

# bulletIN

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## Editorial

by Sissel Solum, Senior Vice President Communication, Nammo Group

The financial crisis that rippled across the globe has barely had time to settle. Now recent events like the terrible destruction in Japan, and the ongoing political riots and violence in several parts of the Middle East and Africa, are situations whose long-term effects will be unknown for some time.

Negotiations and nonviolent political actions have proven successful in resolving some of the conflicts, but far from all of them. While the use of military force regrettably continues in many countries, deterrence is still the most efficient tool for maintaining peace. Therefore, it is essential that the global defense industry continue to improve its products and solutions. This serves to equip modern defense forces while remaining in compliance with domestic and international laws.

"We will secure National and Allied Forces with high quality defense products." This is one of the five statements that support Nammo's Vision: Securing the Future. Only by having strong, viable armed forces, supplied by a modern defense industry, are we able to secure democracy and peace around the world.

Nammo continues to deliver excellent results, which are a reflection of the top performance demonstrated by our dedicated employees. Additionally, and for the very first time, the Nammo Group signed up for two national sponsorship agreements with a focus on technology and careers for women in the defense industry. The sponsorships will be important tools in the continued work toward building a strong company culture.

We now invite you to learn more about our unique goals, plans and people in this 2011 edition of the Nammo Bulletin. You will find out how women are playing a vital role in the Group in leadership positions; discover the possibilities created by our new technologies and top performances; and, you will meet five dedicated Nammo employees, each with something important to share about what it's like to work at Nammo.

Happy reading!

## Nammo in brief

**The Nammo Group, headquartered in Raufoss, Norway, is a nordic defense and aerospace group specializing in high-end products.**

The Nammo Group's shareholders are the Norwegian Ministry of Trade and Industry (50%) and the Finnish Defense Security and Aerospace Group, Patria Holding Oyj (50%).

The core business of the Nammo Group is the development, production and sales of military and sport ammunition, shoulder-fired weapon systems, rocket motors for military and space applications, and leading global services for environmentally friendly demilitarization. Nammo operates through its five business units; Small Caliber, Medium & Large Caliber, Missile Products, Demil and Nammo Talley.

Nammo is present in seven countries with a total of 18 production sites and sales offices.

## Female Leadership in Nammo



### Kathrin Sondershausen

President Lapua GmbH, Schönebeck

When I started my first work day at Lapua GmbH as Financial Manager five years ago, I was not sure whether or not this was the right job for me.

Ammunition, explosive substances – an international group of companies – all this sounded fine, however, my language skills in Norwegian, Swedish and Finnish were pretty awful. Adding to the situation was that the Managing Director of the company decided to deal with the Prime Minister of the Federal State of Saxony-Anhalt during my first day, and left me on my own...

And so, I, Kathrin Sondershausen, born in 1965 in Saxony, the former German Democratic Republic, stood at Nammo's gates on 13 March 2006.

Yes, I had learned a commercial profession before I studied business administration. However, the foundation for my present job was laid in 1991, which was only a short time after the Berlin Wall came down. I worked in a law office, and then for 14 years in the commercial division of a production plant. At that company, I had the chance of getting acquainted with every aspect of an enterprise, from purchase through dispatch, to financial management and contracting.

Now I started to work as Financial Manager at Nammo. And since then, a lot has happened – one year ago on 26 May 2010, I took over the management of Lapua GmbH in Schönebeck – who would have thought that in 2006?

What happened to me?

I go to work every day with great pleasure. Values like honesty and sincerity are my constant companions, along with a sense of being grounded. I simply enjoy working with people, whatever their nationality and whatever training they have undergone. I am proud to have a team like the "Schönebeckers" or "LAPUA" behind me.

My managerial style is marked by endeavors to set a good example. I know that I can make demands of others only when I am able to satisfy these demands myself. I am sure that I have gained the respect of all the employees at Schönebeck. I listen closely to what others say. A superficial approach is never successful. When I ask one of my employees, "How are you?", I wait for his or her answer.

I am a direct person, someone who takes the initiative in solving existing problems.

However, it is often not easy for a woman in a male-dominated industry. But I have risen to the challenge; I do everything possible to show everyone that a woman is capable of guiding and managing a company, even a company that produces ammunition. It would be great if all NAMMO managers supported these efforts, everything else will sort itself out.

I would like to take this opportunity to thank, in particular, Raimo Helasmäki for placing his trust in me as manager, and who firmly believed that I am capable of managing the company.

I thank Sirpaliisa Jussila for the extensive and intensive telephone conversation we had just two days before I became Managing Director, and who told me that even as a woman I will live up to the challenges of the management function. I also thank Dr. Georg Plenikowski, who intensively prepared me for my present job, and like a father and good friend he always lends a supportive hand when I need it.

I am proud to work for Nammo, and I am happy to be part of the big Nammo family.

- My home is where my heart is. -

### Rita Strandbakken

Supervisor Production, Medium & Large Caliber Division

I started as an operator in the Industrial Park at Raufoss in 1997. After a few years in different departments, I started in the assembly department of explosives in 2000, where I have had different responsibilities and work tasks since. This has given me a great deal of experience and a varied background, which I believe made me qualified for the position as Supervisor of Production for the assembly department in February 2011.

The work environment in Nammo is very good, and hierarchy is not a dominant factor in the work culture. In my department, the employees are trusted to do their tasks, and are free to discuss issues with me when necessary. I have received nothing but positive feedback from my colleagues in the department after I was appointed Supervisor of Production.

The supervisors for the production lines in Nammo Raufoss meet quarterly. Being the only woman can get a bit lonely sometimes. I got one improper comment

from a man at a meeting who said, "Well, let's see how this goes." Aside from that, I received a warm welcome and have been treated fairly. In my experience, women tend to have different approaches to tasks and subjects. Women want to be involved with and devoted to the job, but also tend to be more humble than most men. Perhaps we put too much pressure on ourselves to succeed, and that may frighten some women away from applying for higher-level positions.

I encourage other female operators in Nammo to apply for position as supervisor if they get the opportunity. I feel I get the same respect in the department as a male leader does. I also receive positive comments from employees, and some have mentioned that female leaders tend to be more sympathetic to the professional and personal circumstances of their employees than male leaders are.

Go girls!



### Turi Røyne Valle

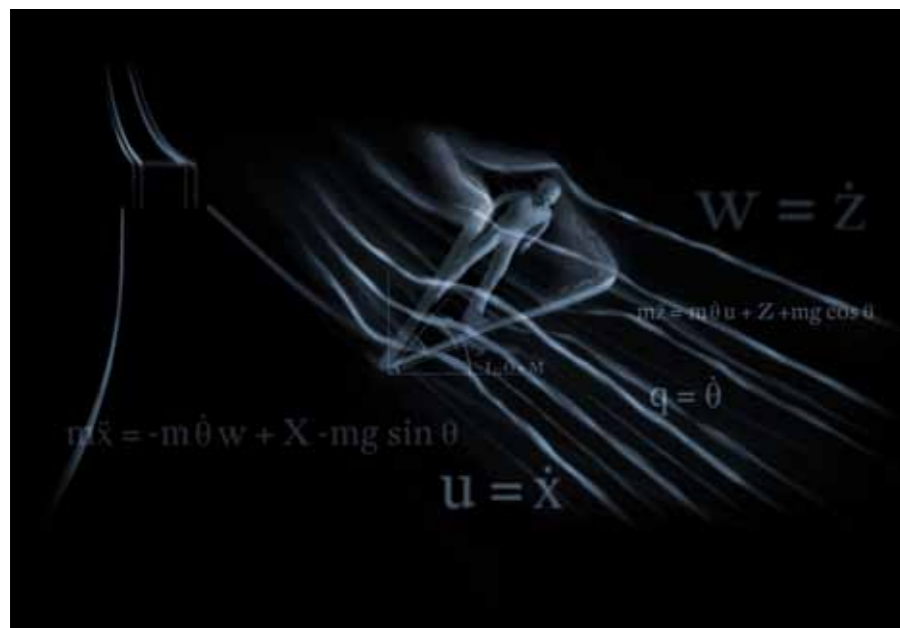
Program Manager, Missile Products Division

