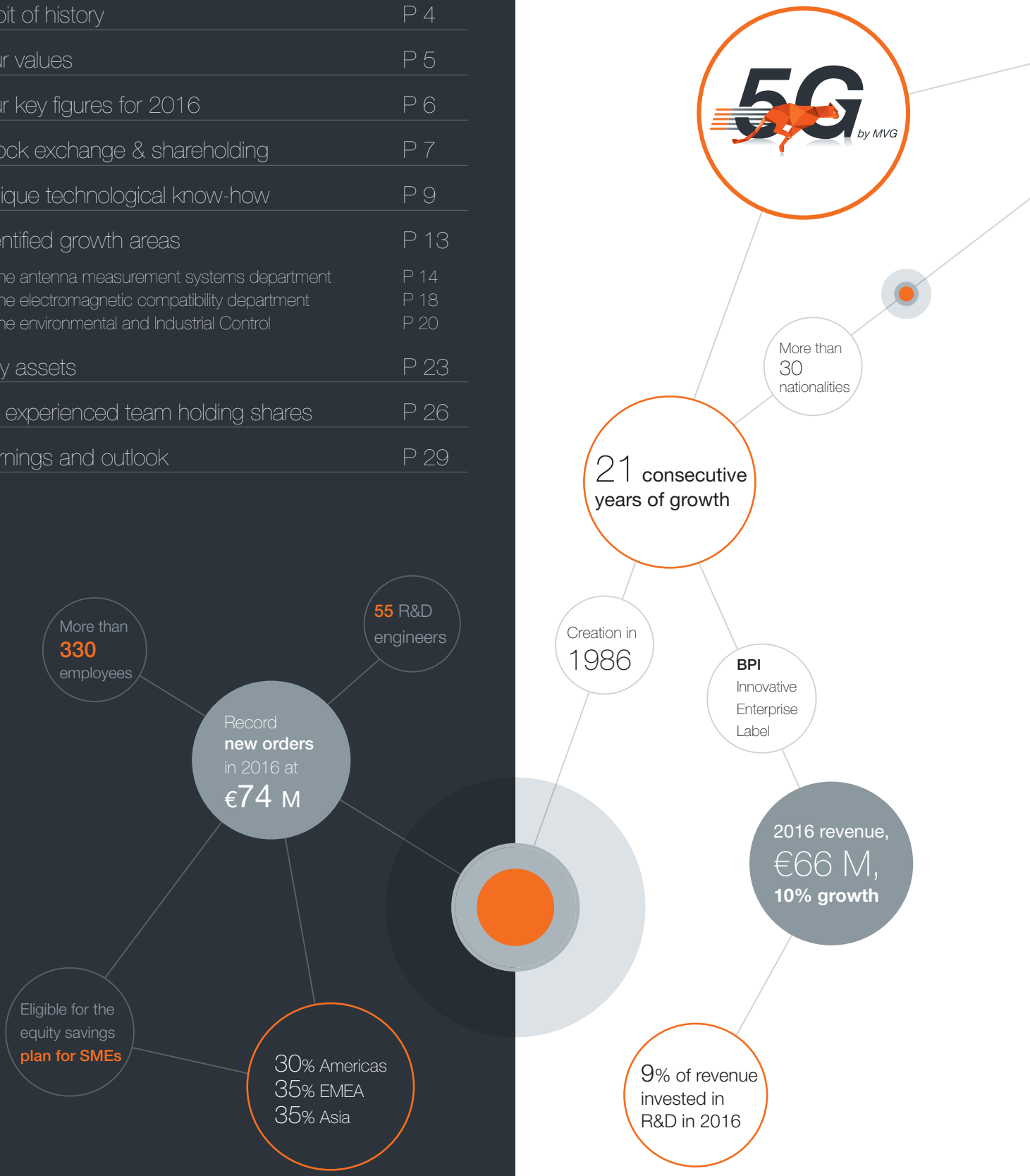
ANNUAL REPORT 2016

Microwave Vision Group

CONTENTS



ÉDITO

5G, Nice growth opportunities for MVG!

In the near future, the arrival of 5G will lay the foundation for a hyper-connected society.

A world in which everything that can be online will be. Internet connections will move from computer and smartphone screens to a world of objects that will communicate directly among themselves.

All sectors of society will be profoundly transformed by this technology: from industry 4.0, with smart factories, to the automobile industry, with self-driving cars, not to mention the healthcare sector with remotely controlled robotic surgical procedures, and connected homes, smart cities, etc. There are many examples.

5G is based on three cornerstones. The first is an increase in bandwidth and network capacity to transmit ever greater quantities of data in record times. The second is ultra-reliable wireless connections with low latency allowing critical real-time applications to function securely (self-driving cars, remote surgery, etc.). The last is the deployment of networks that use little bandwidth and energy to prepare for the massive deployment of connected objects.

By making permanent connections possible, the arrival of 5G will be accompanied by massive usage of "cloud computing", which will make it possible to efficiently operate many new services.

The success of many of these services will depend upon wireless connection quality. Wireless connection performance will be a parameter that is difficult to control, as it will be based on both the quality of the networks deployed and on that of the hardware used. To validate performance, tests and measurements of hardware and 5G relay stations must be conducted. They will differ considerably from what is done currently. In fact, 5G will use higher frequency bands and compatible hardware will not have physical connectors. Therefore, they will have to be tested exhaustively in wireless mode (OTA) while traditionally, many tests are conducted in wired mode.

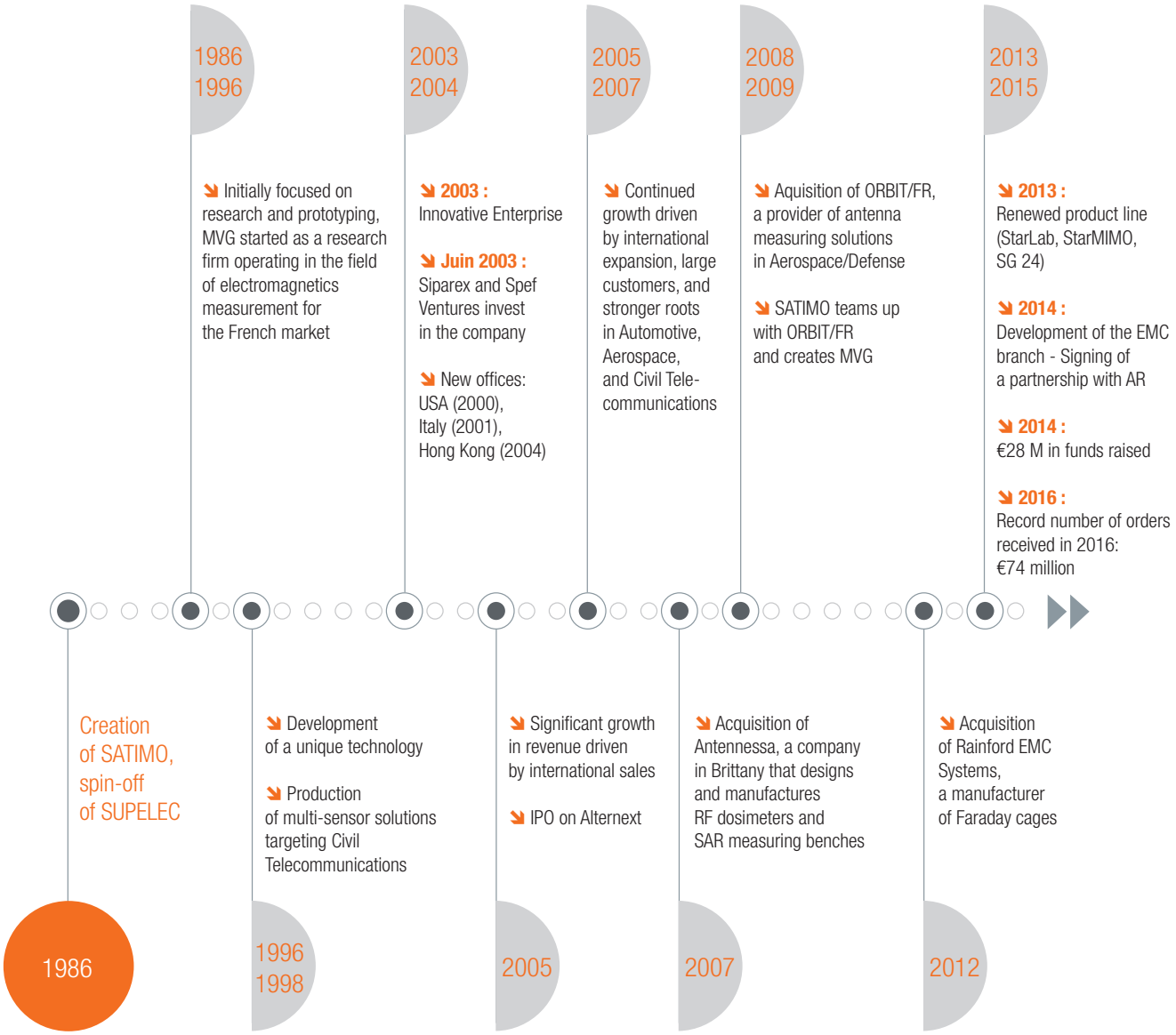
Therefore, we should see an increase in the power of OTA tests, in which MVG is the most well-known specialist. MVG is working hard to support the industry in developing a special range of products intended for 5G tests, including systems to help re-create environments in the laboratory that are as close as possible to real life, and thus to test each peripheral and application exhaustively.

