

– In spring, the Government will be submitting a new long-term plan, and the basic premise for all work with the long term plan is that today's Defence is too weak to counter the expected security political developments in our closest regions. The Government will accordingly continue its work on strengthening the Armed Forces, said Skogen in conclusion, adding that one premise for the new long-term plan is to move further towards the two percent target.

The Managing Director of the FAD, Frank Bill said in his opening statement that even

though Norway and Denmark have a long history of defence co-operation, this event marks the first occasion of a Danish-Norwegian Defence Industry Seminar. Mr. Bill also pointed to the big NDIS 2020, to be held in the beginning of September this year. This is a huge conference and exhibition, for an expected attendance in excess of 250 exhibitors.

### Danish procurement plans

Brigadier Peter C Alexa of DALO, the Danish Ministry of Defence Acquisition and Logistics Organisation, opened his presentation with the expected development of the Danish defence budget. The budget for 2019 was 31.1 Bn DKK, which is about 1.35 percent of the Danish GNP. Budgets will grow over the coming years, and for 2023 the expectation is some 35.3 Bn DKK, an increase to 1.50 % of the Danish GNP.

– So, Denmark still has a way to go to achieve the two percent NATO target by 2024. What we will achieve, however, is the NATO goal of appropriating 20 % of the defence budget to materiel investments, Alexa concluded. – For 2019, the Danish defence spent some 5.3 Bn DKK on major materiel pro-

curements, corresponding to 17 % of the total defence budget. For 2023 our expectation is to spend 7.1 Bn DKK, which will then be 20.1 % of the total defence budget.

Among the major Army projects, Alexa mentioned the procurement of Armoured Personnel Carriers (Piranha 5) and the Leo 2A5 Main battle tank. Additionally, the Danish Army is looking to procure anti-aircraft missile systems and new cargo trucks. – The Danish Army is going through what is almost a total materiel renewal in almost every aspect, said Alexa in conclusion, noting also that such an extensive renewal program is naturally associated with challenges in areas like education and training of personnel.

On the Navy side, particularly the procurement of the Area Air Defence missile system stands out as one of the largest projects. Furthermore, the Danish Navy is engaged in the procurement of a Towed sonar Array anti-submarine warfare system.

For the Air Force, the procurement of the F-35 stealth fighters puts all other activities in the shade. Even so, Denmark is working on carrying out replacement of their Air Warning radars on Bornholm and in the Skagen area. ■■



Managing director of the FAD, Frank Bill (left) and Brigadier Peter C. Alexa of the Danish Ministry of Defence

Photo: MilitærTeknikk

### FAD;

the Danish Defence and Security Industries Association (Forsvars- og Aerospaceindustrien i Danmark)

FAD is the voice of the Danish defence, security and aerospace industry and the focal point concerning all matters related to defence and aerospace industry, nationally and internationally. FAD acts on behalf of the Danish defence and aerospace industry as a whole, and is the forum for networking, cooperation and coordination of the defence and aerospace industry in Denmark.

The FAD represents approximately 100 member companies.

## TECHNOLOGY DAYS WITH THE NAVY

# THE NORWEGIAN NAVY MEETS INDUSTRY

In January this year, the Norwegian Navy held a seminar where the theme was meeting with the industry. The seminar was held at the main Navy base of Haakonsværn, just south of Bergen.

These meetings between the industry and the end users have become very popular, both from the side of the Armed Forces and from the industry side. For the industry, great importance is given to meeting with the end users among the Armed Forces, and to be able to demonstrate the possibilities currently available on the market. The feedback from defence personnel clearly indicates that this activity is valued for the information it provides.

A total of 25 companies took the opportunity to present a stand during the Technology Days. Further to this, the companies were given the opportunity to present themselves during the seminar part.

Opening the Technology Days was the Chief of the Navy, Rear Admiral Nils Andreas Sten-

sønnes, whose initial statement addressed both the challenges and the opportunities that the technological development is causing for the Naval forces.

Admiral Stenstønes mentioned the development in unmanned vessels among several other issues. –It is no more than a few years since we were discussing the threat from hordes of UAV's, each carrying an explosive charge. At the time, we looked upon it as a future threat. Today, we have seen drone swarms being used in attacks against Russian military bases in Syria, as well as targeting oil installations in Saudi Arabia.

– At the same time, we have also seen the value of unmanned vehicles here at home. Following the fatal helicopter accident at Svalbard in the fall of 2017, when a Russian helicopter went

down at sea off Barentsburg, a search was launched using four surface vessels as well as a Hugin autonomous underwater vessel (AUV). – When the status was summed up for the search, we could see that the Hugin had searched 95 % of the search site. The four surface vessels on their side had only been able to search the remaining 5 % of the area. This clearly indicates the capacity that unmanned technology can provide, said Stenstønes, adding that with respect to the UAV capacity in the Navy, we will now be working to build up the Coastal Hunter command to be our UAV unit. – UAV's will provide the coastal hunters deployed along the coast with a significantly added capacity for gathering information. The UAV's will empower a Coastal Hunter group to monitor a much larger area than today.

Captain N Stein Nilsen focused on the development of the Navy over the times ahead, opening by stating that there is a trend towards a two-crew solution for several of the naval vessels. – We have kept two full crews for the frigate “Otto Sverdrup” for some time now, and the results have been very good. We are accordingly envisioning similar solutions for a few of the other vessels.

Among others, we are hoping to build up dual crews for the KNM “Maud” in the course of the year, adding that there have been a number of technical warranty issues with the “Maud”, but things appear to be coming towards a solution.

Nilsen also mentioned the tragic fate of the frigate “Helge Ingstad”, and discussed how the Navy is compensating for this loss.

The original plan called for the phasing out of the Skjold class coastal corvettes in 2025, but in the wake of the loss of Helge Ingstad, we will be extending the operation of the Skjold class quite a bit longer, perhaps until 2032, or even as far ahead as 2035.

When it comes to the mine clearing vessels, these will be phased out, to be replaced with autonomous mine clear-



Nammo presented some of the ramjet technology that the company is working on. The picture shows what a ramjet missile of the future might look like. From the left, Erland Ørbekk, Kai Fossumstuen and Frank A. Møller. Photo: Norwegian Navy

ing systems in the years towards 2028-29. The current number of vessels has been reduced from six to four.

Even the submarine fleet will be downsized over the times to come. We are cur-

rently running six subs of the Ula Class, and are expecting to reduce this number to four in the period of 2022 to 26.

The four new submarines we are now working to procure, are expected to be ready for

phasing in around the year of 2030.

Concluding, Nilsen noted the personnel side in the Armed forces. We can see that all the alternative recommendations in the Military Advice

of the Chief of Defence call for increased numbers of personnel. And regardless of which alternative becomes the new basis, increased manning will be important for us in the Navy, said Nilsen in conclusion. ■■



The exhibit was well visited by Navy personnel.

Photo: Norwegian Navy



Chief of the Navy, Rear Admiral Nils Andreas Stensones, took the time to visit the exhibitors at length. Here from the Eqpivnor exhibit. From the left, Rune Helmik Helgesen and Christian Aalborg.  
Photo: Norwegian Navy



Vestdavit was one of the exhibitors. Since 1975, the Bergen-based Vestdavit has supplied over 2000 davits and side and stern launch systems all over the world, says Martin Sundgot Hansen.  
Photo: Norwegian Navy



Gunnar Hellerslien from Rohde & Schwarz Norway. Rohde & Schwarz is a global supplier of information and communications technology products for professional use. The company was founded 80 years ago, and today the company has 12,000 employees in more than 70 countries.  
Photo: Norwegian Navy



Steinar Østby from Saab Technologies Norway AS. Saab has for many years been a major supplier to the Norwegian Navy.  
Photo: Norwegian Navy

**FSi SMB CORPORATE PRESENTATION:**



Alfa Solution AS is a leading provider and developer of comprehensive covering and preservation solutions. The covers from Alfa Solution are custom made and can be fitted to all kinds of equipment, from spare parts and handguns to heavy artillery or vehicles.

**T**oday Alfa Solution products are being used in the harshest environment, offshore and onshore, all over the world.

Alfa Solution has through many years collaborated with the Armed Forces and the defence industry on the development of covers for protection of various kinds of defence materiel, for both storage, transport and operational use.

**ProGARDO**

One of the main products from Alfa Solution is the patented ProGARDO covers. When the object is packed in this cover, a component called VCI+ vaporizes from within the fabric of the cover, creating a thin film of VCI+ on the metal surface of the object, to disrupt the electro-chemical reaction that causes corrosion.

By using the ProGARDO cover technology from Alfa Solution, corrosion can be

reduced by up to 95 %. In addition, the covers provide up to 100% UV protection.