I have worked in the Space Department at Nammo since 2007, and have been the Program Manager for Space Programs since 2009. It was very useful for me to start as a Project Leader before advancing to the Program Manager position. Being new to the defense business, there was a lot to learn about products, customers, different systems and so on. However, most of the tasks as a Program Manager involve more than just knowing the products and the business. I have experience with our various internal programs and systems, and have to demonstrate strong leadership skills and the ability to acquire information quickly.

I feel that I get the same kind of respect as my male colleagues, and we have an open environment where everyone is encouraged to propose their ideas and bring up their opinions. Even though I am the only woman in the division's strategy group, I don't consider this as a problem. Still, I hope this will change as we recruit more women into the business unit. They could qualify for managerial positions as time goes on.

I believe experience and knowledge in the work you are performing is of much greater importance than gender; something I continue to believe after four years at Nammo.





The former Olympic Champion in Biathlon Halvard Hanevold gave a speech at the 2010 Nammo Forum, explaining what it takes to perform at the highest level year after year.

## ISSF World Championship

by Heiko Weidner, Ltr. Service, Small Caliber Division

The 50th ISSF World Championship in all shooting disciplines took place at the 1972 Olympic Shooting Range of Munich. The competition, which is the first 2012 Olympic Qualifying event, broke every record with 2500 participants from 105 countries, who competed in 55 different events. Sixty-nine Olympic Quota Places, the entrance tickets for the next Games, will be distributed to the best finalists of the past summer in the 15 Olympic events of Rifle, Pistol and Shotgun.

Lapua Rimfire Ammunition. One of the most valuable results was the gold medal in the main discipline "50m rifle 3 positions men" by the Hungarian shooter Peter Sidi. Even a low battery couldn't stop his power shooting. After the last shot, Peter said, "I risked losing the final because of an empty battery but luckily, the battery worked for the last two shots!" Finally, the current European champion won the title with selected Lapua ammunition.

off slowly and with precision. After the first half she was in first position. As the other competitors came in with excellent scores, everyone knew that the second part would bring the decision. Coaches, teammates and the Lapua-team, who selected the right ammunition, waited nervously for the end of the competition. Tejaswini came a mere three points short of the maximum score in an exciting 60-shot prone event. Although she missed those three points, it was still enough for the gold medal in Munich!

### SUCCESS FOR LAPUA RIMFIRE AMMUNITION

During the World Championships in Munich, seventeen medals were won with

Another gold medal went to a young Indian woman, Tejaswini Sawant. A few days before her event, we tested her rifle and selected new ammunition for the upcoming competition. At the event itself, she started

## Top Performance in Nammo

by Bertil Pålrsrud, Senior Vice President Human Resources, Nammo Group

In 2010, Nammo entered into a four-year sponsorship agreement with the Norwegian Biathlon Association, promoting the Lapua brand on the women's national team. Through this sponsorship opportunity, Nammo will be the primary supplier of ammunition to the national teams of the Norwegian Biathlon Association. The sponsorship agreement also includes a Lapua scholarship for talented young athletes.

Nammo want to focus on female employees who have the ambition to develop their own careers inside the company.

Nammo has experienced continuous, positive development in recent years, through product and sales results along with a strong company culture. Our sponsorship involvement gives us the unique opportunity to work closely with some of the

world's best athletes and coaches in their respective sports. These athletes work hard every day to perform better than they did in the previous season. To win gold medals they have to make sure that they always are at the top of their game. We believe that the close relationship with these top performing athletes will help to inspire our own organization as we continue to build a performance-dedicated culture in Nammo.

Nammo has also signed a sponsorship agreement with the Norwegian Ski Federation. The goal of the agreement is two-fold. The first part is a technology project where Nammo will contribute to the development of ski jumping through increased technological expertise and support around aerodynamics. The second part of the agreement features Nammo as the sponsor of the women's national team in ski jumping on their road to the first women's Olympic ski jumping competition in Sochi in 2014. These two national sponsorships are important steps toward promoting Nammo and the Lapua brand.



Nammo aims to recruit more women into the company, and to maintain employee focus on top performance. Sponsoring the female biathlon team and the female ski jumping team will help us visualize that



## 2010/2011 Biathlon season

by Heiko Weidner, Ltr. Service,  
Small Caliber Division

The IBU World Cup Total winners are Tarjei Bø and Kaisa Mäkäräinen (photo at right).

The preparations for the winter season began in the summer. One of the first teams to arrive at Lapua GmbH in Schönebeck was the Norwegian team, which came to test and select the new Polar Biathlon rimfire ammunition. Other teams, including those from Germany, Russia, Austria, Slovakia and Bulgaria, made their way to Schönebeck. A total of 18 nations were represented, and the teams appreciated the hospitality and they all took the possibility to choose the best ammunition for the upcoming winter season, highlighted by the World Championship in Khanty Mansiysk.

Everyone longed for the start of the new biathlon season, and then the temperature dropped before the World Cup in Östersund, Sweden. The first competition of the season, the women's individual, was won by Sweden's Anna Carin Zidek, France's Marie Laure Brunet, and the Swedish World Cup Winner from 2008/09 Helena Ekholm, at temperatures around -18°C. In the women's sprint competition, the hour had come for Finland's Kaisa Mäkäräinen as she won the first World Cup of her career. One week later in Hochfilzen, Austria, the athletes hoped for cosier temperatures. But it wouldn't be easy, and it snowed incessantly throughout the event. The Nor-



wegian team gave the best performances, also won in the men's sprint competition.

Tarjei Bø and Kaisa Mäkäräinen won the biggest of the annual prizes, the IBU World Cup Total. Their success was a

result of their consistency, perseverance and determination. Neither of these two first-time winners had the most victories, as Bø finished with five and Mäkäräinen with three. But both athletes won a World Championship title.



## Nammo Cup 2011

by Carl-Henrik Andersen, President of Karlstad Judoklubb, Competition Director of Nammo Cup 2011

For the first time in six years, a judo competition was arranged in Karlstad as Västcup 1, was held on 19 March 2011. Nammo LIAB AB stepped in as the main sponsor, and the name of the competition was changed to Nammo Cup 2011. An event of this size requires that the responsible club has a number of sponsors. Karlstad Judo Club would like to express its sincere gratitude to Nammo LIAB.

Approximately 220 contestants from 32 different Judo clubs participated in the Cup. Two clubs were from Norway and the rest were from Sweden.

