
Profile
2016/17



Financial Highlights

CONSOLIDATED

DKK million	2016/17	2015/16	2014/15	2013/14	2012/13
Key figures:					
Order intake	1,411	1,671	1,394	1,455*	2,037*
Order backlog, year-end	2,431*	2,739*	2,567*	2,507*	2,188*
Revenue	1,719	1,499	1,308	1,137	1,140
EBITDA	288	220	174	159	130
Depreciation, amortization, and write-downs	147	107	74	75	57
Operating profit	141	113	100	84	73
Financial income and costs	(21)	(28)	(29)	(30)	(30)
Earnings before tax (EBT)	120	85	71	54	43
Profit for the year	91	66	53	53	29
Non-current assets	899	839	796	788	785
Current assets	892	862	763	714	755
Total assets	1,791	1,701	1,559	1,502	1,540
Investment in property, plant, and equipment	129	56	30	26	12
Equity	562	572	491	490	440
Subordinated loans	125	0	0	0	0
Capital base**	687	572	491	490	440
Provisions	146	149	127	123	137
Non-current liabilities other than provisions (excl. subordinated loans)	298	344	394	440	399
Current liabilities other than provisions	660	637	547	449	564
NIBD (excl. subordinated loans)	306	418	389	431	393
Cash flows from operating activities	285	120	133	50	128
Cash flows for investing activities	(208)	(139)	(81)	(77)	(52)
hereof investments in property, plant, and equipment	(134)	(70)	(35)	(28)	(12)
Cash flows from financing activities	(36)	17	(67)	(47)	(13)
Total cash flows	41	(2)	(15)	(75)	63
Financial ratios:					
EBITDA margin	16.8	14.6	13.3	14.0	9.3
EBT margin	7.0	5.7	5.4	4.7	3.8
Return on investments	8.2	7.0	6.6	5.9	5.3
Liquidity ratio	135	135	139	159	134
Solvency ratio (capital base)	38.4	33.6	31.5	32.6	28.7
Return on equity	16.1	12.5	10.8	11.4	6.8
Leverage ratio	1.1	1.9	2.2	2.7	3.7
Average number of full-time employees	1,257	1,174	1,117	1,065	1,080

* Including five-year framework agreements relating to the F-35 Joint Strike Fighter program.

** Capital base is defined as equity and subordinated loans.

Financial ratios are calculated in accordance with "Recommendations and financial ratios 2015" of the Danish Finance Society.

Definitions

EBITDA margin:	$\frac{\text{EBITDA} \times 100}{\text{Revenue}}$	EBT margin:	$\frac{\text{Earnings before tax} \times 100}{\text{Revenue}}$
Return on investments:	$\frac{\text{Operating profit} \times 100}{\text{Average operating assets}}$	Operating assets:	Total assets less cash at bank and in hand, other interest-bearing assets, and equity interest in affiliated companies
Liquidity ratio:	$\frac{\text{Current assets} \times 100}{\text{Current liabilities other than provisions}}$	Solvency ratio: (Capital base)	$\frac{\text{Capital base} \times 100}{\text{Total liabilities at year-end}}$
Return on equity:	$\frac{\text{Profit for the year} \times 100}{\text{Average equity}}$	Leverage ratio:	$\frac{\text{NIBD (excl. subordinated loans)}}{\text{EBITDA}}$

Images: European Space Agency, Lockheed Martin Corporation, Royal Danish Navy, Royal Netherlands Air Force, IOMAX/USA, Siemens, Nordex, U.S. Air Force, David Bering, and Terma

Highlights of the year 2016/17

- The UAE-based Al Maskari Holding and Terma agreed to establish a Joint Venture, named Terma Middle East LLC, to operate from its new office in Abu Dhabi and serve as the interface to partners, customers, and clients in the UAE.
- Madrid Barajas Airport joined the long list of airports to operate the new generation Solid State SCANTER 5502 Surface Movement Radar.
- Tata Advanced Systems' subsidiary Nova Integrated Systems (NISL) and Indian Ministry of Defence signed a contract for a surface surveillance radar project. NISL has partnered with Terma to undertake the manufacturing, integration, and testing of the radar system under Transfer of Technology in India.
- With Royal Netherlands Air Force being a valued Terma customer, it was a pleasant continuation of a long lasting collaboration to sign a new contract for missile warning integration and Flare-up for the Dutch F-16s.
- Six students from the Technical University of Denmark and Aarhus University were selected for the 2017 F-35 Master's student internship offered by Lockheed Martin Corporation in Texas, in close collaboration with Terma.
- GET Group and Terma entered a strategic partnership to promote Terma's acclaimed intelligent wide area protection system, T.react CIP, across the continent of Africa and Egypt.
- The European Union decided to support Terma with a MEUR 28 loan from the European Investment Bank (EIB). The loan was the first corporate transaction in Denmark to be guaranteed under the European Fund for Strategic Investments, heart of the Investment Plan for Europe, in which the EIB is the European Commission's strategic partner.
- Terma and BAE Systems agreed to continue and intensify their collaboration on helmet audio advances – the BAE Striker® II Helmet with Terma 3D-Audio technology.
- Terma signed a contract with NATO Alliance Ground Surveillance Management Agency (NAGSMA) for delivery and installation of an automated target recognition and identification system for the NATO Alliance Ground Surveillance (AGS) Programme.
- Following Denmark's decision to acquire 27 F-35As, Terma and Lockheed Martin Corporation confirmed opportunities for Terma to pursue additional component production for the F-35 Joint Strike Fighter beyond their current contracted agreements.
- With a global footprint and European companies in Denmark, the Netherlands, Germany, the UK, and the opening of the NATO and EU office in Brussels, Terma is a key supplier to most NATO member states within airborne and naval platforms and the land-based radar segment and to the European space industry.
- The Danish Defence Acquisition and Logistics Organization (DALO) entered into an agreement and signed a contract with Terma on Integrated Air and Missile Defense (IAMD) for study and advisory support within the Ballistic Missile Defense and IAMD domains.
- Terma and Atlas Telecom signed a long-term partnering agreement covering T.react CIP solutions for wide area protection of critical infrastructures. A demo system was set up in the Emirate of Abu Dhabi where customers can experience the frontier of wide area protection technology available in the world today.
- The European spacecraft ExoMars with the Terma developed "Remote Terminal and Power Unit" for the landing module Schiaparelli and critical software for the Mission Control System to monitor and control the mission was launched in March 2016.
- Terma's regional offices in Singapore and India were announced to merge into one region, named Terma Asia Pacific, to create synergies, allocate resources, and more effectively manage and pursue business opportunities across the Asia Pacific region.