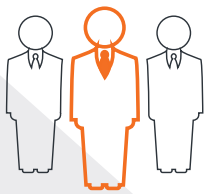
From all these transformations, new services, products, and companies will develop. Each represents favorable growth opportunities. You can be sure that MVG will be ready to take advantage of them!

Philippe Garreau
CEO of MVG

A bit of history…

Since its creation in 1986, MVG's success has expanded from France to international markets as early as 1996. It is a result of combining organic growth based on continuous innovation and the integration of carefully chosen companies to its portfolio which has continuously opened new markets for the company. This momentum has also been made possible thanks to the confidence of its customers, the involvement of its employees, and the support of investors who have accompanied it throughout its journey.





Our values

Innovation, technological excellence, team spirit, boldness, involvement, and diversity are the values shared by MVG's employees.

"In the dynamic, complex, changing sectors in which MVG operates, what makes the difference is our human capital, our culture, how we work together, and understanding how our values will best serve our customers.

Philippe Garreau,
CEO of MVG

Innovation

MVG's offering consists of highly innovative, distinctive products. This positioning guarantees the Group's margins. These margins allow us to maintain a high level of R&D investment and thus develop new innovative products. It is this virtuous circle of value creation that constitutes MVG's DNA.

Excellence

Excellence is a cornerstone of MVG's worldwide reputation. It characterizes the Group's ability to transform innovations into robust, scalable, industrialized products and to make every effort to exceed the expectations of its customers.

Team Spirit

As a team, MVG meets its customers' needs through a commitment to service fed by the diversity of each team member's areas of expertise and knowledge. This team spirit is based on listening, transparency, respect for others and rules, creativity, solidarity in implementing major decisions, and mutual support, particularly in difficult times.

mvg
Microwave Vision Group

Boldness

The confidence in our know-how and our capacity to innovate gives us the boldness to undertake, propose, and always consider that a more efficient solution can be found. MVG pushes its managers to delegate particularly large tasks, so that they can develop their own skills even further. The Group encourages those who try, even if it means failing, rather than those who attempt nothing.

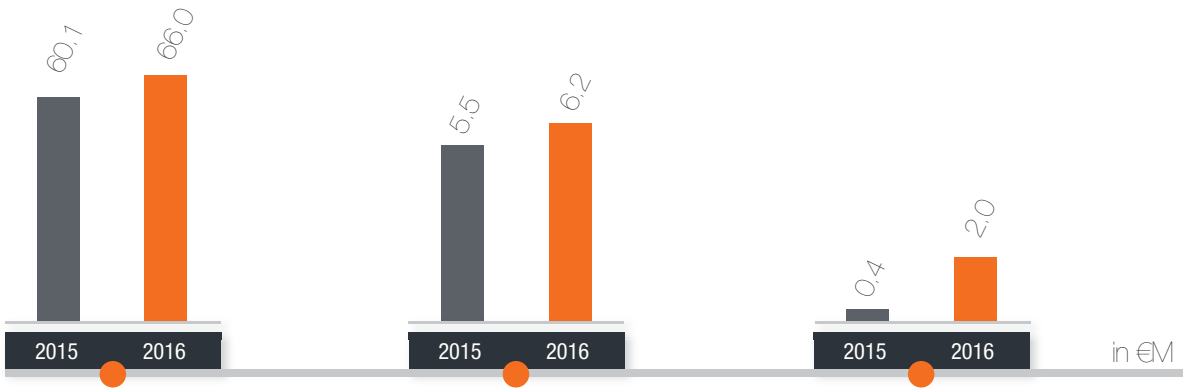
Involvement

MVG strives to involve its employees in its corporate strategy, mobilize them around a common culture, and have them contribute to its overall performance. In return, the Group expects high level of involvement from its employees when working with customers and around its strategic projects.

Diversity

MVG hires people of different backgrounds, religions, countries, genders, sexual orientations, physical conditions, and professional careers. The Group believes that mixing the skills, cultures, training, and talents of each individual is an asset and contributes to the innovation and success of its projects.

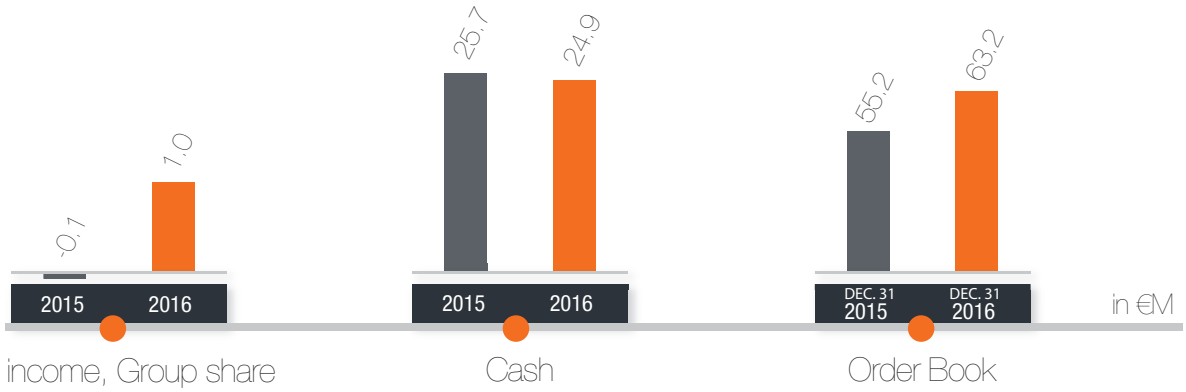
Our key figures for 2016 (€M)



Thanks to a record level of orders produced over this financial year, the MVG Group recorded revenues of €66.0 M in 2016 against €60.1 M in 2015. All divisions in the Group contributed to this performance. At constant exchange rates, total revenues rose by 11%. The Aeronautics/Defense sector was particularly dynamic, accounting for 56% of revenues. The geographical distribution remained balanced (Europe and Asia 35%, United States 30%).

Thanks to the very tight control of current operational expenses, the Group recorded a very solid EBITDA of €6.2 M, a growth of +15.6%. The Group is thus starting to reap the benefits of its reorganization, resulting in greater operational efficiency. The EBITDA margin reached 9.5% over the year, with 12.1% over the second half alone.

Non-recurring expenses also saw a net reduction compared with 2015 (€1.7 M against €2.8 M). The Group benefited from the end of the intellectual property procedure in the United States. The Group thus recorded an operating income of €2.0 M, compared with €0.4 M in 2015.



In the end, after recognition of financial expenses, taxes and minority interests (Orbit/FR), the Group share net income totaled €1.0 M (against a loss of €0.1 M last year).

Shareholders' equity stood at €70.4 M on December 31, 2016. Operational cash flows made strong progress at €4.7 M (against €0.8 M on December 31, 2015). These broadly cover the year's net investments (€3.5 M) as well as financial interest paid over the fiscal year (€0.7 M). Finally, free cash flows stood at +€1.1 M (against €2.3 M in 2015). Cash net of debts was stronger at €18.0 M on December 31, 2016 (against €17.4 M on December 31, 2015).

The Group is in a very strong financial situation for seizing new external growth opportunities, while remaining highly selective.

MVG set a record for order intake in 2016 with €74.2 M compared with €72.2 M last year (€75.3 M at constant exchange rates).

This performance was driven especially by the very good momentum of the EMC branch, which represented 22% of orders (compared with 17% in 2015).

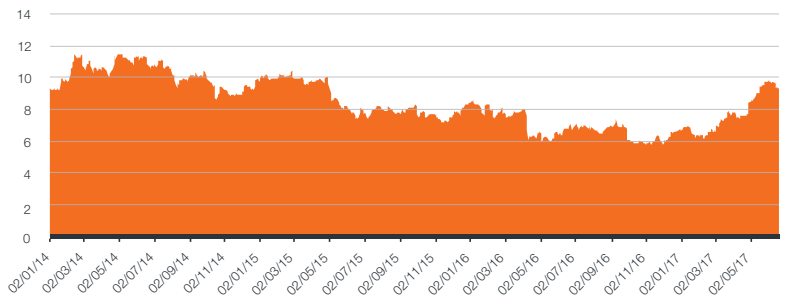
Building on this order intake, the Group started the 2017 financial year with an order book worth €63.2 M (96% of the 2016 revenue).

Stock exchange & shareholding

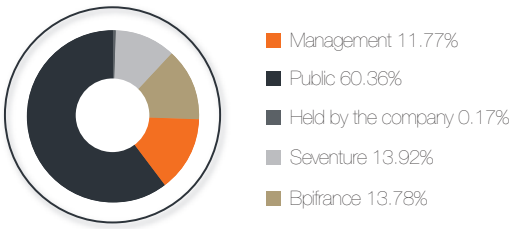
By investing in MVG's capital, you benefit from the momentum of a hi-tech company whose unique know-how brings the multitude of invisible electromagnetic waves to an unprecedented level of visualization for analysis.