NAMMO Cup was widely praised by the eleven judges, and many of the participating clubs gave their thanks for a pleasant and well-organized contest. NAMMO Cup has put Karlstad back on the Judo Map!

## A closer look at Nammo LIAB

by Robert Daunfeldt, Senior Director, Marketing and Sales, Nammo LIAB AB

Nammo LIAB AB has developed through tough times into an expanding site within Medium & Large Caliber Division in Nammo. Our loyal and very competent employees, active product development plan, wise product investments, and a new and extensive business strategy plan have been behind our rise to stability and success.

Profitability has been the focus throughout, and we now have a unique and strong product portfolio that will carry us into the future. Nammo LIAB AB is ready to consolidate markets in order to increase sales, as well as actively work to improve the production and development of new products sought by the customer for the future battlefield.

Nammo LIAB AB's portfolio is based on both military and civilian products. Our Sea Safety products complement our military ones in terms of economy and production. Sea Safety is sold to more than 100 customers worldwide through an

extensive distribution network. We see a strong growth potential within the product group, and together with our investment in automated production, we are now capable of being a very strong competitor in the market.

Nammo LIAB AB has always worked closely with customers. This allows us to be responsive and produce or develop products that fast meets the demands of our customers. We have implemented a flat process based organization and flexible production methods for quick decision-making, regardless of the size of the order. We are currently implementing new "decision groups" within the organization with expertise in key areas. This is to actively engage as many co-workers as possible in the day-to-day improvements that needs to be done to keep us in the forefront in the eyes of the customers.

Nammo LIAB AB has during the last 10-15 years implemented a job rotation program

that allows us to have our personnel complement each other between military and civilian productions. In parallel to this we have developed new and modern production lines. This has given us a capability to respond to customer needs faster and address peaks in production thus being more competitive.

In regards of sub suppliers and their contribution we have actively strived to secure quality and timely deliveries. We work on a yearly basis with more than 100 different sub suppliers. They are a very important part of us being able to deliver the right product, in time and to the right price.

Nammo LIAB AB sees huge possibilities in the upcoming Long Term Plan (2012-2014) and believes that with continuing precise and timely investment in people and equipment as well as an aggressive marketing and sales strategy we should be able to increase probability as well as increase our product and capability portfolio.



New 40mm and 57mm Fuze line



Casting in Björkborn facility



Sample of our Sea Safty products (Illumination rockets, Flares, Line thrower and Man Overboard signal)

## World's Largest Closed Detonation Chamber

by Tor Bjørklund, President Nammo NAD AS

Nammo NAD in Løkken Verk, Norway, provides conventional ammunition demilitarization in a closed detonation chamber environment. Operating in the former Astrup copper mine with detonation chambers 930 meters below the surface, the mine provides an environmentally controlled facility for underground detonations. Any required preparation and disassembly is carried out within specially designed areas at the 810-meter level below the surface.



Detonations are conducted using remote-fire charges, which enable personnel to be above ground and away from the resulting temperature and pressure increases. The pressurization allows for more thorough explosive reactions than those in open detonation or standard incinerators. This results in the complete destruction of all ammunition components. Dust and gases are naturally cooled and filtered by the wet ventilation channels of the mineshafts. These environmental controls are in full compliance with Norway's strict environmental laws. All water from the mine is collected, stored and analyzed before released into a filtered water basin adjacent to the facility. Over time, the water eventually returns to the aquifer after further analysis and cleansing.

Currently, the annual capacity in the mine is in excess of 500 tons of Net Explosive

Weight (NEW) per year. The facility has performed conventional ammunition demilitarization on all kinds of munitions, from small caliber to 8 Inch HE DP Improved Conventional Munitions (ICM), mines of all sizes and types, Explosive D projectiles, Multiple Launch Rocket System (MLRS) warheads for NAMSA, MK117 Bombs, 155mm HE, M483 ICMs for the US Army and many other explosives and propellants. After extensive testing to ensure complete detonation, donor charges, if required, are prepared and placed by specially trained and licensed personnel in accordance with an internally developed test plan.

Nammo NAD is ISO 9001 and ISO 14001 certified, and provides closed cycle demilitarization in small and large capacities. If the demilitarization of specific ammunition is a problem, Nammo's flexibility offers a safe, environmentally friendly solution.

## Demilitarization of Cluster Munitions

by Reijo Bragberg, Executive Vice President, Demil Division

For many years, Nammo has invested heavily in highly automated equipment for demil of Cluster Munitions (CM). These ammunitions are filled with individually fuzed submunitions and warheads, which make safe disassembly for demil a complex task to carry out while keeping an acceptable cost and safety level in mind.

Nammo has demilitarized more than 10 million different submunitions from CM over the last 10 years. We started with demil of various ICMs and CBUs in the mid-90's, at Nammo Buck, Germany and Nammo NAD, Norway. Since then we have demil'ed many different types of artillery cargo rounds, aircraft-carried pods and rockets. We are currently working on multiyear contracts for BWB, NAMSA and UK MoD, for demil of various types of 155mm ICMs and the MLRS M26 rocket system.

Last year, we completed the demil of the Norwegian 155mm ICMs, which received

a great deal of attention from the Norwegian authorities following the signing of the Oslo Convention in December 2009. The Convention banned the development, production, use, and sales of 155mm ICMs, and demanded the disposal of CM stocks. Since then, we have noticed a considerable increase in the interest in CM demil, and we presently have several standing offers for CM demil. However, there are still many customers that are not planning for their future CM demil needs, even though the agreed eight-year timeframe for the disposal of CM stocks is passing quickly.

Nammo has unique capabilities in CM demil, with the "World's Largest Closed Detonation Chamber" [see other article] in Norway, and with our highly automated disassembly and disposal lines in Germany. This means that we are definitely well-suited to take care of upcoming CM demil needs, and we are just as optimistic about the future potential that this brings to our company.



## Success in the US

by Trond Bergerud, Sales and Marketing Manager, Medium & Large Caliber Division

Nammo has produced the 12.7mm Plastic Short Range Training Ammunition (P-SRTA) for more than 50 years. The round has been improved several times during this period in order to meet new requirements from different customers.

Plastic Training Ammunition from Nammo has been sold to the US for more than 20 years. In the late 1980's, the US purchased more than 3500 Recoil Amplifiers for the 12.7mm M2 Heavy Machine Gun from Nammo. The US also purchased the 12.7mm P-SRTA. There have been several contracts between the US and Nammo for

training ammunition and supplementary components in the period between the late 1980's and 2006.

In 2007, Nammo was awarded a long-term contract (initially 5 years) for delivery of the 12.7mm P-SRTA. This is a Single Source Contract, meaning that Nammo was selected to be the sole supplier of this ammunition for the US. Before production started for this contract, improvements were made to the round to meet US requirements for firing from several different mountings.

Upon receipt of this very important contract, Nammo decided to invest in a new production line for 12.7mm ammunition. This production line is qualified by representatives from US government. The new production line allows high production capacity and produces excellent quality ammunition.

Supplying the 12.7mm P-SRTA for the US is very important. Nammo has received consistently positive feedback on the round, and it is of great importance to the company to retain the US as a customer in the future.