Terma at a Glance

2016/17 IN NUMBERS

Order intake
(DKK million)

1,411

Down from 1,671

Order backlog, year-end
(DKK million)

2,431

Down from 2,739

Earnings before tax (EBT)
(DKK million)

120

Up from 85

Revenue (DKK million)

1,719

Up from 1,499

EBITDA (DKK million)

288

Up from 220

Return on investments (%)

8.2

Up from 7.0

Leverage ratio

1.1

Down from 1.9

Capital base (DKK million)

687

Up from 572



Letter from the CEO

As President & CEO of Terma, I take pride in introducing you to yet another positive and satisfactory year for Terma.

In 2016/17, we continued the positive development within all Business Areas. The order intake of MDKK 1,411 resulted in an order backlog of MDKK 2,431 which provides for a comfortable business base this year as well as in the years to come.

The 2016/17 revenue of MDKK 1,719 represented a year-over-year growth of 15% – a strong growth for the third year in a row. 94% of the revenue was generated outside Denmark.

Earnings before tax increased to MDKK 120 from MDKK 85 in 2015/16, representing a growth of 40%.

Another significant achievement was the reduction in the net interest-bearing debt from MDKK 418 the previous year to MDKK 306, despite significant investments in the F-35 program ramp-up as well as investments in product development. This positive development is primarily driven by recent years' efforts to reduce working capital.

The overall strategy of Terma stands on three fundamental pillars; growing the top line, breaking the cost curve, and development of the organization. The objective of all three strategic initiatives is to ensure a profitable and sustainable growth.

This year, we expect a consolidated organic growth >10% in revenue based on the solid order backlog. The U.S. and Europe will continue to be important growth markets for Terma, and we also foresee growth in the Middle East and Asia Pacific, including India.

A significant growth driver for Terma will be the ongoing ramp-up in the F-35 program. Following the June 2016 Danish Government decision to acquire 27 F-35 fighter aircraft, as replacement for Denmark's F-16 fighter aircraft, negotiations have been initiated for Low Rate Initial Production (LRIP) 12-14 orders in excess of 1 billion DKK, expected to be concluded during 2017 and early 2018.

At year-end, total staff was 1,339 Full-Time Employees, an increase of 150 employees.

Jens Maaløe
President & CEO

Per Thiesen
Executive Vice President & CFO

Steen M. Lynenskjold
Executive Vice President & CCO



From left: Steen M. Lynenskjold, Jens Maaløe, Per Thiesen

Our business

Terma provides mission critical solutions for the aerospace, defense, and security industries. We are guided by one overall purpose: to deliver security for countries, alliances, and individuals. Security is a means to maintaining and developing prosperity and protecting human lives and sovereignty.

The Company consists of four Business Areas: Aeronautics; Space; Surveillance & Mission Systems, and Support & Services.

Aeronautics provides aircraft self-protection, 3D-Audio, and Active Noise Reduction solutions for all types of military aircraft as well as high-technology aerostructures and electronics manufacturing services to large systems integrators and aircraft manufacturers worldwide.

The down-selection of the F-35 as Denmark's next fighter aircraft fulfilled a critical pre-condition for the expansion of the production capacity in the Aerostructures Manufacturing facility in Grenaa, Denmark. Last year, the first phase of a significant investment plan was completed. The investment ensures necessary production capacity for F-35 annual full-rate of 170 aircraft. In 2017, the plant produces panels and components for 57 F-35 aircraft, a quantity that will increase to 94 in 2018. Read more on page 11.

Focus on upgrade of F-16 pylons to PIDS+®, optionally integrating the MILDS-F missile warning sensors, and adding a flare-dispense capability (Flare-up®), has significantly strengthened Aeronautics' market position.

Space develops and supplies electronics, software, and services for satellites, space control centers, and for test and validation tasks related to development of new satellites and spacecraft.

Building on the power electronics delivered for the ExoMars 2016 mission, a new power electronic product series has successfully been introduced, and new contracts are secured in the defense and telecom markets.

Terma develops the Mission Control System for the ESA satellite Solar Orbiter's positioning and orbit. The satellite will conduct observations close to the Sun. Terma's software is crucial for the satellite's correct positioning relative to the Sun. Building on that success, a major software program is under development for the ExoMars 2020 mission as well as for ESA's Earth observation program JASON.

Surveillance & Mission Systems provides radar systems for coastal surveillance and traffic control in sea ports and airports, radars for naval vessels as well as radars for wind turbine interference mitigation and Obstruction Light Control. The activities also cover command, control, and communications solutions for naval vessels and air defense systems, self-protection systems for naval vessels as well as systems for security surveillance of critical infrastructures.

2016/17 was the most successful year for the Surveillance & Mission Systems Business Area to date with high revenue growth, a significant radar sale, and a growing command and control systems pipeline.

Terma Support & Services provides maintenance, support, and update of Terma and third-party products and solutions.

Maintenance, Repair & Overhaul (MRO) capabilities are expanding in both the Netherlands and in the U.S. Strong and mature MRO capabilities, together with a dedicated business development effort, are important enablers for pursuing and capturing MRO services for third-party OEMs.

As a truly global Company, Terma is active in more than 40 countries worldwide, and within all business activities and programs, we collaborate with nationally as well as internationally based suppliers and partners encompassing well over 700 suppliers and partners.