These waves are at the heart of our day-to-day lives. Smartphones, computers, tablets, cars, trains, aircraft – all these devices would not work without them. **By making "the invisible visible"** thanks to its testing and measurement equipment, MVG enables its customers to develop ever more efficient products. Building on this expertise, the Group has risen to the top ranks among its market's global players and has acquired international recognition. MVG employs more than 330 people, has offices in ten countries, and exports more than 90% of its production.

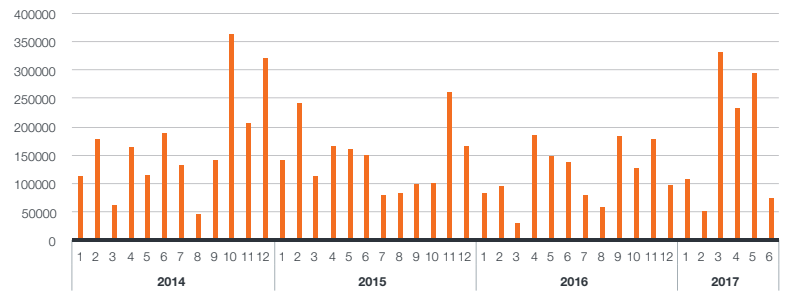
MVG'S OPENING PRICE SINCE 2014



SHAREHOLDING



MONTHLY MVG SHARE TRADING VOLUME



ANALYST MONITORING
Gilbert Dupont, Euroland Corporate

LISTING
- Listed on NYSE Alternext (ALMIC) since 6/29/2005
- Price at 20/06/2017: €9,50
- Market capitalization at 20/06/2017: ~€59,7 M
- 2016 average daily volume: 5 500 shares/day (2017 - 9 239 shares/day)

CAPITAL
- 6,282,186 shares
- 8,619,092 voting rights
- Share capital: €1,256,433.20

FINANCIAL CALENDAR
Publication of earnings
1st half 2017 | sept. 27, 2017

CERTIFICATION
Bpifrance's "Innovative Enterprise" Certification

ELIGIBLE FOR THE EQUITY SAVINGS PLAN FOR SMES

9.2%
of revenue invested in R&D

22
international patent families

55
R&D engineers

Unique technological know-how

MAKING THE INVISIBLE VISIBLE

Similar to MRI scanners used in hospitals to view the inside of the human body, MVG has developed unique technological know-how: scanners that allow electromagnetic waves emitted by an antenna to be viewed, thus making the invisible visible.

These scanners allow users to:

- **Measure the amount of energy emitted by antennas.** An antenna converts existing electrical quantities in a conductor or a transmission line (voltage and current) to electromagnetic quantities in space (electric and magnetic fields), either in transmission or in reception. This measurement quantifies the efficiency of this conversion.
- **Determine in which directions this energy is radiated in space.** This involves determining the radiation pattern of the antenna. In a smartphone, for example, the manufacturer seeks a radiating pattern that is well distributed throughout all directions in space, because it is not possible to predict from the phone's direction given by the user. However, in the case of a radar, the manufacturer aims to focus maximum energy in one direction in space to measure with the utmost precision where detected devices may be located.
- **Describe the quality of information carried by the transmitted signal.** This involves transmitting data from several directions in space and reducing the level of energy emitted until communication with the device is no longer possible.
- **Test the operation of the device in real environments.** These are MIMO tests. They determine how a device will react in its real environment. Will its performance be deteriorated by or can it take advantage of the barriers and disruptive objects that separate it from emission sources?

These scanners rely on a unique, patented multi-sensor technology: MV-Scan™. Unlike conventional single-sensor technologies, which require long and tedious mechanical movements, MV-Scan™ scanners perform their measurements through numerous sensors equally spaced on an array. These sensors, scanning electronically, drastically reduce the measurement time by limiting mechanical movements. This decrease leads to a much better return on investment for installations equipped with MV-Scan™ than for those equipped with single-sensor solutions.

The MV-Scan™ technology was initially developed for the Civil Telecommunications sector, where it perfectly met a key requirement for speed due to very short product development cycles. For several years, it has also been deployed in the field of Aerospace and Defense, where electronically scanning radars have become imperative and require significant testing.

This technology is covered by several worldwide patents. It allows MVG to offer distinctive products and services to its customers.

UNLIMITED ADAPTATIONS ON STRUCTURALLY GROWTH-GEARED MARKETS

Satellites, planes, mobile phones, computers or touch tablets, GPS navigators, medical instruments or wireless home technology... All these increasingly ubiquitous appliances have something in common: they have antennas, designed to convert electrical signals into radio signals. MVG's role is to design and manufacture systems allowing manufacturers to test and measure the radiation pattern of these antennas. MVG markets a range of constantly evolving antenna measurement systems to increasingly diversified markets, supported by strong growth in the Aerospace and Defense, Automobile and Telecommunications industries:

- the wireless market, stimulated by increasingly sophisticated terminals, integrating multiple communication protocols (4G, WiGig — very high-speed Wi-Fi, 5G in development in several countries, etc.),
- land, space, and air surveillance through radars, drones, etc.,
- Internet-of-Things,
- connected or autonomous vehicles,
- data protection.

MVG's products have won over the biggest names in Aerospace (NASA, ESA), Aeronautics (Boeing), Automobiles (Renault, BMW), as well as Electronics (Ericsson, Nokia, Panasonic, Huawei) industries.

This expertise in electromagnetic wave measurement tools has been a driving force in the company's international growth since its creation. It also encourages MVG to constantly renew its offering to follow the development of protocols, and permits diversification to new markets.

A HIGH LEVEL OF R&D INVESTMENT

The MVG Group is the leader of a portfolio of technologies, patents, and diversified products, given its desire to constantly strive to develop new value-generating ideas around its founding patent on the MV-Scan™ multi-sensor technology. To anticipate the needs of customers, MVG devotes an average of 10% of its revenue to R&D, which allows it to grow not only in its historical markets, but also penetrate related markets, such as environmental and industrial control, or conduct research projects in medical imaging or security imaging. During financial year 2016, the Group invested 9.2% of its revenue in its Research and Development effort (10.0% in 2016). The Group produced demonstrators for all its new products, making it possible to present perfectly functional new innovations to its customers. This is an important factor in the decision-making process of customers. In general, the aim of the Research and Development efforts is to prepare the Group for the increased frequency

The Group mission

MVG's unique expertise makes it possible to visualize electromagnetic waves. These waves are at the heart of our day-to-day lives: smartphones, laptops, tablets, cars, trains, aircraft – all these devices would not work without them. By making "the invisible visible" thanks to its testing and measurement equipment, MVG enables its customers to develop ever more efficient products. The Group's mission is to extend its expertise and unique electromagnetic imaging technology to all sectors where they can provide high added value, satisfying the "adaptation of technology" against "acceptable market cost" equation.

of future communication products. The Group is also continuing the development of hardware and software sub-systems for multi-sector technologies to meet the future requirements of its markets. MVG continues to receive the **Research Tax Credit.** MVG also has labels recognizing its innovative profile in France: **Innovative Enterprise and Réseau Bpifrance Excellence.**

Each of these two projects addresses specific R&D themes and also serves as a catalyst for the development of sub-assemblies that will be included in the antenna measurement systems of tomorrow. **They draw future investments and employ highly qualified engineers in order to succeed in bringing about enhanced value.**

TEAMS ORGANIZED IN PROJECT MODE

The Group's R&D, with hubs in three sites – two in France and one in Italy – is organized in project mode, meaning that it works on defined themes with dedicated teams, allocated budgets, and deadlines to be met. This organization and the resources allocated to it allow the Group to maintain its technological lead and come up with breakthrough products on its current markets or targeted new markets.

The R&D team manages mainly short and medium-term projects. However, within this team, in the NSH (National Security & Healthcare) department, two long-term projects are currently in development:

- a security scanner, for the detection of weapons and explosives that could be hidden on the human body,
- a medical scanner, for the detection and monitoring of breast diseases.

Positive advances on NSH (National Security & Healthcare)

2 R&D PROJECTS are currently in progress for two identified growth markets:

- A security body scanner intended for airport security with possible future extensions to sensitive buildings and multi-modal transport sites (train stations, subways, etc.).
- A microwave imaging scanner intended to detect breast pathologies in developed countries with a screening program, with the potential for future use in developing countries.