## Ammunition Mix – Vital for the Door Gunner

by Peter Hedsand, Product Manager, Small Caliber Division

Helicopter door gunners have used Small Arms Ammunition for more than 40 years against ground-based enemies. Normally, the door gunner uses an ammunition mix of 1 tracer to 4 ball rounds. This has so far met the needs for defeating and suppressing the enemy targets close to the helicopter – with some compromises. The weapons that are most commonly used for this role are FN MAG (M240) type machine-guns and 12.7mm M2/M3 BMGs mounted in the side doors of the helicopter.

Aiming and leading on targets is much more difficult from a moving aircraft, so the Gunner must use the tracers for guidance and long bursts to be able to hit the target. Tracers play a very important role in the ammunition mix because in these kinds of situations it is almost impossible to use a sight. The tracers must guide the airborne shooter far more than for a ground gunner.

Firing from a helicopter in darkness, particularly during take-offs and landings, is critical because the warfighters movements around the helicopter must be observed by the door gunner.

Standard Tracers will disturb the Night Vision Devices (NVDs) and the door gunner will have problems seeing the movements of his own troops and problems seeing the enemy. Normal Tracers create a "halo effect" which limits the door gunner's awareness of the combat scene. Standard tracers will also disturb the pilots and rest of the crew if using NVDs.

Nammo has solved this problem by developing a family of Dim Tracers, Near Infra Read (NIR) Tracers, in 5.56mm, 7.62mm and 12.7mm calibers. The 7.62mm and 12.7mm are the most common calibers used by helicopter crews. The NIR Tracer will not hamper the door gunner or the crew on the helicopter during firing. The 7.62mm NIR Tracer has a long trace distance of up to 1250 meters to increase the firing range and strike possibilities for the gunner.

A standard ball round in 7.62mm will have very little effect on targets beyond 600

meters, and will have reduced or no effect against light protection such as car doors or light walls beyond this distance. In addition, the ball round has almost no effect against a lightly-armored fighting vehicle, which makes it a must to have ammunition with armor piercing capabilities.

The Nammo Armor Piercing (AP) ammunition is ballistically matched to the ball and tracer ammunition, and provides the door

gunner a great effect on the target with each burst. A burst must carry a lethal mix of projectiles and be effective against a large number of different targets with varying levels of protection. The amount of ammunition a helicopter can carry is limited, therefore the AP ammunition helps him to conserve ammunition because of the direct effect in the target. Simply put, the door gunner doesn't need to fire as much.



By Courtesy of US Gov.



Nammo  
Door  
Gunner Mix

## Minimizing Risk of Collateral Damage

by Peter Hedsand, Product Manager, Small Caliber Division

The urban combat scenario is fast-moving, with threats coming at all sides. The need for reliable performance is obvious, especially with a maximum combat distance of 200 meters. The combat distance is probably shorter and the warfighter has to be prepared to fire at any second and in any direction without walls or houses to stop the bullets. If the soldier misses the target, the projectile can fly as far as 4000 meters in its trajectory at almost full speed. There is no time for the warfighter to consider the risk of a projectile missing the target and then going the maximum distance. This means that civilians or fellow troops are at risk of being hit by projectiles far away from the combat scene.

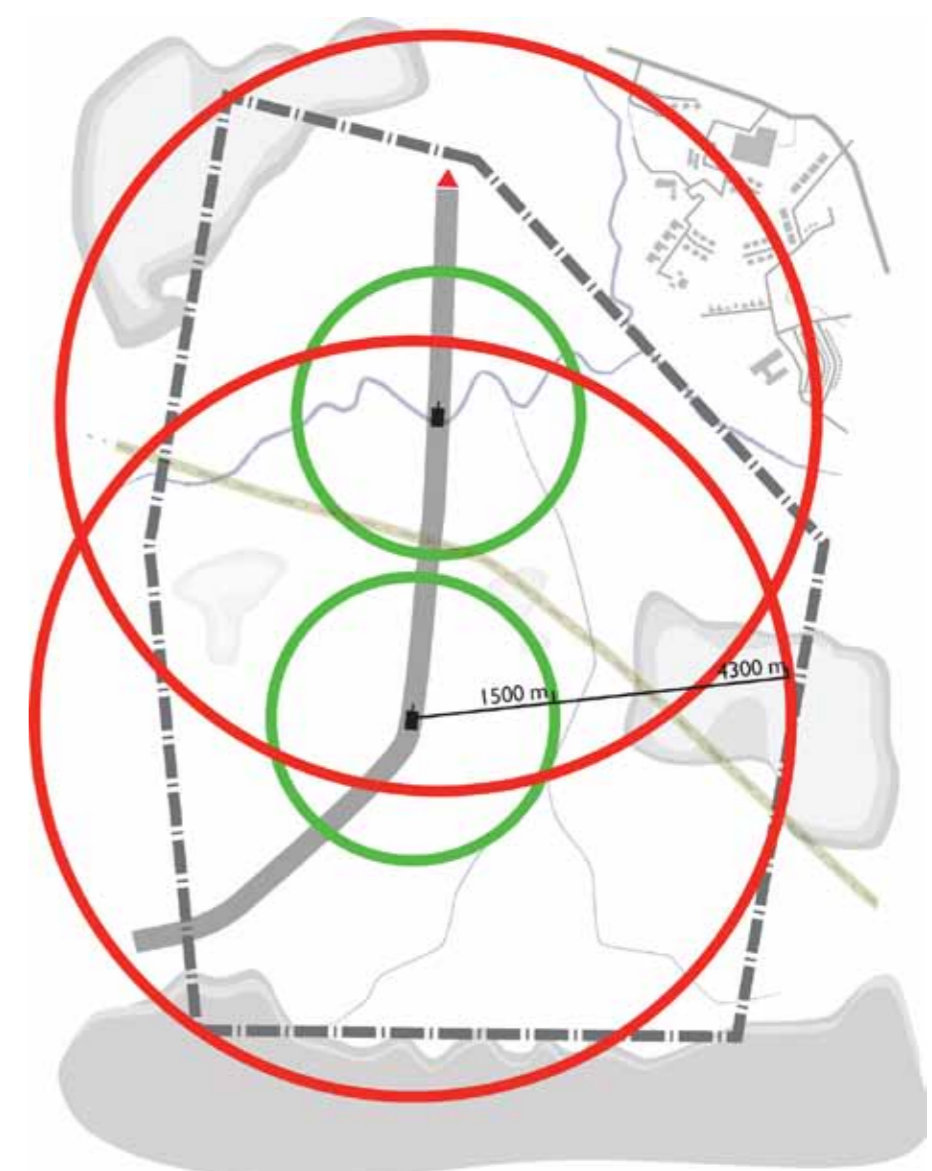
The warfighter must move swiftly, often from house-to-house, clearing areas and rooms. There is no time to think or adjust the weapon to minimize the risk of collateral damage. This said risk must be minimized by the system and the ammunition which is being used. Such performance is built into the system by using a Reduced Range Ammunition for urban combat.

Nammo's answer to this problem is a family of 100% lead-free 5.56mm and 7.62mm Reduced Range ammunition (RR). These rounds have full combat performance and matched trajectory compared to M855/M80 up to 200 meters, but with a safety fan of only 1500 meters. This makes it safer to use live ammunition in politically sensitive or populated areas.

The RR round is also perfect as a combat round on missions where combat-risk zones may be limited. It is also highly suitable for federal and law enforcement operations in public areas.