Since starting our journey in 1949, Terma has maintained deep and proud roots in Denmark. Denmark is our center as we do business around the world. Terma believes in international partnerships and strong strategic alliances. Rooted in a small country, we depend on our ability to reach out to partners – and create solutions together.

Framed by the Market Development organization, Terma works closely with national defense forces, public authorities, and international organizations around the world. Our global expansion, with the purpose of being closer to key customers and end users, will accelerate in the years to come.

This global reach goes hand in hand with a natural focus on the Danish home market. A major task within our European region is to monitor the Danish market, with a holistic approach, and the region has successfully redefined our customer and stakeholder engagement with the armed forces, Danish political leadership, and relevant key government authorities.

Being the first corporate transaction in Denmark to be guaranteed under the European Fund for Strategic Investments, heart of the Investment Plan for Europe, the European Union supports Terma with a MEUR 28 loan from the European Investment Bank – a strategic partner to the European Commission. The loan entails research, development, and innovation investments for the development of radar technology and high-tech products for space applications.

Based on Terma's values of working with integrity, showing passion, and working globally, we wish to impact our industry and society in a positive way. Terma's Corporate Social Responsibility (CSR) program takes place in close interaction with customers, partners, employees, the local community, and the world around us.

On behalf of the Board of Directors and the Executive Management, I greatly appreciate the dedication, commitment, and efforts of our employees worldwide.

Yours sincerely,

Jens Maaløe
President & CEO



Daniel Maass
 Mechanical Engineer, Design in
 Airborne Mechanical Development
 MSc (Biomedical Engineering,
 Biomechanics), Aarhus University,
 Denmark

2017

Last year, Virtual Reality went mainstream. By 2020, Augmented Reality is predicted to reach a global revenue of more than **100 billion USD**

VIRTUAL REALITY



VISUALIZATION USING AUGMENTED AND VIRTUAL REALITY

In late 2015, Daniel Maass from Mechanical Development, Lystrup, came up with the idea behind the innovation project entitled “3D visualization, quality control and assembly tool”. His vision was to use existing 3D models of Terma’s products for more than just generating 2D drawings for manufacturing purposes.

The presentation included an interactive application where various steps in the assembly of e.g. aerostructures were animated on an iPad. The animation was aligned with real-world drawings using the technology “Augmented Reality” (AR). This implies that one can observe virtual elements in a real-world environment, when looking through the iPad.

Research & Innovation Management had experience with similar technologies from building interactive simulators for Aeronautics and was put in charge of the technical parts of the project, choosing the correct technologies, and implementing the proposed ideas.

The project has generated a massive interest inside and outside the Terma organization, and a team now works full time on the project.

In order to be at the forefront and utilize these new technologies, Terma is launching a technology project in order to increase the use of visualization. This takes place through the use of interactive 3D simulators as well as Augmented Reality (AR) and Virtual Reality (VR) technologies and aims at increasing the maturity level of these technologies.

For the 3D visualization, relatively well-known technologies will be used to create interactive simulators on either PC and/or iPad/iPhone platforms to support sales and marketing activities in all major Business Areas. This will ensure novel ways of presenting our products and solutions.

VR offers unique ways of displaying the capabilities of Terma’s products and solutions, by showcasing them in virtual environments similar to the real-life environments in which the products are used. For example, customers can already experience a virtual F-16 flight where Terma’s electronic warfare (EW) system is demonstrated in a realistic scenario.

AR is an emerging technology that offers virtual overlay of information on top of real-world products or environments. This part of the project will focus on increasing the maturity level of AR technology when used in a production setting. Initially, our goal is to determine how well the AR technology can help production workers, e.g. if the technology can contribute to reducing scrap due to errors.

Visualization using unique and noticeable technologies such as AR and VR also offers excellent branding potential. These new “experiences” draw many visitors at trade shows and job fairs and provide visitors and customers with the possibility to experience Terma’s products in a brand new way.

Significant milestones for 2017 include VR experiences for selected exhibitions within several of Terma’s Business Areas where the goal is to demonstrate our unique solutions.

In 2017, we will also explore the use of the AR technology in a production setting in connection with a new product introduction at our Grenaa facility.





Tanja Lindberg Pedersen
Operator, Untrimmed Composites
in Aerostructures Manufacturing
Trained in Terma

2017



3,000+
military aircraft
equipped with Terma's
airborne solutions

BUSINESS AREAS

AERONAUTICS

Aeronautics provides aircraft self-protection, 3D-Audio, and Active Noise Reduction solutions for all types of military aircraft as well as high-technology aerostructures and electronics manufacturing services to large systems integrators and aircraft manufacturers worldwide.

Aeronautics



TERMA TO INTEGRATE AIRCRAFT SURVIVABILITY EQUIPMENT ON DUTCH NH90 HELICOPTERS

In 2012, Terma completed a study program for Royal Netherlands Air Force (RNLAf) to identify the best possible way of protecting the NH90 aircraft against IR seeking missiles. The study identified a number of solutions all centered around a Missile Warning System, the Terma Advanced Countermeasures Dispenser System, and ALQ-213 Electronic Warfare (EW) controller.

The outcome of the study was extensively reviewed by RNLAf to make sure that all aspects of integration, operation, and continued airworthiness of the system were taken into account. The evaluation included assessment of the system when installed and operated, both on the land-based Tactical Troop Transport (TTT) version as well as the ship-based NATO Frigate Helicopter (NFH) version of the NH90.

Based on the recommendations from the study program, Terma was contracted in late 2014 to integrate the Terma Modular Aircraft Survivability Equipment (MASE) onto the RNLAf NH90 helicopters to meet current needs and prepare them for future growth options.

The MASE installation consists of the proven modular aircraft survivability equipment concept, consisting of the ALQ-213 EW controller, a modular self-protection pod equipped with the MILDS-F Missile Warning System, and the Advanced Countermeasures Dispenser System updated with the latest generation Terma Digital Sequencer Switch.