ADVANCES MADE

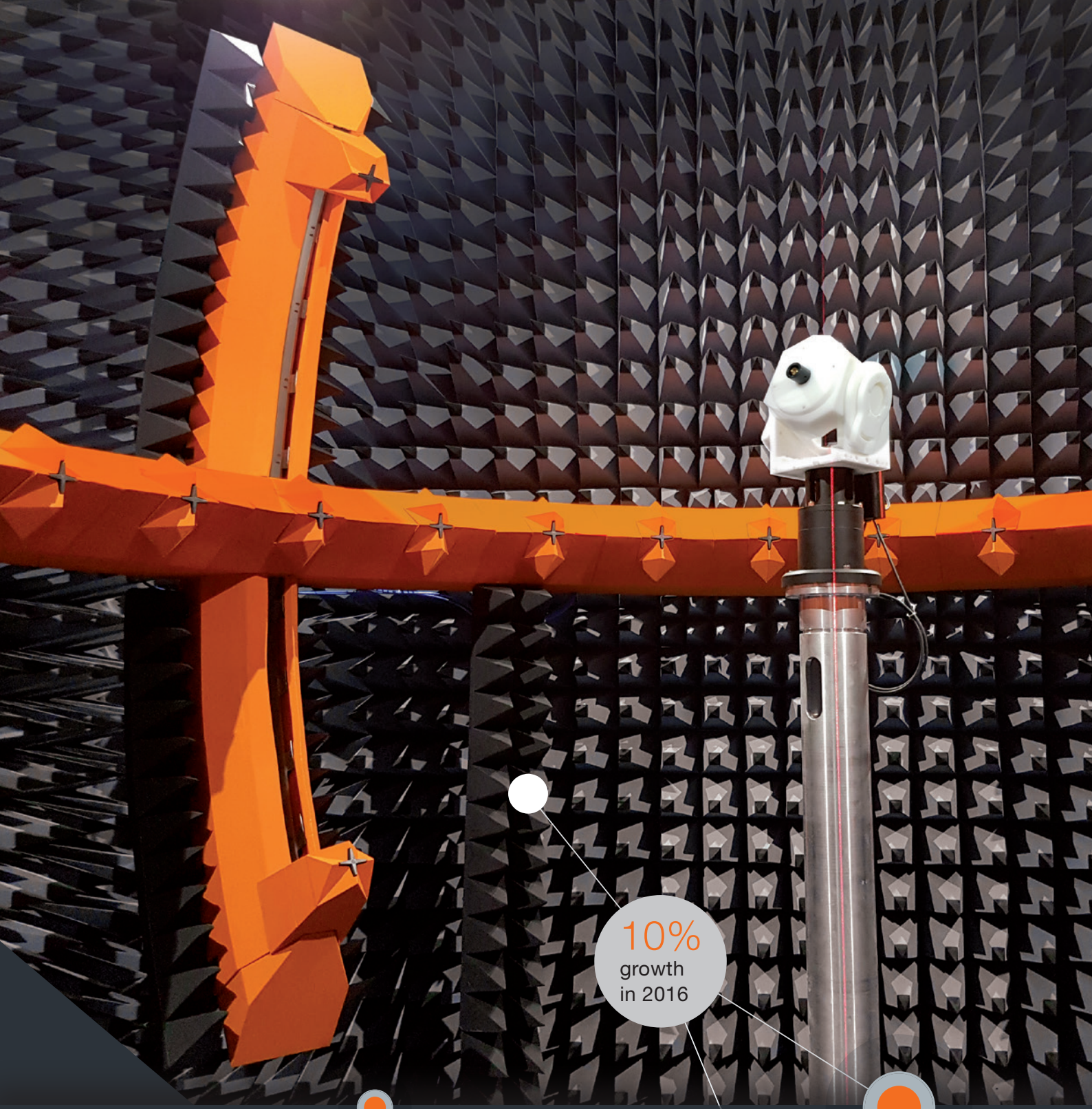
Encouraging detection results have been obtained with experimental prototypes:

- Security scanner (airports): using mannequins and targets placed under clothing.
- Medical scanner: using realistic phantoms of breasts and tumors.

ADVANCES IN PREPARATION

Experimental demonstrators with on-board rapid measurement technologies. The main objective is to acquire data with real persons and evaluate the potential for future products:

- Security scanner (airports): rapid scan of a person and calculation of the image in a few seconds.
- Medical scanner: first clinical trials with 30 women who have palpable breast cancers or non-cancerous cysts.



10%
growth
in 2016

3
operational
departments

81%
of revenue
by the AMS
branch

Identified growth areas

Since 2012, MVG has structured its activities into three operational departments: AMS, EMC, EIC. This organization makes it possible to pursue a strategy of creating distinctive added value in each of the branches.

BREAKDOWN OF REVENUE BY BRANCH

AMS

THE AMS DEPARTMENT

(***A**ntenna **M**easurement **S**ystems*)
dedicated to antenna measurements and tests, the Group's historical activity

€53.6 M

EMC

THE EMC DEPARTMENT

(***E**lectro-**M**agnetic **C**ompatibility*)
dedicated to electromagnetic compatibility testing of systems, a growth area for the Group

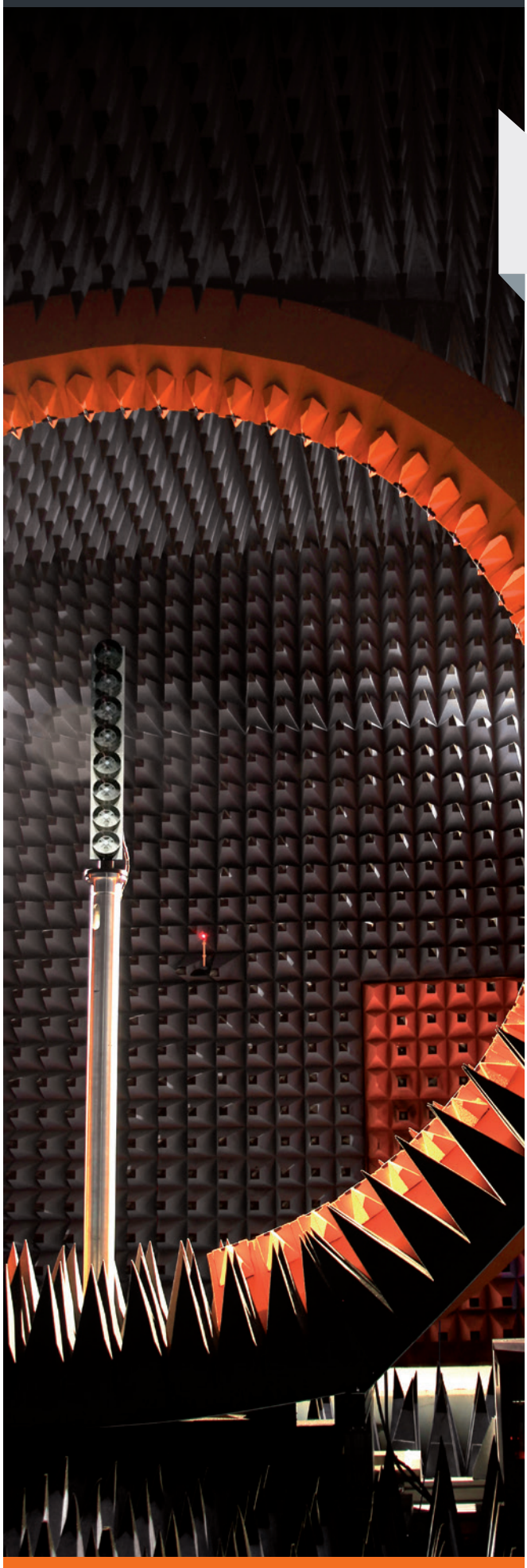
€10.3 M

EIC

THE EIC DEPARTMENT

(***E**nvironmental and **I**ndustrial **C**ontrol*)
focuses on environmental and industrial control tests, growth drivers for the Group

€2.0 M



AMS

The antenna measurement systems department

Key points

Activity

This is the Group's core business. It brings together MVG's activities in the field of antenna measurement. MVG has acquired a position as technological player of reference in this field at the European and global levels. It addresses two sectors: Civil Telecommunications and Aerospace/Defense.

Strategy

Provide products and turn-key solutions customized on the basis of standard technological blocks to a diversified customer portfolio, maintain its technological lead, and offer support services (software upgrades, preventative maintenance contracts, relocations of facilities, etc.).

Offering

MVG offers the most extensive range of turn-key antenna measurement systems (near-field and far-field, single-sensor and multi-sensor, radome test, RCS - radar cross section - measurements). As part of this offering, MVG also includes the associated software – equipment drivers, data acquisition, and post-processing. All customized solutions are designed, manufactured, marketed, installed, and maintained by MVG.

Price range

From €150 k to several million euros.

Key achievements

The AMS department accounted for 81% of revenue in 2016, or €53.6 M. The key achievements for 2016 were:

- A record production in Aerospace & Defense,
- The high attractivity of our 4G measurement systems.

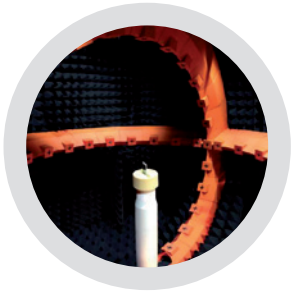
5G, a promising market

Wireless (OTA) tests will gain ground with the arrival of 5G

5G hardware and relay station tests and measurements will differ significantly from what is done currently. From a technical point of view, the RF (radio frequency) architecture of 5G hardware, the higher frequency bands used, and the lack of physical connectors stemming from this will require OTA tests while traditionally, these tests have been conducted using coaxial cables.