The RR round can also be used as a training round, and in some cases can improve training. One example is situational awareness for a vehicle crew. It is often a problem on small firing ranges to fire in all directions using live rounds because of their large safety fan. Training in a fighting vehicle for 360-degree awareness using the reduced range ammunition requires a much smaller safety fan compared to a ball round. The safety fan is reduced to a maximum of 3000 meters around the ve-

hicle, compared to 8600 meters for a 7.62mm ball round.



## Development Contract for F-35 Ammunition

by Eva K. Friis, Project Manager, Medium & Large Caliber Division

Nammo Raufoss AS and the Norwegian Defence Logistics Organization (NDLO) have signed a contract on the final development and qualification of the 25mm APEX (Armor Piercing with EXplosive) ammunition and the associated training ammunition for the F35 Fighter.

The contract was signed by Nammo CEO Edgar Fossheim, and head of NDLO Major General Trond R. Karlsen on November 25, 2010. The contract is worth up to NOK 88 million. Of this amount, Nammo will be providing up to NOK 22.2 million. Furthermore FFI (the Norwegian Defence Research Establishment) will participate in the development with funding from the NDLO for up to NOK 7.5 million.

Nammo started developing the APEX ammunition in 2005. This year is the final year of the development. The qualification phase is expected to conclude by mid-2013.

None of the ammunition types currently on the market are designed to meet the increased user requirements of aircraft ammunition. In order to meet the current and future operational challenges, the users want ammunition that is able to defeat both air and ground targets. APEX is designed to meet these requirements and is effective against both armored and light-skinned targets.

Nammo has a long history as developer and manufacturer of aircraft ammunition. Nammo's MP (Multipurpose) ammunition is used on a wide spectrum of aircraft and ground-based platforms.

The APEX, with its explosive and incendiary filling, has the advantages of traditional HEI (High Explosive Incendiary) rounds and MP (MultiPurpose) rounds, which is important for defeating lightly to moderately protected targets. A fuze initiates the explosive after a delay so the blast and fragmentation is delivered inside the target.

In addition, APEX has AP (Armor Piercing) capability against armored ground targets. The tungsten carbide penetrator is able to penetrate targets with thicker armor than the full caliber shell body can do. The tungsten carbide penetrator is placed in the



Signing of the contract: State Secretary Roger Ingebrigtsen (standing), Nammo CEO Edgar Fossheim (left) and Major General Trond R. Karlsen from NDLO. Photo: Norwegian Ministry of Defence.

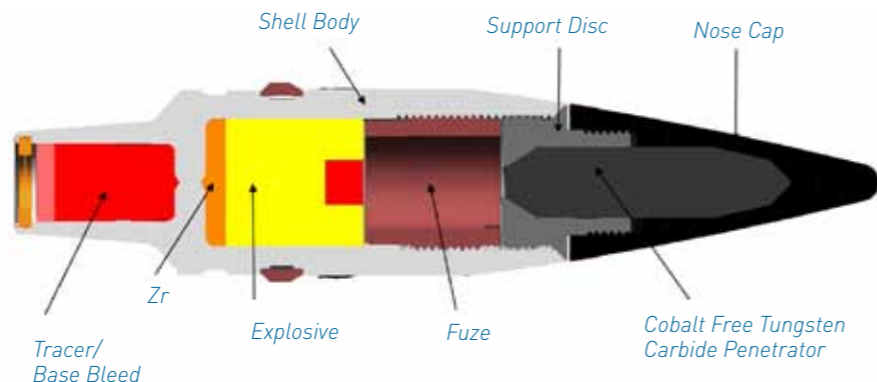
front end, and is then given an extra push from the weight of the shell body to further enhance the effectiveness of penetration. Once inside the target, the penetrator bursts into heavy fragments.

Parallel to the APEX development, Nammo is developing a 25mm training round. The design is based on Nammo's Reduced Ricochet Risk (RRR) technology. With the RRR concept, the risk of self-damage to the aircraft by flying into ricochet rounds is greatly reduced when compared to traditional training ammunition. The 25mm TP-RRR is a ballistic match to the APEX.

Just like MP ammunition was developed for aircraft in the 1970s, and has been adapted for other platforms and in various calibers, APEX ammunition can also be adapted for use on different platforms and calibers.



High speed camera photo of a detonating APEX round in a light-skinned - i.e. 2mm DurAl plate multi-array target. Photo: Alexander Kralic



## Hystrix – Metamorphosis of a Hand Grenade

by Olli Harju, Business Area Manager, Mortar Products, Medium & Large Caliber Division

Nammo is a major player in today's military munitions market, delivering high technology products to allies worldwide. One of the latest innovations is the Hystrix Close Range Defense System (CRDS) developed by Nammo Lapua Oy Vihtavuori plant.

The basic idea of Hystrix is to fire pre-fragmented grenades into a target area. Since Hystrix grenades operate as an air-burst munition, they are effective over all kinds of terrain. The effect of the system is based on the even distribution of up to 7500 high-penetration fragments covering a target area of approximately 2500 square meters.

Nammo has a long history of developing and manufacturing high-quality hand grenade products for demanding customers and conditions. The Hystrix grenade is based on Nammo's pre-fragmented hand grenade. Customized ammunition can be developed based on this design. Nammo's selection includes fragmentation, offensive, smoke and training hand grenades, all with extraordinary performance and scalable effect for different targets.

**OPERATIONAL CHARACTERISTICS**  
Modern surveillance technology is a way of controlling the fields that are at risk for unfriendly activities. Hystrix can be used as a single-man operated unit, but it can also be used with any existing surveillance and command system with electric or non-electric remote firing feature, to maximize the benefits of the weapon system.

Hystrix operates as an indirect fire unit. No electricity is required when using Nammo's Shock Tube system for firing, and operational areas can be extended by attaching several Hystrix units together. System safety is evaluated and tested according to applicable STANAG requirements.

**PROTECT – PREVENT – PRESERVE**  
Nammo's vision, Securing the Future, is the guideline for all activities within the company. Nammo takes part in securing the future by delivering high-quality products to the national armed forces and allied nations. By Hystrix CRDS, Nammo is introducing technology that allows

adequate response to situations and challenges in modern missions.

Hystrix protects military and civil locations, troops, positions and actions whenever needed. Hystrix also prevents the enemy from taking hostile actions against a line of defense, while preserving the dominant strategy applied to important areas. Hystrix enables the user to increase the flexibility and operability of a weapons inventory, and gives the user an optimal solution for controlling vicinity.