**Shrink-wrap plastics**

Alfa Solution is also a major supplier of shrink-wrap plastics. Shrink wrap has numerous application areas within the armed forces and the defence industry. The shrink wrap is also provided with UV protection to prevent the degradation of the material, while also protecting products and equipment against sun bleaching. Shrink wrap may also be supplied with VCI+ for extra corrosion protection.

**Number of staff:** 6

**Owner:** Rune Johansen

**Loaction:** The city of Grimstad, located at the very southern tip of Norway

**FSi Membership:** Member of FSi since 2005

**Why member of FSi:** To attend the meeting place of the defence sector and contribute with our knowledge.



*Alfa Solution covers fits all kinds of equipment.*



*Alfa Solution offers covers that can reduces corrosion up to 95 %.*

# PROGRAMME CONFERENCE AIR

This year's programme conference Air was held at Holmen Fjordhotell in Asker, just south-west of Oslo. This year's conference was like before split into a seminar part and a speeddating event.

The slowness of the processes for procurements and innovation in the Armed Forces has been a huge challenge for a long time. FFI has established the ICE Worx, which is an innovation centre designed to stimulate better collaboration within the defence sector, while also developing more effective tools and processes.

Among the goals of the ICE Worx is to achieve a faster innovation route, says Peder Oscar Andersen from FFI/ ICE Worx. We have among other things cooperated with Air Station Rygge as the trials site for the base defences for the future. Here, we have deployed various sensors and placed them in a systematic grid to provide the watch and protection forces with new tools. The purpose is also to convey to the watch soldiers an enhanced situational awareness, without in-

creasing the operational stress, says Andersen, adding that the watch force is mainly composed of conscripts, making it a key factor that the sensors and systems we deploy require minimal training and are easy to use.

## NH 90 maintained by Kongsberg

As early as 2016, when Kongsberg purchased 49% of the shares in Patria, this was an element in the strategy for Kongsberg to strengthen its engagement in the aftermarket, which is to say particularly the operation and maintenance of the Armed Forces' systems. We later took over AIM Norway in 2019, and formed KAMS (Kongsberg Aviation Maintenance Services), opened Roar Bergqvist Larsen from the Kongsberg Defence and Aerospace.

– In December 2019 we signed a strategic agreement

with the Armed Forces to perform routine maintenance on the NH 90 helicopters. While this is naturally a new contract for us, we are already identifying new opportunities and challenges. For one thing, we have seen that to succeed in the aftermarket, we need to be located where the Armed Forces are. We are also seeing that the availability of resources is a limitation, not least when it comes to aircraft technicians. This is a common problem for us as well as the Armed Forces, so perhaps we should be looking into the possibilities of co-operation here, such as joint training and education, or the use of shared resources between us and the Armed Forces?

As of today, we do not have the answers to all the questions, but these are some of the matters we are working on today, explains Larsen in closing.

## UAV Collaboration

During the UAV seminar held by the FSI last autumn, the issue was raised that there were too many small units on the supplier side. The companies Radionor Communication AS, Robot Aviation AS, Maritime Robotics AS and Nordic Unmanned AS rose quickly to the challenge and formed the NUAS Alliance.

– Together, this conglomeration amounts to a leading group in the field of smaller UAV's in Europe, explains the General Manager for Nordic Unmanned AS, Knut Roar Wiik, adding that as far as unmanned technology is concerned, Norway is at the cutting edge internationally.

We are nonetheless seeing a number of issues that need to be resolved for the use of UAV's in a defence context, such as the current dependence of the UAV's on the GPS grid. Furthermore, there is currently limited availability of smaller UAV's containing no Chinese components, explains Wiik in closing. ■■



Roar Bergqvist Larsen from the Kongsberg Group.  
Photo: MilitærTeknikk



Peder Oscar Andersen from FFI presented the work being carried out at ICE Worx.

Photo: MilitærTeknikk



Representatives of the four businesses who have joined to form the NUAS Alliance (Norwegian Unmanned Aerial Systems Alliance):

From the left, Hanne Sjøvold Hansen from Radionor Communications, Knut Roar Wiik from Nordic Unmanned, Børre Larsen from Robot Aviation and Geir Olav Kjosnes from Maritime Robotics.

Photo: MilitærTeknikk

FSI-NIFRO;

# NORWEGIAN SPACE CAPACITIES

Norwegian space activities generate a turnover of some 8 BNOK, or 800 MEUR per year, and space will increase in both economic and security-political importance over the years to come. With this background, the FSi joined up with NIFRO to arrange a dedicated seminar on Norwegian Space Capacities in the beginning of February, attracting almost 140 announced participants.

The seminar was opened by State Secretary Marianne Hagen from the Ministry of Foreign Affairs, whose address started with a reminder that the Government has recently submitted a new Parliamentary Report on Norway's activities in space. The report has been drawn up jointly by the Ministry of Foreign Affairs.

– What is new in this report versus the previous space report is a stronger focus on Norwegian foreign interest and defence political aspects of Norwegian space policies, opened Hagen, adding that this bears witness that security and

defence are becoming a steadily more important driving force for developments concerning outer space.

Russia China, India and the USA have all established anti-satellite capacities that can neutralise objects in space. The outer space is to an increasing extent becoming an arena for exercising security policies, making it a domain of contention in a potential conflict.

– For Norway, the Northern regions are clearly vital to our foreign and security political interests, and capacities in these areas are therefore fundamental to the exercising of our space policies.

In conclusion, Hagen noted the recent decision of NATO that outer space should be regarded as an operational domain along the lines of land, sea, air, and cyber. And when space activities become a more pronounced part of the security and defence politics, the significance of the trans-Atlantic dimension increases as well, explained Hagen, noting that the USA is looking to take part in a satellite project for broadband in the Northern region. This project will enhance the allied ability to operate in the northern regions and establish Norway firmly as a central player for NATO in the North.

General Manager for NIFRO, Ms Mari Eldholm, angled her address from the importance that space technology is increasingly assuming. A recently published study indicated that the proportion of the US economy that is in one way or another dependent on space technology, corresponds to a value of about 5 trillion USD.

In many ways, space technology has therefore taken the step from "Nice to have" to "Must have".

And with this increasing importance comes the security-political aspects of space gaining importance as well. Few will be

surprised to learn that US and France have both established their own "space commands". Perhaps a bit more surprising is the fact that even Japan has established such a unit.

Eldholm emphasised the significance of Norwegian participation in international co-operative programmes, particularly within the EU, and Eldholm pointed especially to the ESA (European Space Agency). But we should be asking ourselves whether we are getting all our needs fulfilled through the EU collaboration, or whether we can achieve more in certain areas through the establishing of our own national space programmes. Experience has also shown that national programmes can be less bureaucratic, promoting faster developments. And this can contribute to making Norway a more sought-after co-operating partner internationally. ■■

## NIFRO

Norsk Industriforum for Romvirksomhet, NIFRO, was established in 1986 by a group of industry companies and research institutions. NIFRO is the organisation that manages Norwegian industry interests in space.



Managing Director for the Norwegian Space Centre, Christian Hauglie-Hanssen, presented studies that would estimate the global space economy at some 360 bn USD. Further to this, there are probably several space programmes that are not shown in this figure for security reasons.

At right, General Manager for NIFRO, Mari Eldholm

Photo: MilitærTeknikk



State secretary Marianne Hagen of the Foreign Ministry

Photo: MilitærTeknikk

# INFO ERFA 20



## INFO/ERFA 28.-29. april 2020

- Myndigheter og forsvarsindustriens årlige møteplass
- Nettverk og informasjonsdeling
- Konferanse og utstillingsmuligheter

### Sundvolden Hotel

Dronningveien 2, 3531 Krokkleiva

- 40 min fra Oslo
- 1 time og 10 min fra Gardermoen
- Gode kollektivforbindelser fra Oslo, Sandvika og Gardermoen

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- 1150 m<sup>2</sup>, 8 m under taket, 600 m<sup>2</sup> mingleareal
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## Velkommen

Mer informasjon på: [www.fsi.no](http://www.fsi.no)



# FSi

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## – BULLETIN BOARD FOR DEFENCE, INDUSTRY AND TRADE –

### AFRL's X-60A programme achieves key developmental milestone

The US Air Force Research Laboratory's (AFRL) X-60A hypersonic flight research vehicle has completed integrated vehicle propulsion system verification ground testing.

Development of the air-launched rocket is currently in progress with Generation Orbit Launch Services as part of an AFRL Small Business Innovation Research contract.

X-60A is a single-stage liquid rocket that uses liquid

oxygen and kerosene propellants. It can be launched from a modified business jet carrier aircraft.

Hypersonic technologies such as airbreathing propulsion, advanced materials and hypersonic vehicle subsystems can be tested using X-60A.

The main objective of the X-60A programme is to allow the US Air Force to mature technologies under hypersonic flight conditions.