Moreover, the capacity and reliability required by 5G will require beam antennas, to offset the propagation losses, which increase with frequency. 5G will also rely on a broader spectrum of available frequencies ranging up to 100 GHz. Thus, it will implement "Massive MIMO" with agile network antennas, operating at high frequencies and sophisticated processing in the hardware. The latter and the network equipment must therefore be tested in many configurations at the system level, including taking into account strong interference that may come from other hardware. Thus, the scope of application for OTA tests will expand: from classic antenna performance tests in the product development phase, they will expand to other sectors, and many RF parameters as well as radio resource management will be tested in OTA mode in the development phases and on the production line.

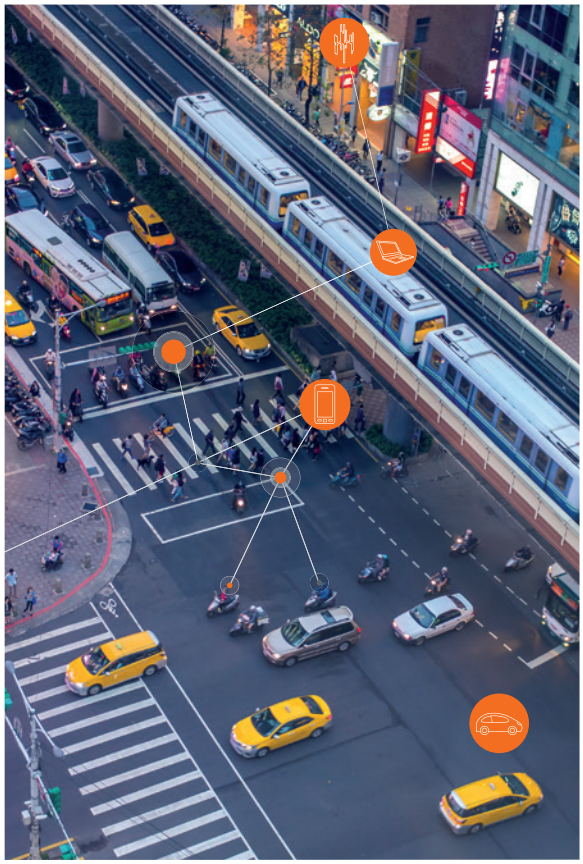
Products



The promise of an interconnected world

(Source JDN - Opinion column by Philippe Garreau)

While Orange has announced having exceeded a connection speed of 15 Gbps during a recent test in an anechoic chamber, and global Telecom players are working to make 5G a reality by 2020, can we actually measure the cultural and sociological impact of this imminent digital revolution?



50 times faster than current 4G, 5G should radically change our daily lives by making the network a neural structure able to expand the realm of possibility: virtual or augmented reality, Artificial Intelligence, smart cities, self-driving cars, increased communication among objects (IoT) as well as with humans... We might ask ourselves about the role of the human brain in this interconnected world.

The intelligence of antennas, the diversity of applications

The number of antennas is multiplying very rapidly around the world, and continues to grow. Not only large, easily visible carrier relay antennas, but also all the mini-antennas inside our laptops and smartphones, as well as in objects that can connect to the Internet and/or communicate remotely, including contactless bank cards.

These antennas are no longer content to send and receive radio signals: they do it intelligently. 5G relay antennas are «massive MIMO», modules comprising a very large number of small, networked radio antennas to transmit high volumes of data in precise and dynamically configurable directions. Thus, 5G will allow almost instantaneous downloads of HD movies or on mobile terminals. But this technology will also offer an extremely low latency, opening up the field to all applications requiring real-time operation, without interruption. With the "unlimited"

Smart Cities and the internet of Things

Virtual Reality and Remote Medical Treatment

connection promised by 5G, driverless cars should be able to communicate with each other, with pedestrian smartphones, or those of cyclists, and with road infrastructures to react instantaneously in the event of accidents or any kind of traffic disruption. 5G should also help support surgical operations conducted by a surgeon on a physically remote patient or allow for very precise medical diagnoses by networking data and expertise. In terms of economic impact, the British firm IHS Markit recently estimated a 12,300 billion dollar contribution from 5G to the global economy in 2035.

Additionally, according to Gartner, the number of connected objects should grow from 6.4 billion in 2016 to 21 billion by 2021. These objects will be able to communicate among themselves, creating a mesh. This will contribute to making the future 5G network the equivalent of a neural structure where computers, smartphones and objects will function like neurons, able to work together to manage and analyze a very large flow of information in real time.

This «brain,» coupled with the increased power of artificial intelligence, will guide an increasing number of our decisions and daily actions. It will improve thanks to deep learning by machines and, for example, will decide proper air conditioning or heating temperature, how far windows/shutters should be opened, the washing machine program, or a grocery list. Indeed, the future described by Didier Schmitt in "Antéversion. Ce qu'il faut retenir du future" (Antéversion. What we should know about the future), no longer seems very far away. But then, what role will humans play in a world where 5G is wide-spread and democratized, worthy of a science-fiction script?

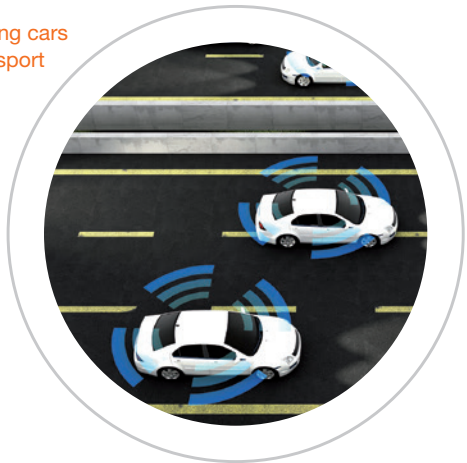
The role of humans: conscience, emotion, and empathy

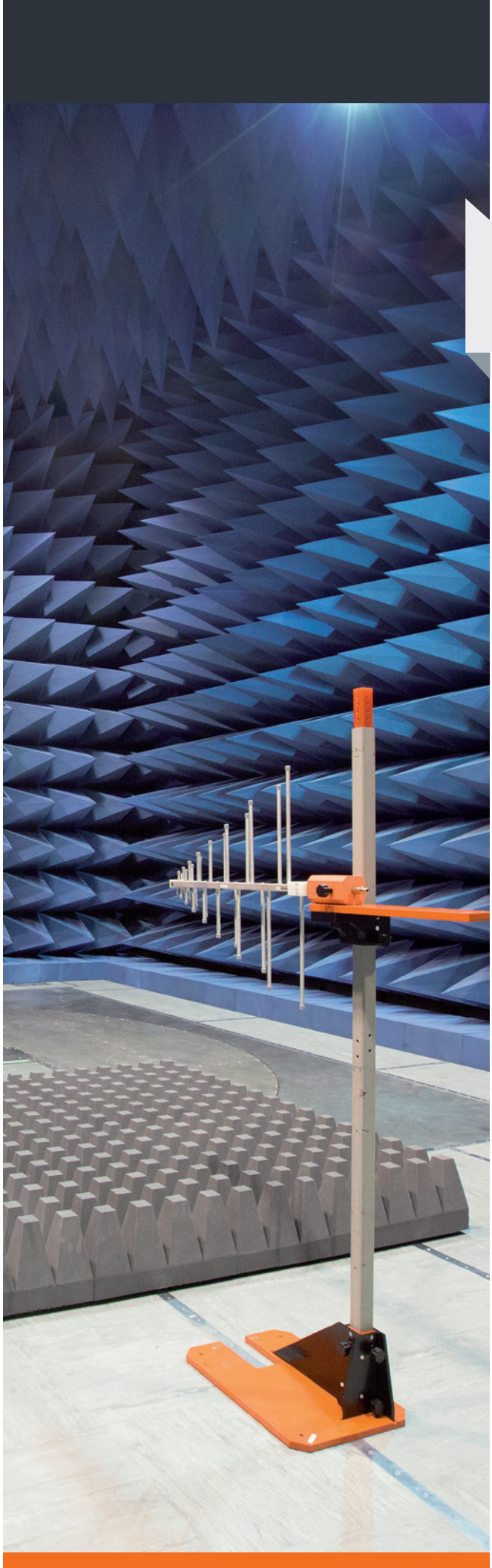
As explorer Jean-Louis Etienne emphasized, «Humans have a prodigious applied intelligence, but their relational intelligence is still very animal.» The human brain is gifted with an incredible ability to adapt. Until now, we have often used it to structure our knowledge and develop our capacity for analysis. But machines can do that much more rapidly than us, and dazzling advances in Artificial Intelligence are already proving this.

The progress of science and technologies, especially that made possible by the advent of 5G should lead new generations to put more effort into cultivating their relational intelligence, their intuition, and better understanding their emotions to interact with others. In short, developing their own emotional antennas. Perhaps one day will we measure them too?

Industry 4.0
and Big Data

Self-driving cars
and Transport





EMC

The electromagnetic compatibility department

Key points

Activity

The MVG-EMC division was created in 2012, thanks to the unique combination of AEMI's expertise in absorbing materials and Rainford's expertise in Faraday cages. The EMC division provides solutions to test the ability of devices to operate in electromagnetic environments and avoid generating disruptions themselves. This activity also extends to the EMC certification of electronic devices, protection against strong fields (data, people), and protection against eavesdropping.