## Shoulder-Launched Munition Solutions

by Gary Ostendorf, Marketing Manager and Special Projects, Nammo Talley  
Dee Swartz, Director Business Development, Weapon System Programs, Nammo Talley

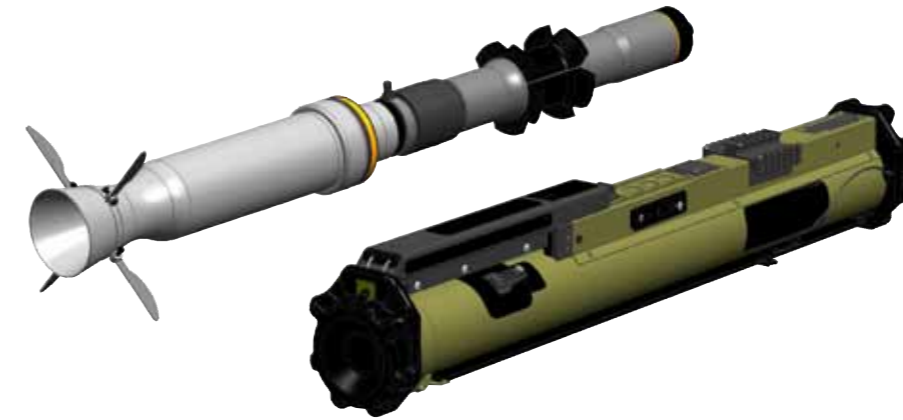
Nammo has a family of Shoulder-Launched Munitions (SLM) to confront a variety of modern battlefield threats. These solutions for today's highly mobile fighter include the light and disposable 66mm M72 Lightweight Assault Weapons (LAW) Family of Weapons; the increased capability, light and disposable 83mm M141 Bunker Defeat Munition (BDM); and the crew-served light, reusable 83mm Serpent. All Nammo SLM solutions provide multipurpose target capability. Solutions range from pure light armor penetration to light-to-medium urban targets, medium-to-heavy urban targets, and a reusable system that covers all targets.

A direct result of Soldier Lessons Learned is the M72ASMRC and the M72A9ASM fielded to give devastating firepower against threat personnel located inside urban masonry structures, light vehicles, or behind earthen fortifications to every squad member and keep size and weight to a mini-

mum. The ASMRC has a reduced caliber carbon fiber warhead, designed for penetration of light-to-medium masonry walls and enhanced blast without fragmentation. It features a dual safe, dual mode fuze allowing for a long or short delay chosen by the gunner. The M72ASMRC composite warhead reduces collateral damage as it minimizes fragmentation. The ASMRC has a newly developed launcher. The new launcher has a better sight, an on-axis trigger and is made lighter by its carbon fiber construction. These factors allow targets to be hit with better accuracy. The M72A9ASM penetrates targets, placing the high output blast [50% more explosive than the M72ASMRC] fragmentation warhead inside to maximize effectiveness. High performance enhanced blast explosives, with fragmentation and structure-penetrating warheads, maximize behind target effects with the preset time delay fuze. Both the M72ASMRC and M72A9ASM have proven to

be exceptionally effective in combat and are in current production.

The M72LAW Anti-Armor family of systems includes the M72EC-Mk1, M72EC-Mk2 and the M72A4 - A7. The latest qualified M72 EC Mk1 and Mk2 have a newly developed launcher with anti-armor warheads designed for RHA penetration greater than 450 and 300mm, respectively. The warhead replaced octol with PBXW-11 (Insensitive Munition) explosive and a dual safe fuze. M72A4 - A7 variants produce RHA defeat, from heavy armor to multipurpose effects on concrete and light armor. The new M72E8 and E10 models introduce true fire from enclosure propulsion systems with the proven multipurpose and anti-structure warheads already in service. The FFE systems will begin qualification testing in 2011 and will be ready for fielding in 2012. Additional User-recommended M72 warhead development work is being conducted



on airburst, enhanced penetration and increased capability variants. In general, M72 family of munitions is well known for their lightweight, reduced length, ease of operation and outstanding effects on target.

Nammo produces ammunition for the reusable 83mm Shoulder-launched Multi-purpose Assault Weapon (SMAW) and the single shot M141 Bunker Defeat Munition (BDM). In production SMAW ammunition includes the High Explosive Dual Purpose (HEDP) and the SMAW Novel Explosive (NE) rounds. The HEDP and NE rounds provide unequalled performance against medium-to-heavy masonry, walls, earthen fortification, caves, and armored personnel carriers. The NE round is specifically designed as an anti-structure munition with almost twice the explosive of the HEDP, making a powerful tool against larger structures and cave complexes. BDM is the first lightweight shoulder-launched weapon system with true multipurpose effectiveness using the same highly effective rocket used in the SMAW. The BDM rocket comes packaged in a rugged, compact, telescoping, disposable launcher, featuring all the necessary gunner controls to aim and accurately fire the weapon. Currently in service for ongoing operations, the BDM is combat-proven against adobe buildings and earthen fortifications.

As the asymmetric characteristics of modern conflict continue to change, the need for accurate, lethal, unit-level fire support has never been greater. Nammo and Raytheon Missile Systems are working together to deliver this critical capability to today's warfighter through the Serpent Modular Assault Weapon. Serpent provides more effective performance against critical targets, especially in urban combat environments. The launcher features low-risk, proven and fielded technologies to increase

the combat utility of existing munitions. Integral range-finding capability, a ballistic computer, and a high performance thermal sight with a disturbed reticle enhance the gunner's first-round target-hit accuracy, all in a light (12 lb./5.44kg) and compact (31-inch/787mm) package. The Low-signature Encased Assault Projectile's (LEAP) fire-from-enclosure propulsion allows target engagement from inside buildings or within other protected positions to greatly reduce assault-team exposure to counter-fire. The new enclosure-firing capability maximizes the Serpent launcher's advantages for the assault team, combining the anti-structure capability of the current SMAW warheads with a new, highly reliable electronic fuze. Serpent will enter system level qualification in the near future.

No gunner training system can match the M72 21mm rocket for effective gunner skill building and low cost. The simple barrel insert quickly converts any M72 tactical launcher into a firing marksmanship trainer and forms the heart of the trainer weapons built for the M141 BDM, SMAW and Serpent systems. The fully qualified trainer rocket realistically simulates tactical round firing effects efficiently achieving and maintaining superior gunner skills. The Nammo 21mm training system is US Army Type Classified, has US Navy Service Release, and is currently in production.

Nammo has a Shoulder-Launched Munition solution for every target on the battlefield. Our target set goes from tanks to technical vehicles, reinforced concrete to hastily prepared positions and all targets in between. Nammo has an unmatched legacy of durable, safe, highly effective weapons. This legacy is a result of the close work we do with Users worldwide to continuously update and improve SLM capabilities to meet battlefield challenges.



## In service with the US Marine Corps

by John Hill, Vice President Business Development, Nammo Talley

Nammo's shoulder-launched products have been in service with the USMC throughout Operation Iraqi Freedom and Operation Enduring Freedom in Afghanistan. The M72A7 LAW's light weight and compact size made it the system of choice for the dismounted light fighter. There have been numerous reports of Marines having used the M72A7 to suppress enemy positions at ranges over twice the advertised maximum range of the system. Nammo is currently moving forward into the qualification phase for the USMC's two new M72 Fire from Enclosure (FFE) systems. The two variants are the M72A8 High Explosive Anti-Armor (HEAA) and M72A10 Anti-Structure Munition (ASM).

Nammo also provides the Marines with 83mm ammunition for their long-standing

crew-served workhorse, the 83mm Mk153 Mod-0 Shoulder Fired Multi-purpose Assault Weapon (SMAW). This Marine asset has been the backbone for the Marine rifle companies' assault support since its fielding in 1983. The SMAW's versatility stems from the variety of missions it can perform, from neutralization of fortified positions, buildings, and caves, to heavy armor defeat. Nammo Talley and its partner, Raytheon Missile Systems, of Tucson, Arizona, are in the process of designing the Marine Corps' next generation SMAW II and new 83mm Fire from Enclosure (FFE) ammunition. The new SMAW II launcher (Shoulder Fired Modular Assault Weapon II) is a state of the art system capable of seamless day and night operation with its own integrated fire control system. The current contract will qualify the launcher followed by the

Fire From Enclosure Round. Following that will be a low rate initial production for the launcher and then the round.