An X-60A air-launched rocket during a hot-fire test at Cecil Spaceport in Jacksonville. Photo: USAF

### Turkey will make F-35 Parts far longer than anticipated

Turkey will continue making parts for the F-35 through 2020, at least a year and a half after the country was ejected from the Joint Strike Fighter program, according to Pentagon.

Defense leaders had hoped to find U.S. sources for all Turkish-made components by March, but have decided to allow prime contractor Lockheed Martin and engine-maker Pratt & Whitney to honor contractual obligations that will keep some parts arriving until year's end.

The majority of the supply chain will however be out of Turkey by March 2020, but

Lockheed Martin and Pratt have contracts in place that will perhaps carry out to the end of the year.

The Turkish parts are for six key components of the plane, including the jet's fuselage and landing gear. According to official sources the parts are already paid for.

### Remote Weapons Stations to Switzerland

Kongsberg Defence & Aerospace AS (KONGSBERG) has signed a contract with Armasuisse for delivery of the KONGSBERG PROTECTOR Remote Weapon Station (RWS) to the Swiss Army worth 230 MNOK.

Switzerland has been a PROTECTOR RWS user for

more than 10 years, and since first selecting the PROTECTOR RWS in 2007, Switzerland has procured additional RWS systems on several occasions. Switzerland has installed the RWS on a variety of platforms, including armoured vehicles and patrol boats.

### US Navy's Ford aircraft carrier starts testing

The US Navy's newest aircraft carrier USS Gerald R Ford (CVN 78) has started test and trials over the rest of fiscal 2020 off the East Coast.

As part of this, USS Gerald R Ford (CVN 78) departed its homeport of Norfolk to begin Aircraft Compatibility Testing (ACT) following the landing of the first aircraft, E-2D, on board.

During this period, at-sea testing of the Electromagnetic Aircraft Launch System (EMALS) and Advanced Arresting Gear (AAG) would be carried out.

EMALS, which is the launch system of choice for Ford and

all future Ford-class aircraft carriers, uses stored kinetic energy and solid-state electrical power conversion.

AAG is software-controlled and is a modular, integrated system that comprises energy absorbers, power conditioning equipment and digital controls. It provides increased safety margins and reduces the fatigue impact load on aircraft.

During the upcoming test phase, compatibility testing will include T-45 Goshawks, F/A-18 E/F Super Hornets, and E/A-18G Growlers and E-2D Advanced Hawkeyes and C-2A Greyhounds.



An F/A-18F Super Hornet approaches USS Gerald R. Ford. Photo: U.S. Navy/E. Hildebrandt



Hycopter hydrogen-electric UAS is the first of its kind drone, developed by HES Energy Systems. Photo: HES Energy Systems

## Hycopter Hydrogen-Electric UAV

Hycopter is a hydrogen-electric unmanned aerial vehicle (UAV) designed and developed by HES Energy Systems, a developer of hydrogen fuel cell technology for defence and commercial applications. It is the world's first hydrogen fuel cell-powered rotary-wing unmanned aircraft system.

Hycopter is intended for persistent reconnaissance and surveillance, as well as large-scale infrastructure inspections.

The vehicle requires two people for deployment and can be deployed within ten minutes. It has an optional feature of accommodating a parachute, which reduces the payload capacity by 550g.

The UAV can be operated in temperatures ranging between -5° and 45°. It can survive wind speeds up to 32km/h.

Navigation and real-time positioning for the Hycopter UAV is supported by the onboard

global positioning system (GPS).

Hycopter hydrogen-electric unmanned vehicle is equipped with a fuel-cell using hydrogen in a compressed gas-hydrogen cylinder. It comes with three different cylinders with 5l, 9l, or 12l storage capacities.

The nominal power of the fuel cell is 1,500W, while the Li-Po battery delivers a peak power of 4,000W for less than ten seconds.

The drone can continuously perform operations up to 3.5 hours at a speed of 56km/h. Its maximum ascent and descent speeds are 3.2m/s and 2.2m/s, respectively.

### SPECIFICATIONS

- ▶ **Wingspan:** 1,450mm
- ▶ **Maximum Take-Off Weight:** 15kg
- ▶ **Range:** 3km (line of sight)

## Remote Weapons Stations to Denmark

Kongsberg Defence & Aerospace AS (KONGSBERG) has signed a contract with the Danish



Denmark is the 23rd country to select a KONGSBERG PROTECTOR RWS. Photo: Kongsberg

Ministry of Defence Acquisition and Logistics Organisation (DALO) for delivery of the KONGSBERG PROTECTOR Remote Weapon Station (RWS) to the Danish Army worth 270 MNOK.

The system will be integrated on Denmark's new fleet of Piranha V 8x8 vehicles. The contract was won in an international competitive bidding process.

## Report on Australian Submarine Program

The Australian National Audit Office (ANAO) has released a report into the Future Submarine Program on the country's future submarine capability.

Following a comprehensive selection process, it was determined that France's Naval Group is the most suitable partner to design and deliver a superior submarine that will meet the demanding capability requirements.

The ANAO auditor argued that the decision to engage Naval Group as a strategic partner for the Submarine Program, rather than buy an off-the-shelf submarine, has "increased the risk of this acquisition."

Furthermore, it found that two design milestones were extended and its success is dependent on the 'timely and cost-effective delivery' of such milestones.

ANAO further added: "Acknowledging the scale of this programme, we remain confident that our work on the Attack Class Submarine Program with Naval Group and Lockheed Martin Australia is progressing thoroughly and will result in the delivery of a regionally superior submarine capability for Australia from the early 2030s, establishing a truly sovereign capability as we maximise the involvement of Australian industry."



Norwegian NH-90 at Bardufoss.

Photo: Torbjørn Kjosvold/FMS

## Two agreements with Norwegian Defence Logistics Organisation

KONGSBERG and Norwegian Defence Logistics Organisation (NDLO) signs two agreements which strengthens the cooperation between the two parties, respectively on air and sea.

The first agreement is a framework agreement for follow on technical support of systems that KONGSBERG has delivered to the Norwegian Armed Forces.

The second agreement was signed between Kongsberg

Aviation Maintenance Services and NDLO and is related to maintenance and support of the Norwegian NH-90 helicopter fleet. The agreement will initially apply for the years 2020-2026, and there will be annual calls from the agreement. The estimated value is about NOK 400 million distributed over the first four years, subject to it being renegotiated after two years. Maintenance will mainly be carried out at the Bardufoss main base.

## 30 “Freccia” 8x8 for the Italian Army

The Italian Army’s order for a new batch of Freccia 8x8 tank destroyers will allow the production line to remain open pending the finalization of an order for 381 vehicles worth €5.5 billion whose has already been approved by Parliament. (Leonardo photo)

The contract for the purchase of 30 “Freccia” 8x8 Medium Armoured Vehicles (5 in Combat version and 25 in Anti-tank version) with ten years integrated logistics support was signed late December 2019.



The “Freccia” VBM is an 8x8 Armoured Infantry Fighting Vehicle (AIFV) with a HITFIST turret with 25 mm cannon. Photo: IVECO

## No Bradley replacement

The US Army has cancelled its optionally manned fighting vehicle (OMFV) programme to replace the ageing Bradley Infantry Fighting Vehicle (IFV).

The US Army has said that it will now look to revisit “the requirements, acquisition strategy and schedule” of the programme before making any further decisions on its future.

Late last year a Raytheon-Rheinmettal bid for the programme was disqualified leav-

ing just General Dynamics Land Systems (GDLS) in the running. Originally BAE Systems had also been interested in the project but dropped out in June 2019.

The US Army now plans to “revise and re-solicit” the requirements for the OMFV programme on a competitive basis, possibly leaving the door open for BAE Systems and Raytheon-Rheinmettal to re-enter.



Bradley Infantry Fighting Vehicle.

Photo: US Army/ Eric Garland

## Legal Actions Against MKS 180 Procurement

The Kiel-based shipyard German Naval Yards (GNYK) will take legal action against the procurement decision of the Federal Ministry of Defence to grant the MKS project to a Dutch led consortium.

“After a thorough examination, we have decided to file a complaint against the award decision,” said a spokesman of the shipyard. He added: “We have serious doubts about the legality of the decision and will therefore exhaust all legal possibilities at our disposal.”

GNYK is thus exercising its right under public procurement law to have the decision reviewed.

Mehrzweckkampfschiff 180 or MKS 180 is the German navy future multi-purpose combat ship. The basic version of the MKS 180 is a full-fledged combat ship. Interchangeable components/mission modules supplement this core capability and specializes the vessel for specific roles. The requirements bring the ships’ displacement to around 9,000 tons and their length to 155 meters. The core crew of the ships would be a complement of 110 while an additional 70 crew would be in

charge of the mission modules.