Strategy

Integration of the value chain through strategic acquisitions, positioning as a supplier of turn-key systems.

Offering

This branch offers a range of EMC test chambers, mode-stir chambers, shielded rooms (control rooms, embassies), shielding for data centers, and shielding for MRI installations.

- EMC test chambers
- Antenna measurement chambers
- Doors
- Absorbing materials
- Faraday cages
- Accessories (masts, positioners, controllers, etc.)

The EMC division also provides project management, maintenance, certification, reinstallation, and installation upgrade services.

Price range

From €10 k to several million euros.

Key achievements

With €10.3 million of revenue, the EMC division represents 16% of the Group turnover. Highlights for 2016 include:

- Strong commercial activities
- This department has gained good visibility from major players in the US and in Europe

Customer testimonial: Huf Hülsbeck & Fürst GmbH & Co, USA

HUF decided to conduct its EMC tests in-house to save time and money and entrusted MVG for this facility

HUF decided to call upon MVG to install an EMC test system to save time and money.

The Partnership signed between MVG and Amplifier Research (AR) helped the automobile parts company, HUF North America, to procure a turn-key solution.

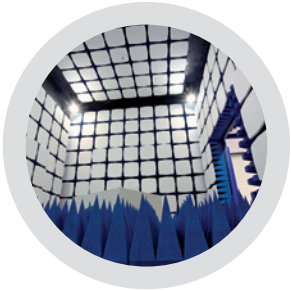
HUF develops and produces mechanical tire pressure, and telematic systems for the automobile industry throughout the entire world. Among its customers are well-known automakers such as Audi, BMW, and Ferrari. Regularly, HUF must identify potential electromagnetic compatibility (EMC) problems and confirm that there are no problems with the products that the company develops. «Until 2016, we outsourced our compliance tests, but it was costly and scheduling tests took time. We To do this, we estimated that we had to build our own facility in our Farmington Hills laboratory, where we could conduct tests on radiation emissions and immunity,» explains Yipeng Tang, Hardware Engineer at HUF North America Automotive Parts Manufacturing, Corp.

MVG advised HUF for the best possible solution: a dedicated anechoic chamber for its internal tests, maximizing available space while minimizing the budget. MVG built and installed a customized semi-anechoic chamber to meet all required standards and Amplifier Research (AR) designed and integrated the EMC test equipment. The result is a complete EMC testing system that allows HUF to insource its tests and thus gain the following advantages:

- Time savings, as insourcing eliminates the need to schedule measurements in an independent testing laboratory,
- Excellent profitability, as the test chamber will be available to the entire company and will serve all HUF divisions worldwide,
- Improved confidentiality as development tests will no longer take place in third party test facilities,
- Rapid feedback, as it will be possible to test, check, modify, and re-examine without constraints,
- Rapid validation, as compliance can be checked and re-checked if necessary,
- Full compliance ensured.

This is the first time that the partnership between MVG and Amplifier Research (AR) has helped an American client with a complete turn-key solution. Completion of this project is a good example of the solid relationship between AR and MVG, the proper combination of their ranges of products, and their expertise to offer one-stop shopping for high-quality, customized EMC solutions.

Products



EIC

Environmental and industrial control

Key points

Activity

The EIC division brings together devices used for monitoring electromagnetic waves, quality control on production lines, and the Neptulink 4G modem by MVG dedicated to Internet connectivity in coastal environments.

Strategy

Go from “follower” to “challenger” by relying on a modernized portfolio of distinctive products.

Offering

MVG has developed a wide range of products:

- Portable RF exposure meters (EME Guard, EME Guard XS, EME Spy)
- Fixed RF exposure meters (FlashRad)
- Software for 3D simulation of exposure to electromagnetic waves (EMF Visual)
- Control system for rock wool and glass wool on production lines (Dentro)
- 4G modem to optimize land/sea connections (Neptulink *by MVG*)

Price range

From €350 to €180 K

Key achievements

The EIC division’s revenue totaled €2 M, or 3% of the Group’s activity. In 2016, 4 new american distributors joined the distribution network of the RF Safety branch and have already made an impact on sales growth.

Customer testimonial: The Solitaire Bompard Le Figaro 2016, France

> NeptuLink by MVG, for sailors, it is the equivalent of going from a 56K modem to ADSL. Difficult to go without it after that!
>
> **Gilles Chiorri**
> *Race Director for The Solitaire*

Even today, without a satellite connection, professional and private sailors use a radio connection with only a low bandwidth, giving very limited on-board Internet access. Although it performs better than a radio connection, a satellite system still provides low bandwidth, at a high cost, and with a long re-transmission delay for images and sound. Neither of these two technologies offer broadband Internet access.

For the organizers of the Solitaire race, a broadband connection was essential as they faced many challenges: ensuring the safety of 39 boats and their skippers at sea, monitoring sporting fairness, as well as broadcasting the sailing race live, without breaks or delays. "As it is a solo race, the competitors rapidly tire out. Therefore, we must be able to monitor them at all times," explained race director Gilles Chiorri of OC Sport Pen Duick. Accompanying the open-water race in his dedicated boat, his assignment was to monitor sailor safety. "Transmitting live images of a sailing race is a real challenge," confirmed Erwan Riquier, Chief Executive Officer of Sea Events, the video production company for the race. "Until now, we had to use major, heavy, expensive resources to obtain high-quality video and sound: relay aircraft, helicopters, etc." For the 47th running in July 2016, the Solitaire called upon MVG, which has now become one of the official suppliers for the race. Its NeptuLink by MVG solution allows boats to have broadband Internet access up to 20 nautical miles (37 km) from the coast. A French innovation that is unique on the market, it was developed to withstand difficult conditions at sea. It optimizes network reception by taking into account radio wave propagation at sea, and the pitching and rolling of the boats. "With NeptuLink by MVG, continuously monitoring and sharing race status in real time has become possible," confirmed Erwan Riquier. "The journalists covering the event were impressed by the quality of the broadcast system."

Because the race organizers were so satisfied with the performance of NeptuLink by MVG, they renewed and expanded the live broadcast experience for the Solitaire Urgo Le Figaro 2017.

Products

10 countries with sales offices

90% of revenue abroad

2 major production centers

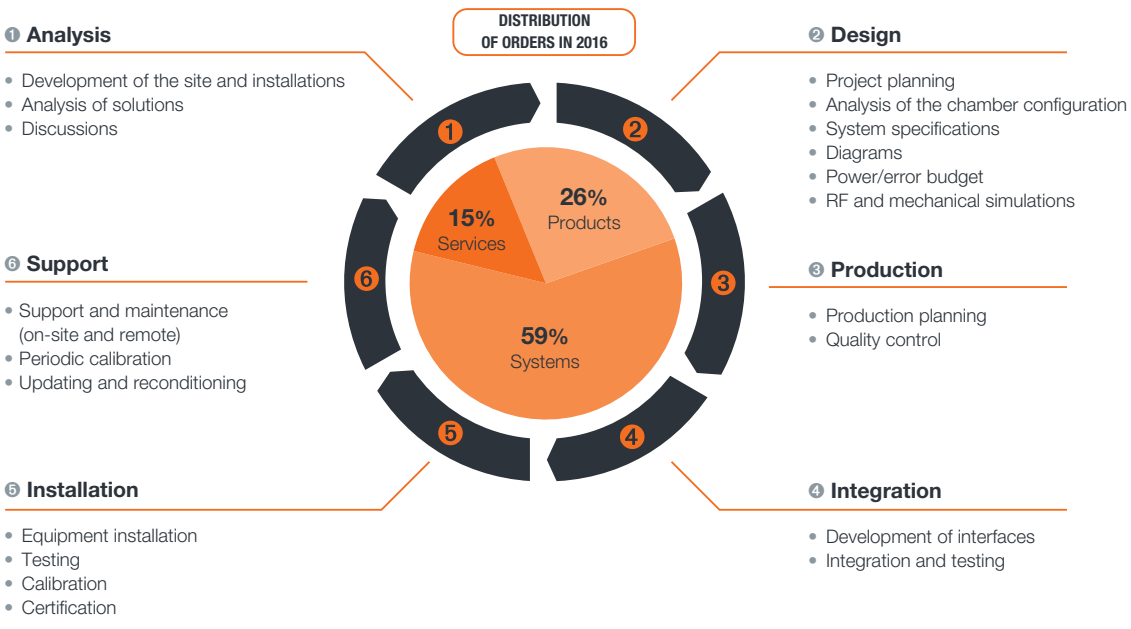
Key assets

Since 1996, the year that marked an industrial turning point for the Group when it decided to move forward turning its unique design office into an industrial manufacturer. MVG has developed two main assets:
• a solid business model, including a high proportion of recurring revenue,
• a multi-country/multi-sector positioning.