The pod is mounted on a dedicated carrier for optimum threat detection and countermeasures dispensing without compromising other NH90 capabilities. Control and operation of the system are provided through the Electronic Warfare Management System, ALQ-213, in the latest version. The basic design of the installation allows for future growth, such as Directed Infrared Countermeasures (DIRCM) or new sensors for e.g. radar warning or laser warning.

As part of the NH90 specific requirements, Terma's system has been optimized to withstand the harsh operating environment helicopters are exposed to

when operating over salt water. In addition, design considerations have been taken to ensure that the installation is practical to handle and operate from a helicopter deck on a frigate, such as easy access to and installation of the pod even in rough weather conditions.

The RNLAf NH90 self-protection suite will go through final ground and flight testing by September 2017 in a close collaboration between RNLAf, Netherlands Aerospace Centre (NLR), and Terma.

The modularity of the MASE pod has enabled tailoring to a number of helicopter platforms, including AH-64D, EH-101, Mi-17, Mi-24, and AS 532 Fennec. Terma's electronic self-protection systems are in use on the AS 532 U2 Cougar Mk2, the F-16 fighter, the C-130 transport aircraft, and other aircraft throughout the world.



Aeronautics

Aeronautics is a global provider of advanced electronic warfare (EW) self-protection solutions, tactical audio technology, aerostructures and electronics manufacturing services for the aerospace and defense industry. Our well-recognized Electronic Warfare Management System, EWMS ALQ-213, is capable of integrating any combination of EW subsystems into a coherent and complete systems solution on any type of aircraft.

The ALQ-213 EW integration platform includes high-level functions such as sensor fusion, embedded training, and electronic countermeasures adaptive processing.

Our advanced audio technology is used for 3D-Audio warning systems which provide maximum situational awareness for crews. An Active Noise Reduction and Electrical Noise Cancelling System is incorporated to reduce pilot stress and fatigue.

To allow systems to be used across the fleet and reduce the overall cost, sensor subsystems may be installed using applied aerostructures, i.e. pylons or modular pods.

In addition to producing electronics for our own products, we offer our competencies for development and subsequent production of electronics solutions for customers in the aerospace and defense industry. Within our Electronics Manufacturing area, we deliver solutions to leading aerospace companies in the U.S. and Europe, including key components for the F-35.



Steve Williams
President & CEO, Terma North America, Aeronautics

Today, more than 3,000 military aircraft worldwide are equipped with Terma's airborne solutions.

Aerostructures Manufacturing's journey to become a world-class facility for design and manufacturing of advanced composite structures has been successful.

Terma has been participating in the F-35 development since 2004 to provide complex composite structures to the program's prime contractors as well as pods and pylons to tier 1 companies. Since 2009, more than MDKK 300 has been invested in the Grenaa facility to upgrade manufacturing capabilities and infrastructure to meet the demanding tolerances and sophisticated technologies of the Joint Strike Fighter program.



Terma's Electronic Warfare Management System, EWMS ALQ-213, is capable of integrating any combination of EW subsystems into a coherent and complete systems solution on any type of aircraft



Aerostructures Manufacturing

"FULL-RATE FACTORY" IS RUNNING ON SCHEDULE



Aerostructures Manufacturing in Grenaa, Denmark, has transformed into one of the most advanced composites manufacturing facilities in Europe. Driven by the F-35 program with a planned ramp-up in number of aircraft, sufficient production capacity combined with highly skilled and experienced operators are mandatory to fulfill our obligations towards our customers – Lockheed Martin Corporation, Northrop Grumman Corporation, BAE Systems, Marvin Engineering Company, General Dynamics Corporation, and others. During the past 18 months, the capacity has been expanded with both new buildings and advanced machinery.

With the Danish parliamentary decision of June 2016 to purchase the F-35 as Denmark's next fighter aircraft, Terma is well underway in the next phase of the challenging and extremely exciting production program which will be a focal point in many years to come.

At the turn of the year 2016/17, the first of three construction phases was completed. The new buildings raised during this phase are now in operation and have provided a highly efficient production flow between the tool store, clean room, and autoclaves. An additional autoclave which can be loaded in two layers has been installed and will be operational in 2017.

New ply cutter machines to cut the carbon fiber material before it is laid up in the clean room by use of laser projectors are now in operation.

The second phase comprises a new packaging hall and an expanded cold store area for the receipt and control of frozen raw materials. Both buildings will be ready for use in September 2017.

A third precision milling machine is being installed, and technicians from the supplier Droop+Rein are preparing the machinery for production. Also, a new coordinate measuring machine (Zeiss CMM) is installed, and the entire line must be ready for production in September 2017.

There is an urgent need for the increased capacity. While Terma during 2016 delivered parts for 43 aircraft, we will deliver parts for 57 aircraft in 2017 and 94 in 2018 – a number that will further increase to 170 aircraft which will be the full rate.

End of March 2017, Terma and Northrop Grumman Corporation signed a Memorandum of Understanding (MoU), confirming opportunities for Terma to pursue additional component production beyond our current contracted agreements for the F-35. The memorandum states that Northrop Grumman Corporation will offer Terma the opportunity for continued F-35 component work beyond Low Rate Initial Production (LRIP) Lot 11, provided Terma remains the best-value source.

In 2015, Terma signed a similar life-of-program MoU with Lockheed Martin Corporation and BAE Systems to continue collaboration when the program goes into full-rate production, effective 2020.

These agreements are strong evidence of Terma's present and future position on the F-35 program and show how collaboration can benefit Terma, Danish industry, and the F-35 program as a whole.

Terma currently runs eight production programs within advanced composite structural parts and electronics for the F-35. Terma has been working on the program since 2004 when Denmark joined the F-35 program as a partner country.