GNYK was the only remaining German general contractor in the European competition of the German Navy. In addition to thyssenkrupp, GNYK integrates numerous other well-known German suppliers from the naval and defense industry into its product range.

The German government announced 14 January 2020 its intention to select Dutch Shipyard Damen as the main contractor, together with partners Blohm + Voss and Thales, for supplying at least four Multi-Purpose Combat Ship MKS 180 frigates to the German Navy. The result of the evaluation process by the German Government awaits parliamentary approval in Germany. The ships would be built at Blohm + Voss shipyard in Hamburg and at other shipyard locations of the North German Lürssen Group. Damen intends to build in this way in order to spend around 80% of the total net investment as added value in Germany. The contract has an estimated value of approximate USD 6.7 billion.

The first MKS 180 ship is to enter service in 2027 following a two-year delay.



Naval shipbuilder Damen has won the selection process for the German Navy’s new MKS 180 frigates, shown here in an artist’s rendering. Ill.: Damen

## What missiles did Iran use to attack US bases?

Iran overnight launched ballistic missiles at two US air bases in Iraq; Al Assad west of Baghdad and another in Irbil. The attacks originated from Iran and were retaliation for the US Government's drone strike, which killed the commander of Iran's revolutionary guard Quds Force General Qasem Soleimani.

Reports from several sources indicate that the Iran used Fateh-110 and Qiam-1 missiles in the attack.

The Fateh-110 Short Range Ballistic Missile (SRBM) has been described as one of the country's more accurate missile systems, is a road-mobile solid propellant system that was previously used by the country in an attack on a ski resort in Israel. This attack however was intercepted by Israel's Iron-Dome missile defence system.

The Fateh-110 missile is primarily operated by Iran by has also seen service in Syria and has been exported to

Hezbollah in Lebanon, giving the group the ability to strike targets in Israel.

The second system that is reported to have been used in the attack is the longer-range Qiam-1 missile. Iranian press reports that the missile has a range of 800km, while the US estimates its range to be at least 750km.

Like the Fateh-110, the Qiam-1 is road-mobile, but can also be launched from a silo. In the past, Iran has supplied the weapon to Houthis in Yemen. The missile is based on the technology behind the Scud missile.

A number of the missiles are understood to have missed their targets, and at least one was intercepted by air defence systems that cover the bases. In Irbil a fuel tank sections from the Qiam system were reportedly found in the area.

Iran has one of the largest and most diverse missile arsenals in the Middle East.

## 51 "K9 Thunder" to the Indian Army

Indian defence contractor Larsen & Toubro (L&T) has delivered 51 K9 Vajra-T 155mm / 52-calibre tracked self-propelled howitzers (SPHs) to the Indian Army.

The K9 Vajra-T is a variant of the Hanwha Defense K9 Thunder SPH.

In May 2017, L&T secured a Rs45bn (\$701.2m) contract from India's Ministry of Defence (MoD) for the delivery of artillery guns for the Indian Army. Under the contract, the company will supply 100 units of the self-propelled gun systems.



The 51st Vajra-T is a variant of the Hanwha Defense K9 Thunder SPH.  
Photo: Defense Citizen Network



Embraer C-390 Millennium.

Photo: Embraer

## Boeing and Embraer in strategic partnership

Boeing and Embraer welcome the unconditional approval of their strategic partnership by the Administrative Council for Economic Defence (CADE)'s General-Superintendence (SG) in Brazil. The decision will become final within the next 15 days unless a review is requested by CADE Commissioners. The partnership has now received unconditional clearance from every regulatory jurisdiction with the exception of the European Commission, which continues to assess the deal.

Unconditional clearance has now been granted in Brazil, United States, China, Japan, South Africa,

Montenegro, Colombia, and Kenya.

The planned strategic partnership between Embraer and Boeing comprises two joint ventures: one joint venture made up of the commercial aircraft and services operations of Embraer (Boeing Brazil – Commercial) in which Boeing will own 80 percent and Embraer will hold 20 percent; and another joint venture to promote and develop markets for the multi-mission medium airlift C-390 Millennium (Boeing Embraer – Defence) in which Embraer will own a 51 percent stake and Boeing will own the remaining 49 percent.

## Rohde & Schwarz supplier for F-16 Block 70 aircraft

Lockheed Martin selected Rohde & Schwarz as the preferred supplier of airborne radio communications for new production F-16 Block 70 aircraft. The F-16 Block 70 is the newest and most advanced F-16 production configuration.

Rohde & Schwarz will provide its AN/ARC-238 software-defined radio (SDR) on F-16 Block 70 aircraft for international customers. The AN/ARC-238 is the U.S. version of the independent company's R&S MR6000R/L radio.

The AN/ARC-238 consists of

two transceivers, one installed in the avionics bay, remotely controlled, and one installed in the cockpit controllable by a local control panel. It is capable to cover the frequency range from 30 MHz to 400 MHz and support the NATO frequency hopping algorithms (TRANSEC) HAVE QUICK II and SATURN. The proprietary Rohde & Schwarz waveform R&S SECOS combines TRANSEC and COMSEC functionality in a single waveform and protects voice and data communications against eavesdropping.



Under Gremlins, aircraft will deploy volleys of small unmanned aircraft that a C-130 mother ship will retrieve in flight. Image: Dynetics

## Gremlins program 1st Flight Test for X-61A Vehicle

The Gremlins Program aims to launch and retrieve low-cost unmanned aerial vehicles with focus on safety, reliability, and affordability

The program has completed the first flight test of its X-61A vehicle. The test in late November at the U.S. Army's Dugway Proving Ground in Utah included one captive-carry mission aboard a C-130A aircraft and an airborne launch and free flight lasting just over an hour-and-a-half.

The goal for this third phase of the Gremlins program is completion of a full-scale technology demonstration series featuring the air recovery of multiple, low-cost, reusable unmanned aerial systems (UASs),

or "Gremlins." The key objective is launching groups of UASs from multiple types of military aircraft while out of range from adversary defenses. Once Gremlins complete their mission, the transport aircraft would retrieve them in the air and carry them home, where ground crews would prepare them for their next use within 24 hours.

Gremlins also can incorporate several types of sensors up to 150 pounds, and easily integrate technologies to address different types of stakeholders and missions.

The U.S. Air Force designated the Gremlins air vehicle as X-61A in August in recognition of the technical challenges associated with the program.

## ApusDuo 15 High-Altitude Pseudo-Satellite (HAPS)

ApusDuo 15 high-altitude pseudo-satellite (HAPS) is being developed by UAVOS, a manufacturer of unmanned vehicles and autopilot systems.

Built using carbon fibres, the HAPS aircraft features two wing structures covered with solar cells. The solar-electric aerial vehicle combines the advantages of a satellite with the flexibility and resolutions of an unmanned aerial system.

ApusDuo 15 HAPS has a wingspan of 14m, while the serial production aircraft is expected to have a wingspan of 28m. The maximum take-off weight (MTOW) of the vehicle is 23kg. The HAPS is capable of operating in extreme temperatures ranging between -65°C and 55°C.

The ApusDuo 15 autonomously performs operations from runways using a fully-

automated take-off and landing system and requires no ground-based landing equipment.

ApusDuo 15 HAPS is equipped with brushless DC motors powered by Li-ion battery modules. The electric motors drive three two-bladed propellers mounted at the forward wing. The vehicle can perform missions for up to 365 days at a latitude of 20°.

It has a maximum airspeed of 8m/s at sea level and 27m/s at an altitude of 15,000m above mean sea level (AMSL). It can reach a maximum altitude of 20,000m.

The HAPS platform is intended for persistent operations for defence, security, surveillance, and other civilian purposes. It can perform real-time monitoring of the Earth's surface and collection of valuable information for long durations.



ApusDuo HAPS can carry a maximum payload of 2kg has a long endurance capacity of approximately 365 days. Photo: UAVOS INC

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CH-47 Chinook.

Photo: Boeing



CH-47 Chinook.

Photo: Boeing

## Germany's next heavy-lift helicopter

Boeing and Sikorsky have submitted bids to Germany's competition to acquire a new heavy-lift helicopter, offering the Chinook and King Stallion respectively.

The 'Schwerer Transport-hubschrauber' (STH) or heavy transport helicopter competition, aims to meet the country's military goal to place a contract for the rotorcraft in late 2020 or 2021, with the delivery of the

helicopters expected to conclude by around 2030.

The chosen aircraft will replace the country's fleet of ageing Sikorsky CH-53 Sea Stallions. The final contract is expected to cover between 40 and 60 aircraft and is worth over 4bn EURO.

### Boeing's bid

Boeing announced that it had offered the CH-47 Chinook to the German Armed Forces. There are almost a thousand Chinook rotorcraft in operation across the world with a number of countries, includ-

ing eight NATO nations, which help Germany's heavy-lift efforts fit into the wider European and cross-alliance capabilities.