A SOLID BUSINESS MODEL

MVG proposes systems with high added value, designed from standardized technological blocks, guaranteeing controlled margins. Its know-how extends from the analysis, sales, and design stages to production, integration, installation and support. These systems accounted for 59% of new orders in 2016.
Alongside these systems, MVG develops, manufactures and markets off-the-shelf products, such as the SG 24 and StarLab. These projects require little adaptation from one customer to another and can be put into service quickly. They represented 26% of orders in 2016.
Lastly, the Group offers engineering and maintenance services. These represented 15% of orders. Service, engineering, and maintenance contracts, associated with the products, represented 41% of sales and are not significantly affected by adverse market conditions.
This solid business model is reinforced by a diversified customer portfolio: the top customer accounted for 9% of the Group's 2016 revenue, and the top five customers accounted for 20%.

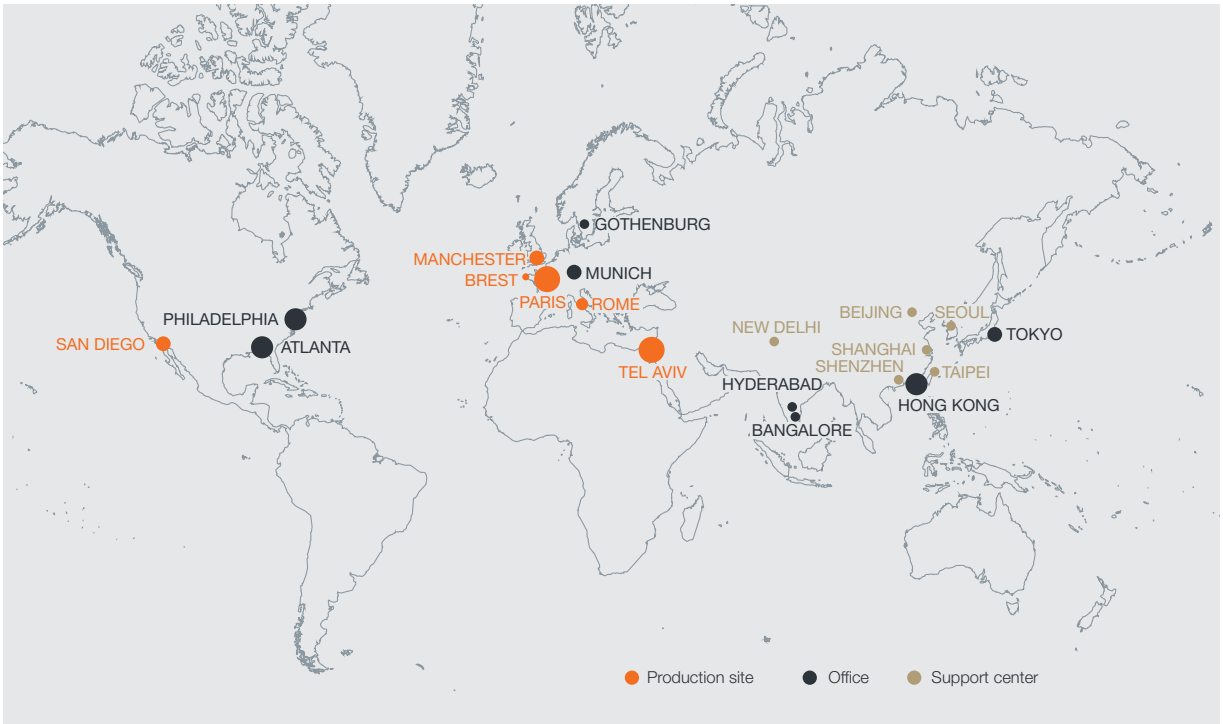
SYSTEM SALES CYCLE



AN INTERNATIONAL GROUP

MVG exports more than 90% of its production. The Group spans Europe, Asia and America through 20 locations in 10 countries. In 2015, a reorganization resulted in a centralization of its mechanical production in Israel, an almost fully sales and service oriented structure in the United States, and ultimately a more productive, more efficient Group focused on the future. It currently consists of two large major production centers: one in France, focusing on electronics and multi-sensor technology, and one in Israel, focusing on mechanics and single-sensor technologies, working in perfect synergy. These two production centers rely on three skill satellites: one that produces Faraday chambers (Rainford - England), one that produces absorbing materials (chamber lining) (AEMI - USA), and one that designs reference antennas necessary for system acceptance (MVG - Italy). With its local offices, the Group is closer to customer cultures and is therefore better able to follow through with customer needs and with higher understanding, in turn limiting travel and transport expenses.

MVG IS PRESENT IN 10 COUNTRIES, THROUGH 20 SITES, INCLUDING 2 MAJOR MANUFACTURING FACILITIES.



PARIS/BREST
MVG headquarters, MV-Scan™ production, R&D, project management, sales, marketing, customer support, and maintenance center.

ROME
R&D, antenna production, and sales center.

MUNICH
Sales and project management center.

GÖTEBORG
Sales center.

MANCHESTER
Faraday cage production center.

PHILADELPHIA
ORBIT/FR headquarters, integration, sales, project management, support, and maintenance center.

ATLANTA
Sales, project management, support, and maintenance center.

SAN DIEGO
Production (absorbents), sales, and project management center.

TEL AVIV
Production (positioners and masts), sales, project management, and support center for Israel, India, and Russia.

TOKYO
Sales, project management, and support for Japan.

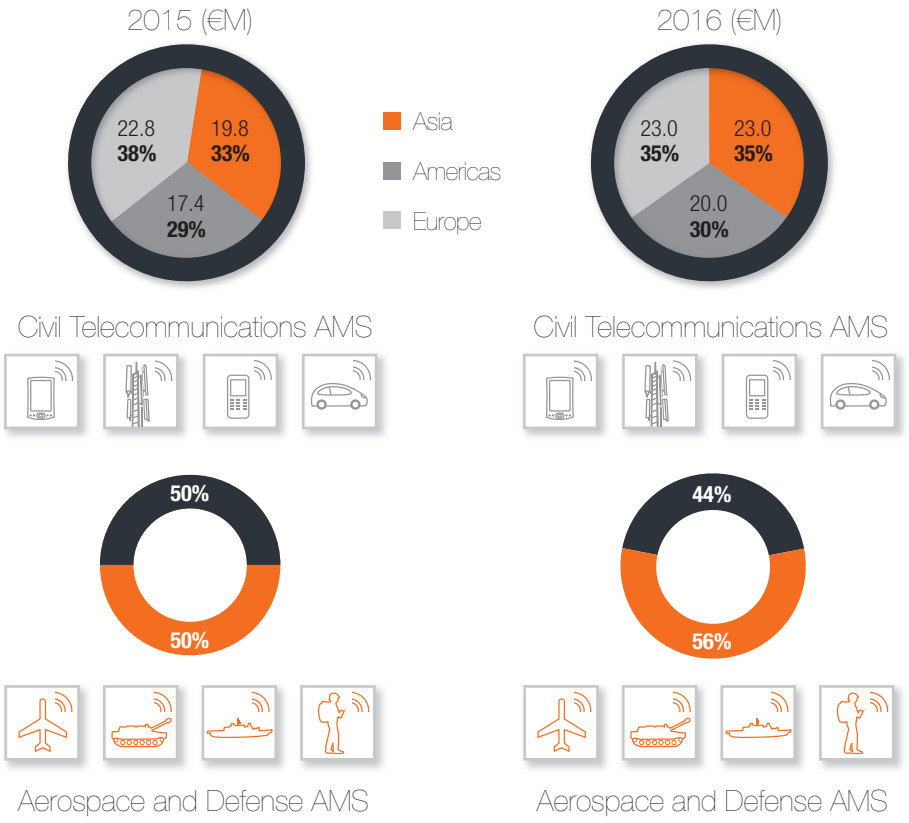
HONG-KONG
Sales, project management, support, and maintenance center for Asia.

BANGALORE
Project management center for India.

A MULTI-COUNTRY/MULTI-SECTOR POSITIONING

The Group is strengthened by a diversified and balanced sector and geographic presence. From a sector perspective, it works in the Aerospace/Defense and Civil Telecommunication sectors. Aerospace/Defense saw strong growth over this Financial Year, up 23% over 2015, and represents 56% of 2016 revenue (vs. 50% in 2015). Civil Telecommunication activities brought in €28.8 M, a slight decrease, but this should rebound in 2017 given the order backlog. In geographic terms, the Group operates on three continents. The geographic distribution was, as usual, very balanced in 2016, with 35% of revenue generated in Europe/Middle East, 35% in Asia, and 30% in the United States.

BREAKDOWN OF REVENUE BY GEOGRAPHICAL REGION/2015 AND 2016



A diverse customer base that protects the Group from any dependency on its main customers

MVG's business model relies on a diversified customer portfolio. From year to year, the share of the top customer and the top five customers remains contained. The top customer's share in the Group's 2016 revenue was thus only 9%, and the top five customers accounted for 20% of the total.