Aerostructures Manufacturing's journey to become a world-class facility



2017/18 Implementation of additional precision milling, coordinate measurement, and ultra-sonic test machines will be finalized, and the factory capacity will be ready for the full-rate pace of up to 170 aircraft per year



2016/17 Considerable expansions completed, including new layup room, tool warehouse, and autoclave area



2009 More than MDKK 300 is invested in the Grenaa facility to upgrade manufacturing capabilities and infrastructure



2004 Terma starts development of complex composite structures for the F-35



The capability to provide advanced composites with pre-impregnated carbon fiber with extraordinary high tolerances is a core competency area. In 2016/17, considerable expansions have been completed, including a new layup room, tool warehouse, and autoclave area. In 2017/18, the implementation of additional precision milling machines, coordinate measurement machine, and ultra-sonic test machines will be finalized. With the recent investment, the factory capacity is ready to manage the F-35 full-rate pace, i.e. 170 aircraft per year.

In addition to F-35, a broad range of structures are provided for the F-16, Gulfstream business jets, Boeing Commercial, and Sikorsky Helicopters as well as missionized pods and pylons for various fixed and rotary-wing aircraft. These products include pods for electronic warfare and aircraft survivability equipment, reconnaissance pods, data acquisition pods for flight testing, fuel pylons, and enhanced weapon pylons.

The production facility has a constant focus on continuous improvements and a unique approach to affordability that yields maximum value for the customers year after year. Affordability requirements and a lean thinking philosophy are therefore cornerstones of the manufacturing model, and every employee is committed to delivering the promise.

The F-35 production environment keeps maturing with introduction of even more producible and affordable solutions, and in 2016/17, Terma again met quality, delivery, and cost targets. The pressure for constantly more affordable prices on F-35 requires continuous substantial improvements.

Space

The knowledge and technology of Danish space research and Danish companies within this market are world-class. In recent years, an increasing scientific, commercial, and educational interest has manifested itself.

Terma contributes with mission-customized software (for onboard as well as ground applications) and hardware products as well as services to support a number of in-orbit pioneering European scientific, Earth observation, and navigation missions, such as Mars Express, Sentinel(s), Gaia, CryoSat-2, Lisa Path Finder, ExoMars 2016, and Galileo.

Additionally, Terma is contracted for the development and delivery of software and hardware systems and services for numerous ongoing and future European, Asian, and U.S. satellite missions. Examples of these are: BepiColombo and Solar Orbiter, both with expected launch in 2018; Euclid with expected launch in 2020, Juicy with expected launch 2022 as well as U.S. and Asian missions.

Also, Terma is under contract with OHB System AG for the Sarah and the Electra missions in areas of both power electronics and software.

Furthermore, Terma is under contract with ESA for the highly sophisticated man-space ASIM mission. Terma is responsible for the international scientific and industrial team developing a structure containing cameras and photo-meters to be placed outside the International Space Station. The purpose of the mission is to contribute to the study and understanding of how thunderstorms affect the atmosphere and the climate. The launch is planned to take place late 2017. Read more on page 13.

The Engineering Services area of Space has continued to grow as a result of a number of new framework contracts at ESTEC, ESOC, EUMETSAT, Harwell, and ESO together with on-site support activities at prime premises.



Carsten Jørgensen
Senior Vice President, Space

Space



The Atmosphere Space Interaction Monitor (ASIM) project successfully achieved important milestones during the last year. As project prime and main contractor, Terma towards the end of 2016 approved the two main instruments – the Modular Multi-spectral Imaging Array (MMIA) and the X-ray and Gamma-ray Sensor (MXGS) – and the main computer allowing the start of the ASIM Payload integration activities.

The approved instruments and systems were integrated by OHB-Italia in Milan as an aggregate ASIM Payload for the International Space Station (ISS). With the ASIM Payload in final flight configuration, the environmental tests in preparation for the launch and in-orbit operations were kicked off.

The ASIM Payload has recently passed the ESA and NASA safety review, which is a major milestone. This certifies that ASIM is safe for astronaut interaction in a space environment; and therefore, ASIM is approved for installation on the ISS.

For Terma, it has been very exciting and challenging to front the management and technical development during the last 10 years since the contract was secured as project lead for the ASIM project with ESA as our customer. The total price of the ASIM project is in the area of MDKK 350.

ASIM – Atmosphere Space Interaction Monitor – is the instrument package that will be installed on the European Columbus-module of ISS at the beginning of 2018. ASIM will be used by scientists for Earth observation in order to study high-altitude electrical discharges in the stratosphere and mesosphere above severe thunderstorms, the so-called red sprites, blue jets, and elves. The scientific studies are highly supported by pictures taken by the Danish Astronaut Andreas Mogensen during his space flight in 2015.

ASIM is the largest space project that Terma has been involved in and one of the most complex and challenging tasks, comprising a number of new developments building on the deep heritage of the Terma space electronics and software product domains.

As main contractor, Terma is responsible for ensuring progress and technical management of the project and for the coordination with ESA and subcontractors, and not least for delivering the ASIM Payload for handover to NASA and SpaceX at Cape Canaveral in Florida. Here, ASIM will undergo final inspection and will be installed on the Dragon spacecraft that will be launched to ISS by the Falcon 9 rocket from SpaceX.

Development and manufacturing of the instruments, computers, and systems have been carried out in collaboration with Danish and European companies and universities.

Terma was tasked with the development of the MMIA instrument in close collaboration with the Technical University of Denmark (DTU) which has been responsible for the development of the MXGS instrument in collaboration with the universities of Bergen, Valencia, and Warsaw. The main ASIM computer has been developed by OHB-Italia in Milan.

The main subsystems developed for ASIM are:

- MMIA: Modular Multi-spectral Imaging Array is an instrument which performs optical measurements
- MXGS: X-ray and Gamma-ray Sensor measures x-ray and gamma ray radiation from thunderstorms
- DHPU: Data Handling and Power Unit provides the electrical and communication interface between ASIM and ISS.

During winter 2016/17, ASIM was prepared for the final integration taking place at the premises of OHB-Italia in Milan. SpaceX has delivered a special integration platform, Columbus External Payload Adapter (CEPA), on which all subsystems were installed. CEPA fits mechanically and electrically to a plug-and-play installation on ISS. Hereafter, the fully integrated Payload went through structural, thermal vacuum, and EMC testing and a number of interface and functional tests before it was packed and made ready for shipment to Cape Canaveral in a specially designed transport container.