Boeing has said that if it wins the contract it will manufacture some of the parts of the Chinook in Germany as well as issuing a commitment to sustain and train crews for the rotorcraft in-country.

### Sikorsky's bid

Sikorsky has partnered with German defence contractor Rheinmetall for its bid to provide the German Armed Forces with the CH-53K King Stallion,

single rotor helicopter, for the competition.

The company has amassed an industry team from across Germany including MTU Aero Engines, Autoflug and Hydro Systems, which are set to receive a portion of the manufacturing workshare if selected.

Sikorsky also stressed that the CH-53K would offer Germany interoperability with its existing fleet of Lockheed Martin C-130 J Super Hercules transport aircraft and the KC-130 tanker. The rotorcraft can carry the same sized aircraft pallets as both aircraft and can be refuelled by the KC-130.

## Unmanned minehunting vessels for the Royal Navy

The UK Royal Navy will begin minehunting and survey operations using unmanned surface vessels (USVs) in March 2020.

The navy will deploy a mix of unmanned and remotely-operated USVs and submersibles designed to detect 'smart mines' and conduct survey missions of the ocean and seafloor.

Initial operation of the vessel will be carried out under the Royal Navy's Project Wilton which aims to develop and deliver the navy's unmanned minehunting and survey programmes. Wilton has three vessels under its control; two remote-controlled and one manned boat alongside several submersible vehicles.

The unmanned systems are set to supplement and support the Royal Navy's existing manned minehunting force provided by Hunt- and Sandown-class minehunter vessels.

Capabilities include Atlas Elektronik's ARCIMS vehicle designed for minesweeping, minehunting, mine disposal, anti-submarine warfare, surveillance, force protection and diver support using several different mission module options. ARCIMS first gained notice as part of Exercise Unmanned Warrior in 2016, where 50 participants demonstrated the capabilities of unmanned systems to the Royal Navy.

Project Wilton is seen by the Royal Navy as a stepping

stone between current and future mine countermeasures (MCM) technology, with the ultimate goal of delivering and developing a fully autonomous MCM system for the UK which would be able to be deployed from many vessels including the existing surface fleet.

The systems are designed

to be transportable via low-loaders, meaning they can be quickly deployed into theatre wherever they are needed.

Project Wilton is named after the HMS Wilton, an experimental coastal minesweeper launched in 1972 that was the first warship in the world to use a glass-reinforced plastic hull.



Atlas Elektronik's ARCIMS.

Photo: Royal Navy

## Extend the service life of the Marder infantry fighting

The Bundeswehr has contracted with Rheinmetall to carry out new measures for extending the service life of the Marder infantry fighting vehicle. In order to maintain the operational readiness of this tracked vehicle, the drivetrain of 71 Marder 1A5 vehicles will be replaced. During the 2020-2023 timeframe, Rheinmetall will be supplying the German military with a total of 78 conversion kits as well as vehicle tool kits and special tools, logistical support,

an initial store of spare parts, and training and instruction. The order is worth around 110 million EURO. The service life extension will maintain and expand the capabilities of the Marder, which the Bundeswehr first fielded in 1971.

As a first step in replacing the drivetrain, a new power-pack will be installed in all of the vehicles, which will boost the Marder's engine output from 600 to over 750 HP.



Besides Germany, the armed forces of Chile, Indonesia and Jordan all use the Marder infantry fighting vehicle. Photo: German Army

## India's DRDO test-fires submarine-launched ballistic missile

India's Defence Research and Development Organisation (DRDO) has test-fired a 3,500km range K-4 submarine-launched ballistic missile (SLBM).

DRDO conducted the test from a nuclear-capable submarine off the Visakhapatnam coast.

Armed with K-15 Sagarika missiles with a range of 750km, the submarine-launched ballistic missile would be equipped the India's Arihant class submarines.

The test was conducted from a submerged pontoon and has met the desired parameters.

A pontoon simulates the situation of a launch from a submarine. The missile ejecting from a submerged platform to the surface is the toughest part.

The 12m long K-4 nuclear missile has a diameter of 1.3m and weighs around 17t. It is powered by solid rocket propellant and is capable of delivering a 2t warhead up to a distance of more than 3,500km.

As reported by The Print, DRDO is already working on a much longer range missile capable of hitting targets that are 5,000km away, known as the K-5.



A KC-46A connects with a B-2 Spirit over California, Apr. 2019.

Photo: U.S. Air Force /Christian Turner

## US Air Force is not happy with KC-46A tankers delay

Nine years after it won a USD 44 billion contract to deliver hundreds of KC-46A tankers, Boeing continues to deliver aircraft that are "incapable of performing its primary mission," the US Air Force chief of staff reminded the company's incoming CEO.

"We require your attention and improved focus on the KC-46" tanker, General David Goldfein, the Air Force chief of staff, warned in a letter four days before Dave Calhoun took over as chief executive officer of

the Boeing company. "The Air Force continues to accept deliveries of a tanker incapable of performing its primary operational mission."

"As one of your largest military customers, we also rely on a relationship of trust and confidence in not only Boeing's products" but also the long-term sustainment effort needed for equipment that "our warfighters require," Goldfein said in the Jan. 9 letter made available to Bloomberg News.

## Counter Unmanned Aerial System (C-UAS) to Germany

Kongsberg Defence & Aerospace AS (KONGSBERG) has entered into a contract with Federal Office of Bundeswehr Equipment (BAAINBw) to deliver a Counter Unmanned Aerial System (C-UAS) based on the PROTECTOR Remote Weapon Station.

The contract worth 250 MNOK was won in an international bidding process.

Germany is the first country to acquire a C-UAS solution with the PROTECTOR as a kinetic effector. The emergence of inexpensive, small unmanned aerial systems (UAS), also referred to as drones, poses a relatively new threat to both military units as well as civilian infrastructure and events,

such as airports, government buildings, power plants, political gatherings and sporting events. The PROTECTOR RWS C-UAS has a rapid deployment and reaction time, and is highly mobile.

For Germany's PROTECTOR RWS C-UAS project, KONGSBERG has cooperated closely with Hensoldt and is integrating the Hensoldt Spexer 3rd generation radar for UAS detection and tracking. The solution utilizes a 40 mm Automatic Grenade launcher with airburst ammunition, - but the PROTECTOR RWS has a variety of weapon integrations up to 30 mm and air defence missiles that can be employed against UAS.



An Australian Air Force PC-21.

Photo: RAAF

## PC-21 aircraft for Spanish Air Force

Swiss aircraft manufacturer Pilatus has signed a contract with the Spanish Dirección General de Armamento y Material (DGAM) for the PC-21 aircraft.

With the signing of the €100m (\$220m) contract, the Spanish Air Force, Ejército del Aire, has become the third in Europe to operate the PC-21 single-engine turboprop training aircraft.

Under the contract, a total of 24 next-generation trainers will be purchased along with

an integrated training system, simulators, spare parts and logistics support.

The aircraft will replace the Casa C-101 jet trainers, which have been in use with the Spanish service since 1980.

The PC-21 uses 50% less fuel than other jet trainers, making it more economically viable for training purposes. To date, Pilatus has sold more than 235 PC-21s to the airforce of Singapore, Switzerland, the United Arab Emirates, France, Australia and Spain.

## Germany Needs a Bigger and Stronger Army

German tank crews have of late been practicing with Volkswagen minibuses because as many as three in four of their Puma tanks are in the repair shop. Ordering backpacks, bullet-proof vests, helmets, visors and all sorts of other gear can take years in the German army. About 20,000 job openings can't be filled because so few young people want to enlist. Officers complain that standards are being lowered, and that new recruits are "fatter, weaker and dumber."

This is all according to Hans-Peter Bartels, an ombudsman appointed by parliament to audit the country's armed forces. And his conclusion was: Germany's army would currently be unable to contribute adequately to the collective defence of NATO.

Germany's allies, especially the U.S. have long known and criticized this reality, without much happening.

In 2014, as Russia was invading Crimea, several senior German officials gave speeches calling for their country to take more international responsibility. Later that year, at a NATO summit in Wales, Germany joined her allied nations in pledging to rise military spending to at least 2% of GDP within a decade.

Germany has started raising its defence spending, but from a low base. In absolute terms, it budgeted 43.2 billion Euros (\$47.6 billion) last year and 45.1 billion Euros this year, and more rises is expected to come. But Hans-Petter Bartels reckons that those won't even get the country to 1.5% of GDP by 2024.

## New portable monitoring receiver

Rohde & Schwarz is showcasing the new R&S PR200 portable monitoring receiver. With a very wide frequency range from 8 kHz to 8 GHz, or even up to 18 GHz with the R&S HF907DC SHF handheld antenna with integrated down-converter, it is highly versatile. Thanks to its high linearity and effective preselection, the receiver is ideal for complex signal environments. The R&S PR200 is an tool for regulatory authorities, mobile network operators, police forces, military units and other security organizations. They can use the portable receiver to search for and analyze known and unknown radio emissions and to localize signal sources. The receiver offers various display options, markers and other signal analysis tools.