Nammo supports more than just combat systems for the Marine Corps. We are one of the major corporate sponsors for the Marine Corps Association. The association is a non-profit organization that supports the active and reserve components of the Marine Corps with professional reading libraries, awards, and scholarships. Most notably Nammo is the Association sponsor for the Henry Lewis Hulbert Award, an award given annually to the most accomplished Marine Infantry Weapons Officer, Marine Gunner, in the Marine Corps.

## Hulbert Award 2010

by Sissel Solum, Senior Vice President Communication, Nammo Group

During the Marine Corps Ground Dinner on Thursday 5 May Nammo was Platinum sponsor to the Hulbert Award.

The Hulbert Trophy for Outstanding Leadership is an award presented annually in memory of Marine Gunner Henry Lewis Hulbert, U.S. Marine Corps, Medal of Honor recipient, killed in action at Blanc Mont Ridge, France on October 4, 1918. While this award will be presented to an individual, its establishment recognizes the vital contributions that Marine Gunners make to the Infantry and Ground Combat Element as a whole.

The mission is to recognize the Marine Gunner who best exemplifies outstanding leadership, courage, and technical expertise within the Ground Combat Arms community.

The recipient of the 2010 Hulbert Trophy was Chief Warrant Officer 2, Paul W. Sandy, who currently serves as the Battalion Gunner, 2nd Battalion, 2nd Marines.

Since he is stationed abroad and could not be in Washington to receive the Award, he was represented by his wife Elisabeth and his oldest son Ethan Harold Sandy, age 12.

The price was handed out by General Dunford, Assistant Commandant of the Marine Corps, with the support of the President of Nammo Talley, Steve Wegener and Nammo's CEO, Edgar Fossheim.

It was a proud young boy who came on stage to receive the award on behalf of his father.



From left: Pat Woellhof, Director of Marine Corps Operations, Nammo Talley, Ethan Harold Sandy and his mother Elisabeth.

## The North Star Concept

by Turi Røyne Valle, Program Manager, Missile Products Division

Nammo has been involved in the development of hybrid rocket motor technology since 2003. From 2005 to 2007, Nammo carried out a large development project, which included the design, manufacture, test and launch of a completely operational sounding rocket. The rocket was launched in May 2007 at Andøya Rocket Range. The rocket was 10 meters long and 250mm in diameter, with a thrust of 30kN. The launch was a great success, and resulted in several new studies and development projects funded by the European Space Agency (ESA). The main objective of these was to further develop the hybrid rocket motor technology to increase the technology readiness level (TRL), making it useful on next generation European Space applications.

A hybrid rocket motor uses fuel. The liquid component and the solid component are comprised of hydrogen peroxide in combination with a rubber-based grain. This gives an effective and compact rocket motor with an adjustable thrust, and its exhaust is environmentally friendly. In addition, this technology makes it possible for the motor to perform several functions, which simplifies the design of the launcher or the spacecraft. The excellent results from this project will be used in new and on-going technology projects at Nammo. Nammo is currently involved in a project where this technology will also be used on a Mars Lander prototype.

In 2010, Nammo made substantial progress with this new hybrid rocket motor technology in a project carried out in cooperation with SAAB Underwater Systems, and with financial support from the ESA. Twenty-nine hybrid rocket motors were fired over an 11-day campaign. This was an important step forward in Nammo's vision of delivering effective, controllable, environmentally friendly and non-toxic rockets to Andøya Rocket Range. They fulfil the cooperation by launching the sounding rockets produced in Norway, the North Star concept.

Now in 2011, a new project has started under contract with ESA, which includes scaling up the hybrid rocket technology to make a rocket that is large enough to reach altitudes greater than 100km. Over the next three years, Nammo's goal is to static-fire

several large hybrid rocket motors with the ability to bring small payloads to altitudes greater than 100 km. The launches will again take place at the Andøya Rocket Range. This project means that the North Star concept rocket is one step closer to becoming reality.



North Star Concept



Test firing at SAAB Underwater Systems in Motala, Sweden.



## AMRAAM – Entering into the qualification phase

by Tor Arne Skjervheim, Program Manager, Missile Products Division

After successfully completing the development phase, the AMRAAM program is now ready for starting up qualification of the Nammo AMRAAM rocket motor. These are the highlights from the development phase:

- Static firing of 12 motors with excellent results
- Successfully testing of Thermally Initiated Venting System (TIVS) on 2 motors
- Combustion stability verification on 3 motors without signs of instability
- Sufficient thermal, ballistic and structural margins demonstrated by analysis and verified by testing

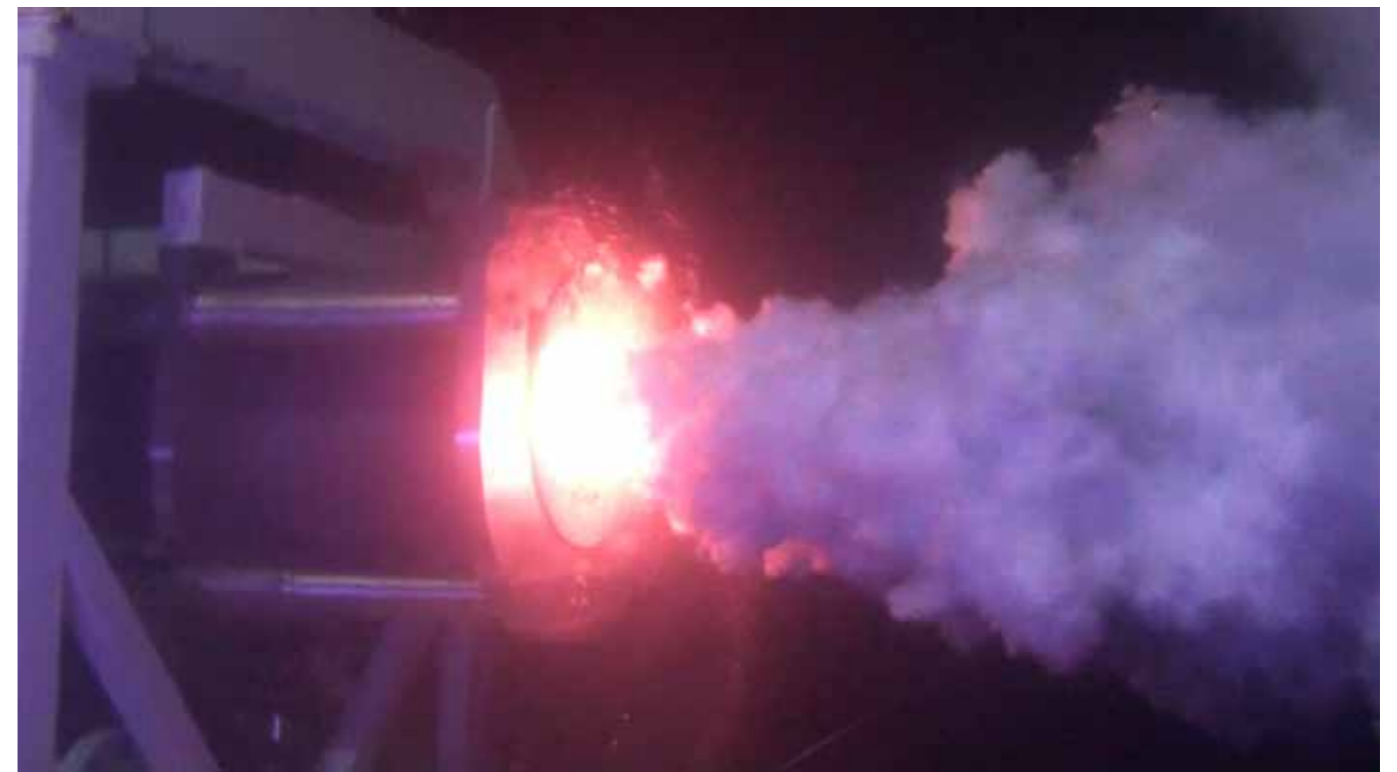
- Excellent propellant characteristics proven

Critical Design Review (CDR) was conducted during week 13, formally closing the development phase for all parts of the motor except the steel motor case. The attendees representing our customer, Raytheon, expressed their satisfaction with the work conducted so far, and gave their consent to proceed to qualification.