All in all, the ASIM assignment has involved 30-40 Terma employees in a fantastic collaboration between our two Danish facilities in Herlev and Lystrup. The project management task itself has involved around 20 employees. To this must be added the development of the MMIA instrument and onboard software to both MMIA and MXGS instruments.

After launch, Terma will contribute to the ASIM installation on ISS and the commissioning of the observatory in collaboration with ISS operations. Terma experts will support the staff at the control center in Belgium with calibration and adjustment of the instruments to provide optimum scientific measurements to the scientists at ASIM Data Science Center in Lyngby, Denmark, and worldwide.

Learn more about ASIM at <http://asim.dk>



Gunvor Tram Koldste
 Software Engineer in Radar Control
 Software & Processing
 PhD (physics – experimental nuclear
 physics doing experiments at CERN),
 Aarhus University, Denmark

2016/17

2,600+
 worldwide
 radar installations

↑
BUSINESS AREAS



SURVEILLANCE & MISSION SYSTEMS

Surveillance & Mission Systems (SMS) delivers products and solutions based on the SCANTER radar and T-Core command and control (C2) technology.



Thomas Blom
 Senior Vice President, Surveillance & Mission Systems

We have leading positions globally in selected markets for security and safety applications at sea, in the air, and on land with our SCANTER surveillance radars. Through our T-Core C2 technology, we provide solutions in the naval, air, and missile defense markets as well as protection of critical infrastructures in the security market.



The recently launched T.react CIP product provides critical infrastructure protection against intruders and security threats using the SCANTER 1002 advanced ground surveillance radar and advanced detection algorithms coupled with automated camera control. It provides very effective area protection compared to traditional fixed camera installations. This novel approach continues to spark high interest from the market.

Navies and coast guards worldwide are important to Surveillance & Mission Systems (SMS), with market focus on Offshore Patrol Vessels (OPV), Patrol Vessels, and interceptors with the C-Series – where we combine our key technologies to deliver a new level of integration and automated surveillance. All systems are designed for vital day-to-day missions such as territorial and Economic Exclusive Zone (EEZ) patrolling, counter piracy/terrorism, Search & Rescue operations, and peacekeeping missions.

The SCANTER radar systems are renowned for their unique capability to detect small and maneuvering targets at long distances and under all weather conditions. Terma is the preferred choice for maritime surveillance, mission critical border security, and traffic safety applications to users worldwide. The SCANTER radar product portfolio comprises the SCANTER 5000 for land-based surveillance, the SCANTER 6000 for naval and coast guard applications on board ships, and the new SCANTER 2000 series.

70+

The SCANTER 2000 series provides an attractive, unprecedented price/performance in the surveillance and safety market and has already enjoyed a strong market acceptance with more than 70 units in operation.



The SCANTER 4000/4100 radar for medium-range air surveillance has undergone a significant technological upgrade lately, moving from tube into high power Solid State technology, increasing reliability, performance, and significant savings in cost of ownership. The ability of the SCANTER 4000 radars to detect aircraft in the vicinity of wind turbines has been demonstrated in multiple tests. Terma now has a growing number of radars in operation in airports close to wind farms to mitigate wind turbine disturbances and is the only Company to have received full government safety approval.

The tall wind turbines in wind farms require powerful aircraft obstruction lights, an unfortunate disturbance to neighbors. However, this can be mitigated with a SCANTER radar turning lights on only when aircraft are in the proximity. With the first installations in operation and as the only Company with approvals in Germany and USA, Terma is in the forefront in this market. Read more on page 21.



Kasper Hornbek
 Electronics Technician in
 Test Production, Electronics
 Manufacturing
*Trained in Terma as Electronics
 Technician Apprentice
 with school periods at Aarhus
 Tech and Mercantec, Denmark*

Based on decades
 of experience,
 Terma understands
 the importance of
 through-life support
 in order to meet
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 requirements.



BUSINESS AREAS

TERMA SUPPORT & SERVICES

Terma Support & Services maintains, supports, and provides updates of Terma products in the global defense and security markets.



Lars Hedemann Hilligsøe
 Senior Vice President, Terma Support & Services

The support and services include discrete spare parts sales, on-call services, and off-the-shelf service concepts as well as more complex availability solutions, which can be tailored to fulfill any operational profile required by the customers.

Centers for Maintenance, Repair & Overhaul (MRO) with a wide range of capabilities are situated in selected geographical locations around the world to support our customers. Currently, the MRO capabilities and capacities are expanding in both the Netherlands and in the U.S.

Sustainability is essential in a market where the demand for component availability increases and where customers' requirements for long product lifecycles increase. Based on decades of experience, Terma Support & Services' staff understands the importance of through-life support in order to meet customers' operational requirements.

With a large, constantly growing, installed base, Terma supports more than 2,000 radar systems, 2,000 aircraft, and several navies worldwide.

4000+ 
 radar systems,
 aircraft and navies
 supported worldwide



Emile Robert Kroon
Outsourcing Specialist in
Technology & Innovation
MSc (Aerospace Engineering),
Delft University of Technology,
the Netherlands

2016/17

Terma has opened an office in Brussels, Belgium, to work more closely with key partners and policy-makers within NATO, the EU institutions, industry organizations, and international partners.



INTERNATIONAL

Market Development's overall aim is to drive the internationalization and market development of Terma across the globe. This also includes the overall responsibility to build and protect the Terma brand.



Jørn Henrik Levy Rasmussen
Senior Vice President, Market Development

Market Development

Market Development delivers on the Group's global and regional strategies and maintains and strengthens strategic customer and partner relationships.

Terma's international activities are headquartered in Denmark and Washington D.C. with regional and local offices in Singapore, India, United Arab Emirates, the Netherlands, Brussels, UK, and Germany. Market Development works closely with each Business Area and Terma North America to deliver the entire Terma portfolio of products.

Terma continues its international expansion with the purpose of being closer to key customers and end users. In 2015, Terma opened an office in Brussels, Belgium, to work more closely with key partners and policy-makers within NATO, the EU institutions, industry organizations, and international partners.