At only 3.5 kg, the receiver features a long operating time of

more than 3.5 hours, perfect for longer field operations.

The R&S PR200 offers wide-ranging recording capabilities for documentation purposes and subsequent signal analysis. The receiver can record and reproduce all measured values over a prolonged period, for example the amplitude, bearing, spectrum and demodulated audio information of a received signal. The receiver can take a snapshot of the I/Q signal with up to 60 million samples. Numerous options and extensions for the R&S PR200 support a wide range of applications. Another important feature is the additional DF function in combination with the R&S Mobile-Locator. Temporarily installed in a vehicle, this combination enables effective geolocation of all radio emissions even in difficult environments such as dense urban areas.



PR200 portable monitoring receiver.

Photo: Rohde &amp; Schwarz

## Kongsberg Maritime sells Hydroid

Kongsberg Maritime AS has signed an agreement to sell its underwater technology company Hydroid, Inc. for USD 350 million to Huntington Ingalls Industries (HII), the largest supplier of vessels to the US Navy. The agreement provides that, the parties will enter into a strategic alliance agreement concerning underwater technology and maritime solutions.

Kongsberg Maritime acquired Hydroid for USD 80 million in 2007 and is now selling this US

subsidiary for USD 350 million on a debt-free and cash-free basis and as adjusted off an agreed upon working capital.

Hydroid, Inc. is a wholly-owned indirect subsidiary of Kongsberg Maritime AS and has its head office in Pocasset Massachusetts in the USA. Hydroid builds autonomous underwater vessels and sells them to military and commercial markets, with the US Navy as its biggest customer.

## KONGSBERG demonstration of remote tower in Australia

Kongsberg Defence Australia, with the support of Indra Australia, is currently showcasing the KONGSBERG Remote Towers solution deployed at RAAF Amberley. The Remote Towers solution, with its electro-optical sensors, is controlled from the Remote Tower Module (RTM) located approximately 1200 kilometres away at Kongsberg Defence Australia's Canberra office.

Representatives from the Australian Defence Force, Airservices Australia, and the Civil Aviation Safety Authority last week attended live system demonstrations in Canberra, conducted under the sponsorship of the RAAF Air Warfare Centre Innovation Hub.

As previously demonstrated at RAAF Amberley, the RTM demonstrates high resolution real-time live panoramic streaming of imagery across an ordinary commercial point-to-point connection, providing the same 'Out of the Window'

view quality as sitting in a tower at the airfield. Additionally, instant remote control of the pan-tilt-zoom camera and other system operations was available through commercial network connections, enabling remote tower operations. Live infrared image streaming is also proving to be an effective situational awareness asset at night, particularly in monitoring movements of wildlife.

John Fry, General Manager of Kongsberg Defence Australia, said the new technology will advance Australia's capacity to provide air traffic services in remote locations across the country.

The KONGSBERG Remote Towers solution was recently commissioned in Norway for Avinor Air Navigation Services in the world's largest remote tower project, and this is the first installation of the system in a remote configuration outside of Norway.

## Finland to modernize its ATC voice communications system

Rohde & Schwarz will upgrade Finland's air traffic control (ATC) communications infrastructure with its IP-based R&S VCS-4G solution.

Air Navigation Services Finland Oy (ANS Finland) provides en-route, aerodrome control and approach control services for 22 airports in Finland, keeping Finnish airspace safe and controlling air route traffic between different airports. ANS Finland recently awarded Rohde & Schwarz a contract to provide Helsinki Area Traffic Control Centre (ATCC) with the R&S VCS-4G voice communications system

The systems for ANS Finland consist of 97 Contoller Working Positions (CWP) for operation in the area control centre (main and contingen-

cy), as well as approach and tower positions in Helsinki. The system will be operating with more than 300 R&S Series4200 Voice over IP (VoIP) radios, already installed country wide to provide voice communication services. In addition, Rohde & Schwarz will provide R&S VCS-4G systems for Avia College – Aviation Training Center, with a total of 80 CWPs in the Simulator & Training VCS plus three additional CWPs in the Test & Validation System.

R&S VCS-4G is a full IP solution, with more than 280 systems contracted in 60 countries worldwide, including airports, area control centers, virtual centers, remote towers, offshore drilling sites, mobile towers and shelters.

## South Korea and Poland into joint tank development?

According to The Korea Times, Hyundai Rotem is planning to partner with the Polish government to develop and produce 800 K2 Black Panther class tanks. The monetary value of the possible deal was unknown.

After France and Germany declined to let it join their joint program to develop a next-gen main battle tank, Poland is now looking to develop its own tank, and South Korea's Hyundai looks as the preferred foreign partner.

There are other prestigious tank developers such as the U.S. M1 Abrams, Russia's T-90

and England's Challenger 2 that could be secured but Poland's fundamental principle is to develop home-grown weaponry which suggests Hyundai Rotem is a strong contender in the race.

The total project is said to be divided into two stages to produce a total of 800 tanks.

Hyundai Rotem officials met with Polish officials several times to explain the specifics of the qualifications and functions of the K2 Black Panther. In 2008, the South Korean company won a bid to sell K2 tanks to Turkey.



K2 Black Panther Tank firing its main gun.

Photo: Korean MOD

## Rohde & Schwarz radios in Gripen

Gripen aircraft have successfully participated in numerous exercises and air policing assignments, for example, Czech and Hungarian Air Force Gripen C/D fighter aircraft flying NATO's Baltic Air Policing operation.

In the year 2000, Saab chose Rohde & Schwarz as radio communications supplier for Gripen fighter aircraft with software defined airborne radios (SDR). The Rohde & Schwarz SDRs are integrated in Gripen fighters in several export countries. As such, the new SOVERON AR was selected by Saab and the Brazilian Air Force to be integrated in the country's Gripen E/F fighter aircraft.

On the world market, Rohde & Schwarz is the only provider of military airborne radios, which meet the civil aviation certification requirements of the European Aviation Safety Agency (EASA). Military aircraft can only be certified and oper-

ated without restrictions when they fulfil both military and civil requirements.

The airborne transceivers use communications algorithms that were standardized throughout NATO, including the fast frequency-hopping technique SATURN (Second Generation of Anti-Jam Tactical UHF Radio for NATO), as well as optional embedded NATO cryptology. Dedicated versions are SECAN and BSI certified to allow secure communications up to NATO SECRET. By means of software downloads, the transceivers can implement important functions required during a mission. This ensures that Gripen can be used in international air space under network centric warfare conditions.

SOVERON radios are in operation around the world. Almost 8,000 SDRs from the airborne transceiver family are in use worldwide on over 70 different airborne platforms.

## Centaur Unmanned Ground Vehicles for USAF

FLIR Systems announced that the United States (U.S.) Air Force has ordered more than 180 of the company's Centaur unmanned ground vehicles (UGV), plus spares. The value of the contract is \$23 million.

Centaur is a remotely operated, medium-sized UGV system that provides a standoff capability to detect, confirm,

identify, and dispose of hazards. Weighing roughly 72 kg, the open-architected robot features an advanced EO/IR camera suite, a manipulator arm that reaches more than six feet, and the ability to climb stairs. Its modular payloads can be used for CBRNE detection and other missions.



Centaur Unmanned Ground Vehicle

Photo: FLIR Systems

## JLTVs order

Oshkosh Defense announced that the U.S. Army has placed an order for 1,240 Joint Light Tactical Vehicles (JLTVs) and associated kits.

This order includes JLTVs for the U.S. Marine Corps (USMC), Slovenia and Lithuania and kits for the U.S. Army, USMC, Slovenia and Lithuania.

The Oshkosh JLTV is a light tactical vehicle with the protec-

tion and extreme off-road mobility to maneuver with combat formations against great power adversaries. The vehicle's digital architecture allows incorporation of advances in weapons, lasers, sensors, networking, and communications. It is designed to meet the requirements for the threats faced today and the decades to come.



Joint Light Tactical Vehicles (JLTVs) from Oshkosh Defense

Photo: Oshkosh Defense

## Production of S-400 defence missile systems

Russia has started the production of S-400 long-range surface-to-air defence missile systems, with plans to deliver them to India by 2025.

Russian deputy chief of mission Roman Babushkin said that the initial batch of the missile systems will be delivered by October this year, with the remain-

ing batches expected to join the Indian Air Force (IAF) by 2023.

In May 2018, India and Russia completed negotiations for the procurement of S-400 Triumf air defence missile systems to be deployed with the IAF in a deal valued at approximately Rs400bn (\$5.92bn).