A steel motor case for this rocket motor is under development by Nammo in co-operation with the German company Winkelmann. A second CDR focusing on

the steel motor case only is planned in June, followed by an extensive safety and Insensitive Munitions (IM) test program on the complete motor with the new casing.

A decision has also been made to build a production line at Nammo Raufoss for the motor case during the production phase. This investment, which includes equipment for machining, welding, heat treatment, surface coating and non-destructive testing, has been applauded by our customer, and fortifies Nammo's position as an independent rocket motor manufacturer.



Underwater test of Scalp Naval rocket motor.

## MBDA Award for Nammo

by Frank Møller, Vice President European Programs, Missile Products Division

Nammo has just received the Innovation 1-Star award for 2010 from MBDA.

Every year, MBDA employees and organizations can suggest the outstanding technical achievements for an Innovation award. Nammo was nominated in 2006, and

received the award for the innovative design and development of the nozzle with thrust vector control for the Exocet MM40 block 3 booster motor. The 2010 nomination and win were for the planning and execution of a very complex underwater test of the Scalp Naval rocket motor.

The test was carried out in a fjord south of Norway, and the firing was documented by underwater video, along with pressure and thrust measuring instruments. MBDA found no solution to carry out this test in France, so it gives full credit to the Nammo team that was present.

## Laws & Regulations

- The Nammo products are all according to national & international laws and conventions
- Nammo's export of defense materiel will always require an export license from the national authorities where we operates from
- End user certificate is usually required by the respective national authorities when we apply for an export license
- Every Nammo facility producing defense products must comply with the national export regulations of its respective country
- Nammo mark all products according to customer requirement and/or NATO standards.

## Nammo Vision and Values

Personnel in various positions and divisions at Nammo were asked:

1. How do you contribute to our Vision: "Securing the Future"?
2. Give an example of how you have seen any one of our company Values being put to use: Dedication, Precision, Care.



**BRITT STAAF**

*Purchaser  
Nammo Vanäsverken  
Sweden*

1. As a purchaser it is my responsibility to establish a stable and long-term relationship with our suppliers. This ensures the supply of high-quality components for the making of high-quality products for our customers

2. Care: During and after a long-term sick leave, my employer's attitude and thorough follow-up was exceptional. It enabled me to return to work and feel very welcome, and made for a smooth transition to a workload that had been adjusted to suit me.



**LONNIE MYKLEBUST**

*Contracts Administrator  
Missile Products Division  
Raufoss, Norway*

1. My contribution to "Securing the Future": We work in the most regulated industry in the world. Each country has its own set of laws regulating the sale and export of our products, and many additional protocols are layered on top, like the European Defence Agency's Procurement Regulations and the Wassenaar Arrangement, and the United States' Comprehensive International Traffic in Arms Regulations "ITAR." I work with these regulations and regimes on a daily basis, and I help Nammo to maintain a level of understanding and proactive planning in order to achieve compliance. The world is Nammo's marketplace, and in order to secure the future we must remain knowledgeable about the ever-changing regulations which govern our marketplace.

2. An Example of Dedication: The Nammo culture of a dedicated workforce is what

attracted me to Nammo as a place to work. I have traveled to Nammo sites in Europe and the United States, and I have been extremely impressed with the dedication of the men and women who are Nammo. We have employees who are second and third generation workers of the legacy of Nammo. These families have built Nammo through the history of ownership, transformation, and changes in the geo-political landscape. It is inspiring for me to know that the dedication of these families has built a solid foundation for Nammo.



**ERKKI MÄKELÄ**

*Site Manager  
Nammo Lapua,  
Vihtavuori, Finland*

1. In order to share the meaning of the Values at Nammo with all of the employees at Vihtavuori, I contribute to giving all of them a broader view of Nammo. I translate important information into Finnish, so that it is easily understood by all of my workers. I repeat what the values mean, and remind them to care about each other. In internal presentations for White Collar people in Vihtavuori we always include the Vision and the Values, and discuss how we can include them in our daily work.

2. Focusing on the Values, we all get motivated to work for a better life. Care: In Vihtavuori we take care of the employees' health, as they can participate in a program after short-term sick leave, which includes close follow-up conversations.



**GALE LASLEY**

*Manufacturing Processor IV  
Nammo Talley, Mesa,  
Arizona, USA*

We experience one or more of our core values in the workplace on a daily basis. Over the years at Nammo Talley (NT), I have seen numerous changes in people, processes, and products come and go, and those changes also include me.

My first 11 years at Nammo Talley was as a Quality Control Inspector. I then moved to Manufacturing and am currently a Manufacturing Processor. In these 20+ years at Nammo Talley I have been committed to the growth of the company through dedication, precision and care in my work performance – but it's not just me – it's becoming the culture of NT. We strive every year to reach record sales at NT.

The way I see it, it's because of our dedication to the people, and our dedication to our processes that says more than I can. There is no way we could have reached these milestones without Dedication. It's the front runner for our ideals, that we can make it from the time product hits the manufacturing floor to the shipping dock. Precision is also why we pay close attention to details. We ask ourselves: how can we improve this process and reduce cost before the next build? We Care that what we produce works the first time, every time. Out of everything I do here, that is what matters the most to me. I'm a mother of three adult children and my oldest son was in the Navy. Our customers depend on me.

I'm very proud to have had a part in our growth and the continuous care for our products, customer satisfaction, product reliability, and the confidence that our customers have in us. "Securing the Future" makes us highly competitive. I can see the future, and Nammo Talley is there.



**ANDRÉ LUTZ**

*Site Manager  
Lapua GmbH,  
Schönebeck, Germany*

1. I feel my contribution is through my daily work as a Site Manager. I take care of all the people I'm responsible for, both employees and customers, and try to make sure they do their best.

2. Dedication and Precision are both essential in the continuous improvement of our production processes. All products, in particular the .22cal for both Lapua and SK brands, are constantly being improved to satisfy our customers.

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## Nammo's vision: Securing the Future

- We will protect our national and allied forces with high-quality defense products
- We will secure the future development of eco-friendly products, processes and services
- We will secure our continued growth based on a strong financial performance
- We will develop and secure a long-term, sustainable business for our customers and employees
- Our future development depends on a secure and safe working environment

S E C U R I N G   T H E   F U T U R E

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