In the coming years, the Danish market will remain a key foundation for Terma's continued international success.

Europe

In 2016, Terma revamped the focus on the Danish home market, and the European region monitors the Danish market closely. With a holistic



Kristoffer Groth Jakobsen
Vice President, Europe

approach, we have successfully redefined our customer and stakeholder engagement with the armed forces, the Danish political leadership, and relevant key government authorities.

The European region doubles as Terma's Industrial Cooperation and Offset function and works across Business Areas and hand in hand with Terma's regions. Furthermore, it is becoming the internal center for Customer Insight responsible for analyzing and providing insight into our customers' perception and how Terma creates even more value.

A special attention is paid to the Nordic countries around Denmark, including Finland, Norway, Sweden, and Iceland as well as the three Baltic States. These countries tend to have common security interests, political cooperation and some interesting industry dynamics, which may be explored further.

The Liaison office in Brussels, Belgium, is a key element of our attention to the Danish home market and our integration of business development and external affairs with other companies and regions within Terma. The Brussels office works closely with key partners and policy-makers within NATO, the EU institutions, industry organizations, and other international partners.

Terma's business in Turkey is designated as a special focus market based on certain high-potential opportunities, but we are aware of the political situation in that market.

The Netherlands

Terma B.V., the Dutch subsidiary, focuses primarily on space activities and aircraft survivability equipment.

For decades, Terma B.V. has formed the basis for the Terma Group's activities including 40+ employees in the Netherlands within aerospace and defense. The Dutch headquarters is based in Leiden, and Terma also supports the Royal Netherlands Air Force from our facility at Woensdrecht Air Base.

Terma and Woensdrecht Logistics Centre collaborate to support the Royal Netherlands Air Force (RNLAf) fleet through development and supply of advanced integrated self-protection systems currently installed on almost all RNLAf aircraft. The airborne EW service and support facility established at the Woensdrecht Air Base is fully operational and processes an expanding range of equipment from the Terma EW product lines.

With Royal Netherlands Air Force being a valued Terma customer for years, it was a pleasant continuation of our collaboration to sign a contract for missile warning integration and Flare-up for the Dutch F-16s.

Once again, we contributed with a constructive solution to one of our “old” customers. Furthermore, we now offer this solution to other F-16 customers as most have the same needs as the Netherlands.

As RNLAf is part of the “F-16 European Participating Group”, it was not unexpected that the RNLAf would choose the same missile warning system, AAR-60(V)2 MILDS-F from Airbus DS, as Denmark and Norway did a few years ago.

Space activities in the Netherlands include in-house turnkey system integration and development, specializing in spacecraft test, simulation, and in-orbit management systems together with the provisioning of highly specialized engineering consultants to ESA’s European Space Research and Technology Centre in Noordwijk, the Netherlands.

Germany

Terma GmbH, the German subsidiary, has emphasis on support and services. For the spacecraft prime contractors, Terma Germany supplies key components for the facilities they use for validating their mission critical spacecraft flight software. This includes providing software models of key elements – including the increasingly sophisticated onboard computers.

UK

Terma (UK) Ltd. primarily focuses on space activities located at Harwell Oxford, initially established with the purpose of supplying engineering services to the UK space industry and ECSAT, the European Centre for Space Applications and Telecommunications.



Nils Greir
Vice President, North & Central America

North & Central America

Terma North America Inc., the U.S. subsidiary, is well established as the interface to North American customers for all Terma Business Areas. Terma North America (TNA) facilitates the growth of Terma’s business in the U.S. through a local presence near to important customers and partners. Headquartered in the Washington D.C. area, TNA leads the interface with senior executives in the Department of Defense, the Department of State, the Danish Embassy, the Federal Aviation Administration (FAA), the Department of Homeland Security, as well as the defense industry’s prime contractors and many other companies relevant to our business.

A major business development and operations facility is located in Warner Robins, Georgia. It maintains business with the U.S. Air Force, providing EW systems for the Air National Guard and Foreign Military Sales, including maintenance and procurement. Activities in 2016 initiated the first steps to allow the TNA team to develop specialty products for the U.S. market.

In Fort Worth, Texas, TNA’s facility is strategically located in close proximity to Lockheed Martin Corporation and the program headquarters for the F-35 and F-16. The Fort Worth office’ expertise provides vital customer insight and program management support.

TNA’s office in Suffolk, Virginia, near the U.S. Coast Guard headquarters, provides support for surveillance sensors. Business development, technical, and logistical support staff has been assigned to provide maximum support and customer interface.

Terma Aeronautics in Warner Robins successfully expanded its traditional customer base by closing negotiations for key Foreign Military Sales contracts for Flare-up and airborne survivability equipment for strategic customers at Hill Air Force Base and in South East Asia. The relationship with Northrop Grumman Corporation and The Boeing Company remains strong with follow-on P-8 Poseidon. Additionally, the collaboration with Lockheed Martin Corporation continued strong with business in the C-130J military transport aircraft and the F-16 fighter programs. TNA continued its U.S. expansion by selling Raytheon Company a new sensor suite for its international customers.



Terma is contracted for the development and delivery of software and hardware systems and services for numerous ongoing and future European, Asian, and U.S. satellite missions.

Obstruction Light Control



The increasing size of wind turbines is creating safety and societal challenges for the wind industry, the authorities, and the surrounding municipalities when it comes to obstruction lighting and marking of wind turbines to comply with air traffic regulations.

As wind turbines grow taller and enter the lower airspace, high intensity obstruction lights are needed. The high intensity lights required for higher wind turbines can appear very intrusive to wind farm neighbors and to an otherwise pristine night sky. The high intensity lights cause a growing number of delays and cancellations of wind farms due to complaints from neighbors and municipalities near planned wind farms.

These problems can be overcome by turning the obstruction lights on only when necessary, i.e. when there is an aircraft in the vicinity of the wind farm. Terma’s radar-based Obstruction Light Control (OLC) solution vastly improves the success rate of wind farm deployments, contributing to national climate objectives and at the same time greatly reducing light pollution caused by wind farms.