Manufactured by Russian

state-owned company Almaz-Antey, S-400 is an upgraded version of the S-300 and is capable of engaging and destroying targets such as cruise missiles, stealth aircraft, drones and medium-range ballistic missiles.

In July last year, Turkey's Ministry of National Defence took delivery of the first components of S-400 systems in Ankara and announced plans in November to start their testing

in spite of pressure from the US to stop the programme.

Besides Turkey, Iran has showed interest in purchasing S-400 systems and Bastian coastal defence systems from Russia, according to a Pentagon report.

And in addition, members of the Iraqi Parliament recently announced that the country was considering the purchase of the S-400 system.



S-400.

Photo: Russian Armed Forces

## 26 amphibious platforms to the U.S. Marine Corps

According to the contract for the new generation of Amphibious Combat Vehicles (ACV) awarded in 2018, CNH Industrial subsidiary Iveco Defence Vehicles is providing its 8x8 amphibious armored platform design, core components and services.

In the frame of the contract recently awarded by the U.S. Marine Corps to the company, BAE Systems, along with team-mate Iveco Defence Vehicles, will deliver an additional 26 Amphibious Combat Vehicles (ACV) under the Low-Rate Initial Production (LRIP) phase of the program. This award

brings the total vehicle orders for the ACV to 116, and moves the program closer to full-rate production.

The ACV is an advanced 8x8 open ocean-capable vehicle that is equipped with a new six-cylinder, 700hp engine, which provides a significant power increase over the legacy fleet currently in service. The vehicle delivers mobility in all terrain and has a suspended interior seat structure for 13 embarked Marines, blast-mitigating positions for a crew of three, and improved survivability and force protection.



(Photo: Iveco)

## Supports the Royal Malaysian Navy's mission

Rohde & Schwarz delivers communications suite for R&S M3SR (Series4100 HF, Series4400 VHF/UHF), Rohde & Schwarz also integrates and interfaces with present third party systems on board such as Datalink, message handling, public address and ship telephone system.

The Royal Malaysian Navy's Lekiu-class frigates, KD Jebat and KD Lekiu, are the most modern surface ships of the Malaysian Navy. To ensure seamless connectivity and support the mission, Rohde & Schwarz has delivered and commissioned its NAVICS IP integrated communications system (ICS) into the Lekiu-class frigates of the Royal Malaysian Navy.

Having upgraded the vessels with NAVICS, and modern

software defined radios of R&S M3SR (Series4100 HF, Series4400 VHF/UHF), Rohde & Schwarz also integrates and interfaces with present third party systems on board such as Datalink, message handling, public address and ship telephone system.

Rohde & Schwarz has provided more than 40 navies with communications technology, and in the last fiscal year, contracted 14 additional platforms with NAVICS integrated naval communications systems. NAVICS references includes the Royal Navy's Type 26 Global Combat Ship (GCS).

## Drone Dome Intercepts Multiple Maneuvering Targets

In a recent demo conducted in Israel, RAFAEL's Drone Dome C-UAS system performed interceptions of multiple drones, including maneuvering targets, using its hard-kill LASER BEAM director. The system achieved 100% success in all test scenarios. The stages of the interceptions included target detection, identification, and interception with a high-power LASER beam.

Drone Dome is an innovative end-to-end C-UAS solution for securing air space from hostile drones. Fully operational and deployed globally, Drone Dome offers a modular infrastructure, comprised of electronic jammers and sensors, allowing effective detection, full identification and neutralization of multiple Micro and Mini UAV

threats employing its unique algorithms.

One of Drone Dome's unique capabilities is integrating laser technology for hard-kill capabilities. When the C41 performs a positive identification, the system allocates the target to the laser effector, which locks and tracks the target and performs hard-kill.

Drone Dome is designed to address threats posed by hostile drones both in military and civilian sites, offering solutions for maneuvering forces and military facilities, critical border protection, as well as civilian targets such as airports, public facilities, or any other sites that might be vulnerable to the increasing threat of both terror and criminal drones.



Drone Dome is designed to address threats posed by hostile drones both in military and civilian sites.

Photo:RAFAEL

## 942 trucks for Romanian Armed Forces

Iveco Defence Vehicles announces a first order of a frame agreement including more than 2,900 high mobility trucks has been signed with the Romanian Ministry of National Defence. These first 942 vehicles will be delivered throughout four years, starting from 2020.

The frame contract includes four typologies of military logistic platforms from Iveco Defence Vehicles'high mobility truck range: 4x4, 6x6, 8x8

and 8x8 Prime Mover, to be further declined in 16 different variants, among which approximately a third are with armored cabin.



(Photo: Iveco)

# FINLAND'S MARKSMAN

At the Lothaja-Vattajaniemi firing range of the Finnish *Maavoimat* (Finnish Army), located on one of Finland's largest sandbeaches in the Gulf of Bothnia (Baltic Sea), observers could witness short bursts of 35mm cannon-rounds fired by one of Western Europe's rare SPAAG's (Self Propelled Anti-Aircraft Guns) at a small target drone: *Maavoimat's* Leopard 2-chassis-mounted Marksman ItPsv *Ilmatorjuntapanssarivaunu 90/Anti Aircraft Tank*).

**Text and photo: Stefan Degraef**

The operational career of the Marksman SPAAG in Finnish *Maavoimat*-service started in 1990 with the acquisition of seven vehicles, developed by Marconi (UK) to replace twelve Russian/Soviet-made ZSU-57-2 SPAAGs, ordered in 1960. Initially a modernisation

programme of these old ItPsv SU 57-2 (in Finnish nomenclature) to more modern -2M standard was initiated in Finland. The main ambition was to equip these SU-57-2 with an on-board radar and added flexibility in on-board ammunition. With no other countries interested in co-financing this modernisation plan, the project was cancelled after the production of a pre-

series prototype due to cost overruns. The final ItPsv SU-57s were withdrawn from operational service in 2006.

Since the Finnish *Maavoimat's* armoured units, including its Panssariprikaati/PSPR tank brigade based at *Paolaanummi* (located some 120 km north of Finland's capital Helsinki) for decades operated Soviet/Russian-made T-54/T-55/T-72 main battle tanks, the decision was taken to install the Marksman turret on a second-hand Polish-built T-55AM chassis. These AM models were also equipped with a more powerful engine and were heavier than Finland's 'own' redundant and mothballed T-55's, offering more stability to the turret, its Marconi surveillance and tracking radar and finally to its two 35mm Swiss-made Oerlikon anti-aircraft cannons.



Finland has seven ItPsv 90 Marksman anti-aircraft systems, providing low-level air defence for tank battalions. The ItPsv 90 Marksman is primarily meant to fight helicopters, low-flying aircraft and unmanned aerial vehicles (UAVs). The armament consists of two Swiss 35 mm Oerlikon anti-aircraft guns, with a rate of fire of 18 rounds per second. The fragmentation round has a muzzle velocity of 1175 m/s. The effective range is 4,000 meters. The vehicle is also equipped with eight Wegmann 76 mm smoke dischargers, a 7.62 mm assault rifle, and a flare gun. The turret can traverse a full 360 degrees and has an elevation range of -10 to +85 degrees. The magazines hold 460 fragmentation rounds and 40 anti-tank rounds. The weapon system is guided by a British Marconi 400 series frequency agile surveillance and tracking X/J-band radar, which can detect targets out to 12 km in search mode and 10 km in tracking mode. The laser distance measure device functions up to 8 km. The commander and the gun operator both have gyro-stabilized optical aiming devices. There are three communication radios in the vehicle for fire guidance and communications. In addition to the Marksman-air defence mission and capabilities, its two 35mm Oerlikon KDA cannons can also be used to engage soft-skinned ground-targets.

In 2002 the Finnish Defence Forces, wanting to upgrade the capabilities of its armoured units, decided to buy 124 second-hand Rheinmetall Leopard 2A4 main battle tanks (aka 2A4FIN) from the German *Bundeswehr*, later supplemented by 15 additional 2A4's to be used as an additional operational reserve and a source for spare parts.

The gradual operational withdrawal of all Russian-made main-battle tanks and linked logistical structure and procedures forced the Maavoimat to mothball its seven Marksman SPAAG's from 2010 on. Furthermore, day-to-day operations with the heavy *Marksman* in sometimes harsh Finnish meteorological and field/terrain conditions showed the less than ideal performances and capabilities of the old T-55AM-chassis.

At the same time, the Finnish Defence Forces were not willing to deprive its armoured and mechanised infantry units of a much-needed close range air-defence cover against hostile low-flying

aircraft, helicopters and – as was becoming increasingly important - unmanned-combat air vehicles/U(C)AV's.

Fortunately - in January 2014 - the Finnish Government approved the purchase of 100 second-hand but very modern Rheinmetall Leopard 2A6 main battle tanks from the Royal Netherlands Army/*Koninklijke Landmacht*. Although these Dutch Leopard 2A6 were all extensively upgraded former-2A4 models, the possibility to obtain these tanks at bargain prices proved a quantum leap in tactical and operational capabilities for the Finnish *Maavoimat*, and prevented an indigenous and (most likely) vastly more expensive Finnish 2A4FIN-upgrade programme.

The first Leopard 2A6's arrived in Finland in May 2015 at the PSPR at Parolannumi to gradually replace the 2A4FIN's as the service's main battle tanks.

The gradual withdrawal from front-line service of the older 2A4FIN's - with its still capable chassis and engines - initiated an ambitious but (tactically and logistically)

sound refitting programme of the Marksman platforms. In close cooperation with Patria - Finland's main armament company - all seven Marksman turrets were installed on modified Leopard2A4FIN chassis. As was hoped, the Leopard 2 chassis, larger in size than the old T-55 chassis, proved to be an ideal fit and firing base during technical and tactical testing and evaluation of the 'new' Marksman.

Nowadays all seven Marksman SPAAG's are assigned to the *Helsingin Ilmatorjuntapatteri* (Armoured Air Defence Regiment) of the PSPR, based at Parolannumi. Within its Regiment, the Marksman *Joukkue* (Platoon) is joined by the 2° *Ohjusilmatorjuntapatteri* (Air Defence Missile Battery), equipped with mobile *Ilmatorjuntaohjus 12* (It012) Kongsberg Defence NASAMS II FIN air defence systems. Purchased in 2009, this medium range air defence missile system (MRADMS) is the first to use ground-based AIM-120 AMRAAM missiles. ■■



The new Leopard 2 chassis greatly improves mobility compared to the older T-55AM chassis, both on- and off-road. The Leopard 2 chassis is also larger, thus providing a more stable firing platform for the Marksman turret to operate from. The vehicle is operated by three crew members: commander, gunner, and driver.

# NEW CAPACITIES FOR THE CV90

**BAE Systems has conducted the first long-range anti-tank missile test from the CV90 infantry fighting vehicle in a series of tests. The completion of missile-firing further diversifies the operational capabilities of CV90 on the battlefield by enabling indirect fire at long distances or air targets.**

**T**esting was carried out in northern Sweden when a Spike long-range (LR) missile mounted on a BAE Systems Hägglunds' CV90 was used to defeat a target at more than 2,000m.

CV90 has been designed to accommodate future growth to meet evolving missions.

The Spike missile family developed by Israel-based Rafael Advanced Defence

Systems is being used actively in 33 countries. Spike is an anti-tank guided missile and anti-personnel missile with a tandem-charge HEAT warhead. It is available in man-portable, vehicle-launched, and helicopter-launched variants.

Spike-LR is the Long Range version. Weight of the missile is 14 kg and the weight of the complete system is less than 45 kg. Maximum range is 4,000 m

(the new LR2 version can reach 5,500 m) and it is used by infantry and light combat vehicles. It adds fiber-optic communication to and from the operator during flight. Dual-sensor electrooptic guidance system allows the system for precision strike.

## **CV90 Mjölner mortar system**

BAE Systems has delivered the Mjölner vehicle mounted mortar system to the Swedish Defence Materiel Administration (FMV) for the Swedish Army's CV90 combat vehicles.

Developed and produced by BAE Systems Hägglunds, Mjölner is a turret solution that will bring indirect fire capability to the fleet of CV90s.

The first four vehicles fitted with the mortar system are being transferred to the Swedish Army.

Indirect fire delivered by the CV90 Mjölner's mortar system will support mechanised battalions. The capability can be adapted for different vehicle platforms.



*The Mjölner 120mm twin barrel mortar system on a CV90*

*Photo: BAE Systems*

The CV90 Mjölner features two smoothbore 120mm gun barrels mounted on the vehicle. The mechanical loading system is designed to rapidly reload the gun barrels in all combat situations.

Mjölner offers a full 60° frontal engagement arch and its elevating range of 45° to 83° enables operates to engage targets over a wide range of distances.

BAE Systems Hägglunds is under contract to deliver 40 mortar systems for the Swedish Army's CV90 vehicles under the Mjölner programme.

The programme began in December 2016 and saw the delivery of the first four test vehicles to the FMV earlier this year to conduct validation and training.

The four CV90 test vehicles are now certified to join the service.

The company is expected to make final delivery of the remaining vehicles under the programme next year. ■■



Test-firing of Spike LR anti-tank missile from a CV90

Photo: BAE Systems

## NORWEGIAN F-35'S PARTICIPATING IN ICELAND AIR POLICING

**In March 2020, Norway is participating in the international operation Iceland Air Policing (IAP) with its F-35's. This is the first foreign mission for the Norwegian F-35 fighters, following their initial declaration as operational in November 2019.**

Since NATO started its "Iceland Air Policing" in 2008, Norway has provided four contributions with its F-16 fighters. Because of the phasing-in of the new F-35 fighters, it has now been four years since Norway's latest contribution.

Deploying the F-35 fighters takes more than deploying the F-16's. Some 150 persons accompany the four F-35 aircraft to Iceland. With regard to security in par-

ticular, there are rigorous requirements calling for extra personnel, and quite a few too.

Iceland does not have an air force of its own, and in order to meet the Icelandic needs for sovereignty assertion and airspace surveillance, NATO is contributing with periodic air defence presence in peacetime. ■■



Norwegian F-35 fighters at the Keflavik Air Base on Iceland.

Photo: Torbjørn Kjosvold/FMS



A B-52 taking off from Tinker Air Force base.

Photo: Wiki/ B. Greyjoy

## SPECIFICATIONS

- ▲ **Crew:** 5
- ▲ **Length:** 159 ft 4 in (48.5 m)
- ▲ **Wingspan:** 185 ft 0 in (56.4 m)
- ▲ **Height:** 40 ft 8 in (12.4 m)
- ▲ **Max. takeoff weight:** 488,000 lb (220,000 kg)
- ▲ **Maximum speed:** 560 kn (1,047 km/h)
- ▲ **Cruise speed:** 442 kn (844 km/h)
- ▲ **Combat radius:** 4,480 mi (7,210 km)

## B-52;

# “THE OLD KING OF THE SKY”

**In service continually since the 1950s, the B-52 Stratofortress have operated in almost every US conflict since it first took flight.**

The B-52 entered into service in the 1950s, and the bomber became a part of the US' nuclear deterrent, alongside intercontinental ballistic missiles (ICBMs) and nuclear-armed submarines.

The first B-52 test-flight was back in April 1952, and the heavy bomber has been in active service with the USAF since 1955. Between 1952 and 1962 a total of 744 units were built, and as of June 2019, 58 are in active service, 18 in reserves, and approximately 12 more aircraft in long term storage.

After upgrading the aircraft between 2013 and 2015, the US Air Force aims to fly the B-52 through 2040 and even into the 2050's. If so, we might see

the B-52 still in active service a hundred years after its first flight.

### Ongoing upgrades keep the B-52 relevant

To stay so relevant for so long, the B-52 has seen its fair share of overhauls and refits, which have upgraded nearly every part of the airframe over the years.

And the upgrading continues; last year Raytheon won a contract to upgrade the aircraft's radar and allow it to act as a 'mothership' for an airborne hypersonic missile test. The US Air Force is also looking to equip the B-52 with laser-based missile defence systems. These upgrades would see one of the oldest serving airframes equipped with some of the US Air Force's most advanced technologies.

### Replacement

The Next-Generation Bomber (NGB) was a program to develop a new medium bomber for the US Air Force. The NGB was initially

projected to enter service around 2018 as a supplement/ replacement for the U.S. Air Force's aging bomber fleet (B-52 and B-1 Lancer). In 2010 the NGB program was superseded by the Long Range Strike Bomber (LRS-B) heavy bomber program.

The Long Range Strike Bomber program (LRS-B) is a development and acquisition program to for a long-range strategic bomber. In 2015 Northrop Grumman was awarded a development contract for its B-21 Raider. The US Air Force plans to procure at least 100 of the LRS-B aircraft, with potentially as many as 200 units. Originally the plan was for the B-21 to enter service in the mid-2020's, but as of today the aircraft is more likely to enter service around 2030. ■■

## ARMAMENT

- ▲ **Bombs:** Approximately 70,000 lb (31,500 kg) mixed ordnance; bombs, mines, missiles, in various configurations.

■ **militærTeknikk®**

ISSN 0806-6159

**Publisher/Utgever:**

Norsk Militærteknisk Forlag  
Krokliveien 66, N-0584 OSLO

**Administration/Administrasjon:**

Castra AS  
Org.nr. NO 971 161 531 MVA

**Editor-in-Chief/Ansvarlig redaktør:**

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**Design/layout & print:**

Konsis - www.konsis.no



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