Market breakthrough

Terma experienced a breakthrough in 2016 by receiving the first three orders for the German market of windfarm OLC radar solutions. Terma is the second Company to obtain step 1 approval (Anerkennung) from the German Aviation Authorities represented by DFS Deutsche Flugsicherung GmbH (DFS). The solution keeps the obstruction lights off when the airspace around a windfarm is empty of aircraft, reducing the light pollution significantly. We see an increasing interest and growth in the pipeline in connection with local German authorities mandating OLC for new windfarms.

Likewise, Terma is only the second Company to get their OLC solution approved by the Federal Aviation Administration (FAA) in the U.S., and we see a growth in the pipeline for the U.S. market as well.

Finally, Terma obtained approval from the Danish authorities represented by the Danish Transport, Construction and Housing Authority for a five-year operational test period at the national test center for large wind turbines in Østerild.

The solution

Terma’s radar-based OLC system is designed to detect aircraft as they approach a wind farm and automatically activate the appropriate obstruction lights until they are no longer needed by the aircraft. This technology reduces the impact of nighttime lighting on nearby communities.

Terma’s SCANTER 5000 radar sensor has a standard range of 18 kilometers yielding in a total coverage of up to 1,000 square kilometers, making the system ideal for larger wind farms and wind farms with a scattered layout. The exceptional range of the sensor also enables future developments and expansions of the wind farm.





Terma Support & Services

The Aeronautics Business Area is strongly represented at the Fort Worth facility. The team has worked closely with Lockheed Martin Corporation, Northrop Grumman Corporation, General Dynamics, Marvin Engineering, and BAE Systems to sustain long-term supplier agreements for the F-35.

The Surveillance & Mission Systems Business Area under new TNA leadership tightens its focus on the U.S., Canadian, and Mexican naval markets. The long-term prospects for solid growth in these areas look very promising. Maintenance and service contracts continue including Canada and the U.S. Coast Guard, supporting our Support & Services Business Area. Certification of our SCANTER 4000 radar by the Federal Aviation Administration (FAA) has opened up new markets for Wind Farm Interference Patterns and Obstruction Light Control, specifically with wind energy developers and municipal energy companies. The first SCANTER 1000 radar was delivered to Port Canaveral, Florida, opening up the critical infrastructure protection market in the U.S.

Asia Pacific

Currently, Terma Asia Pacific covers the Asia Pacific region by means of two regional offices: one in Singapore, Terma Singapore Pte. Ltd., and one in India, Terma (India) Pvt. Ltd.

The two offices serve two very different purposes. Whilst Terma Singapore Pte. Ltd. is a full-fledged office, providing the Asia Pacific market presence for the Aeronautics; Surveillance & Mission Systems; and Support & Services Business Areas through business development, project management, post-sales, and support, the office in India serves as a mere marketing and branding office.

Terma is further cementing its position in the Asia Pacific region by means of strengthening and increasing its network of regional partners whilst strategic partnerships are being even further nurtured and developed to encompass more. Terma is established as a respected and reliable regional partner and supplier of high performance and reliable defense and security solutions in the expanding and developing Asian markets.



Anupam Narain Mathur
Vice President & General Manager, Asia Pacific

There is a very positive regional outlook for expanded collaboration with regional partners in the security and naval domains.

The overarching trend in the Asia Pacific region is a growing ambition to be self-reliant where the key to unlock the market place to a great extent is by means of Transfer of Technology and local production, something Terma has been successful with in the region.

Generally, there is a significant interest in the SCANTER radar family, ranging from surveillance of critical infrastructure and airport Surface Movement Radars over large vessel traffic management systems to coastal and naval surveillance applications. Also, we are experiencing a great interest in Terma's Naval C2 product portfolio in the market place. With many countries in the process to acquire and/or modernize their fleet of aircraft, there is also a large market potential for Terma's niche solutions in the domain of aircraft survivability solutions and 3D-Audio solutions.

Middle East and North Africa

In 2016/17, Terma has further consolidated its presence in the United Arab Emirates by establishing a Joint Venture in the capital city of Abu Dhabi. The Terma staff will support the local end users as well as Terma's growing business across the Middle East and North African region.

The traditional market for Terma in the region has been in the area of security and surveillance, which is exemplified by our steady sale of radars for Vessel Traffic Service and coastal surveillance applications over the last decade.

In the past year, we have experienced continuous sales of our radar products and our solutions for aircraft self-protection as well as sales of the T.react CIP solution for the protection of critical infrastructure. We expect this trend to continue alongside further sales of products from our naval portfolio.



David Adgill Larsen
Regional Director, Middle East & North Africa



Obsolescence and diminishing manufacturing sources and material shortage are challenges for sustainability. And with more than 1,000 Terma legacy Electronic Warfare Management Units installed in U.S. Air Force aircraft, the U.S. Government had an urgent need for a sustainment solution for the products and items which were declared 'end of sale' in 2012.

When made aware of the obsolete components affecting a number of circuit cards, Terma warned the U.S. Air Force of the upcoming sustainment challenge. Based on a dialog between the Air Force and Terma's product management and the Support & Services Business Area, a redesign program was planned and requested starting September 2016 running to September 2018.

The program consists of six engineering services projects. Four of these address parts or circuit cards for the Countermeasures Signal Processor, and the last two projects address the countermeasures sets for the F-16 and A-10 fighter aircraft, respectively.

Being located close to the customer, Terma North America Inc. manages the projects on the program level. The redesign efforts are executed in a close collaboration between Terma North America Inc. and Terma A/S in Denmark and thus illustrate how the Company as well as customers benefit from the cross-Atlantic collaboration. In addition, this example shows how a dedicated service and support Business Area can secure a rapid and solid response to an urgent customer issue.

The current status of the project (May 2017) is that System Requirements Reviews (SRR) have been held and approved by the customer for all six engineering service projects, and the program is progressing well towards the goal of being able to continue the sustainment of the Terma products owned by the U.S. Air Force.





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