Share of revenue in €k	2013	2014	2015	2016
No. 1 customer	3 790	5 665	4 480	5 970
Top 5 customers	10 942	15 149	10 534	13 464

An experienced team holding shares

- **An experienced team bringing together more than 30 nationalities**
- **The management is a shareholder of the Group**

GROUP

Dr. Philippe Garreau, *CEO*

SUPELEC, Engineering PhD
Started his career at the European Space Agency (ESA)
1992: Joined SATIMO - responsible for antenna measurements
1996: Promoted to CEO of SATIMO then the MVG Group in 2008

Olivier Gurs, *CFO*

Holds an MBA from ESCP
Began his career as an auditor at Arthur Andersen
Became CFO of Hybrigenics then SpineVision
2003: Joined DI Finances
2015: Named CFO of MVG

Lars Foged, *Scientific Dir.*

Graduate of the California Institute of Technology
1991: Joined Space Engineering (Italy) in the space antenna R&D dept.
Currently Scientific Dir. of MVG

Gianni Barone, *Sales Dir.*

Graduate of the University of Torvergata and SupAéro
1991: Joined Space Engineering (Italy)
1996: Participated in the launch of Altran in Italy
2000: Joined MVG
Currently Sales Dir. of MVG & Managing Dir. of MVG Italy

Eric Beaumont, *Strategy Dir.*

SUPELEC engineer/M.S. in E.E. Georgia Tech
1996: Joined SATIMO in charge of Signal Processing
2000: Joined the Mobile Network Design dept. of Alcatel
Currently Strategy Dir. of MVG

Nicolas Gross, *Applications Dir.*

ENSTA Bretagne engineer
2006: Joined SATIMO as antenna engineer
2007: in charge of multi-probe systems development
Currently Applications Dir. of MVG

SUBSIDIARIES

ORBIT/FR

Per Iversen, *CEO of ORBIT/FR*

Graduate of UCLA
1991: Joined the Antenna division of the ESA
1998: Tech. Dir. of SATIMO then Dir. of the Atlanta site
2008: Named head of ORBIT/FR

Roni Braun, *Dir. of ORBIT/FR, Ltd*

Graduate of Technion – Israeli Institute of Technology
1996: Began his career as a mechanical engineer at Orbit/FR, Ltd
2009: Named Engineering Director of Orbit/FR, Ltd
2015: Named Dir. of Orbit/FR, Ltd

Aleksis Anterow, *Dir. of ORBIT/FR Europe GmbH*

Graduate of Chalmers University of Technology (Sweden)
1998: Joined Nokia as antenna engineer
2011: Manager of antenna development in Sony Ericsson
2014: Named Dir. of Orbit/FR Europe

MVG-EMC

John Noonan, *Dir. Rainford EMC & AEMI, Inc.*

1991-2008: Dir. of Supaseries Ltd
2006: Dir. of Blackbeam Ltd
2009: Dir. of Rainford EMC Systems Ltd
2017: Dir. of AEMI, Inc

Arnaud Gandois, *Managing Dir. of MVG Industries*

ENSIL engineer
1996: Started his career at SATIMO
Currently Managing Dir. of MVG Industries

John Estrada, *Managing Dir. of MVG USA*

Graduate of Auburn University and Georgia Tech.
2001: Joined SATIMO
Currently Dir. MVG USA and Dir. US Sales

Luc Duchesne, *R&D Dir. of MVG Industries*

Graduate of ENSI and SupAéro
6 years of experience at DASA (Germany)
2000: Joined Satimo
Currently head of R&D of MVG Industries

Yann Toutain, *Head of Brest Site*

Engineer at Télécom Bretagne
2001: PhD from Université de Bretagne Ouest
2001: Joined Antennessa (acquired by MVG in 2007)
2015: Named head of the Brest site

MVG Industries / MVG

Order book
€63.2 M

EBITDA
€6.3 M

Revenue
€66.0 M

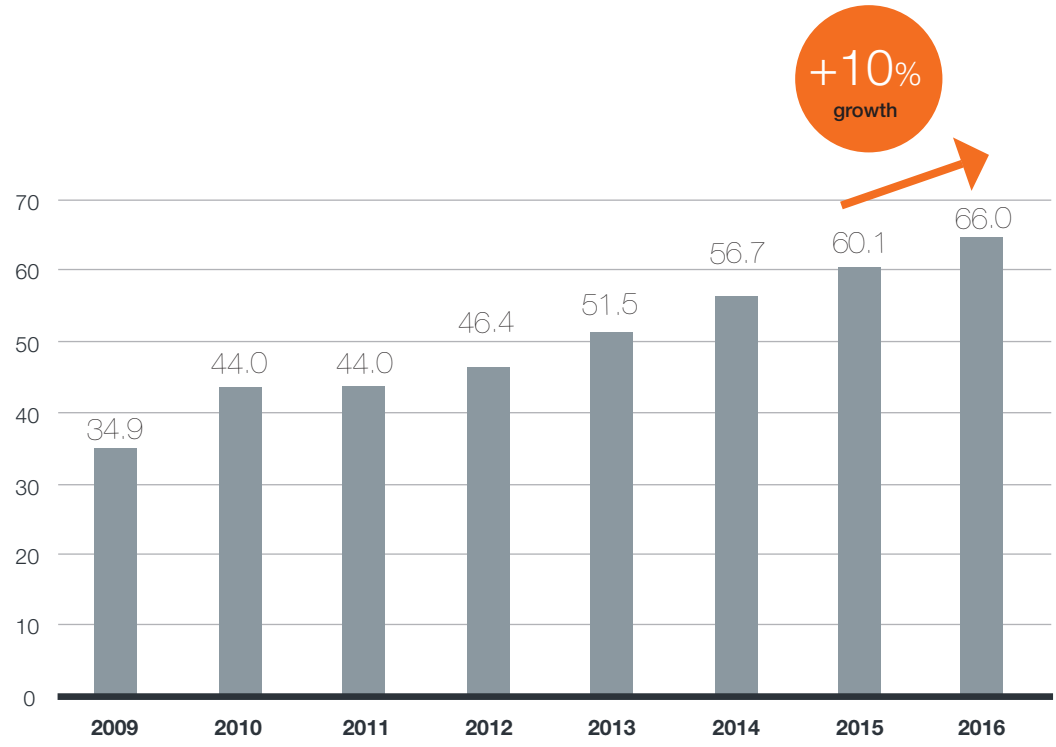
Group share
of net income
€1.0 M

Earnings and Outlook

2016 was a dynamic financial year for the MVG Group, and proved remarkable improvements in all its economic essentials. This performance was particularly apparent in the second half of the year due to the high level of activity over the period and tight control of expenses, both current and non-recurring. The Group re-established a net profit over the entire financial year, illustrating the potential for profitability and cash flow generation in its model.

ACTIVITY

CHANGE IN REVENUE (€M)



AN ORGANIC GROWTH IN REVENUES OF 10%

Thanks to a record level of orders produced over this financial year, the MVG Group recorded revenues of €66.0 M in 2016 against €60.1 M in 2015. All divisions in the Group contributed to this performance. At constant exchange rates, total revenues rose by 11%.

The Aeronautics/Defense sector was particularly dynamic, accounting for 56% of revenues. The geographical distribution remained balanced (Europe and Asia 35%, United States 30%).

EBITDA GROWTH OF 15%

Consolidated data - IFRS - €k

	2015	2016
REVENUE	**60,126**	**66,019**
Purchases consumed	21,086	24,511
GROSS MARGIN	**39,040**	**41,508**
Margin	*64.9%*	*62.9%*
Other external expenses	12,384	11,891
Payroll expenses	21,214	22,445
EBITDA	**5,456**	**6,250**
Margin	*9.1%*	*9.5%*
RECURRING NET OPERATING INCOME	**3,171**	**3,718**
Margin	*5.3%*	*5.6%*

The gross margin totaled €41.5 M against €39.4 M on December 31, 2015, an increase of €2.1 M. As expected, the gross margin showed a downturn over the year (62.9% against 65.6% in 2015), taking account of the higher proportion in 2016 of "all mechanical" compared with "all electronic" contracts. However, the Group continues to work at reducing the difference in margins between these two types of contracts.

Thanks to the very tight control of current operational expenses, the Group recorded a very solid EBITDA of €6.2 M, a growth of 15.6%. The Group is thus starting to reap the benefits of its reorganization, resulting in greater operational efficiency. The EBITDA margin reached 9.5% over the year, with 12.1% over the second half alone.

RETURN TO A NET PROFIT

Consolidated data - IFRS - €k

	2015	2016
RECURRING NET OPERATING INCOME	**3,171**	**3,718**
Margin	*5.3%*	*5.6%*
Non-current operating expenses	(2,813)	(1,715)
Net operating income	363	2,003
Net finance costs	(734)	(465)
NET INCOME	**(836)**	**163**
NET INCOME GROUP SHARE	**(72)**	**1,044**

Non-recurring expenses also saw a net reduction compared with 2015 (€1.7 M against €2.8 M). The Group benefited from the end of the intellectual property procedure in the United States, which resulted in the signing of an agreement with ETS-Lindgren on the exchange of patents in the first quarter of 2017. The Group thus recorded an operating income of €2.0 M, compared with €0.4 M in 2015.

In the end, after recognition of financial expenses, taxes and minority interests (Orbit/FR), the Group share net income totaled €1.0 M (against a loss of €0.1 M last year).

HEALTHY FINANCIAL STRUCTURE

Consolidated data - IFRS - €k

		12/31/2015	12/31/2016
ASSETS	**NON-CURRENT ASSETS**	**28,626**	**29,700**
	CURRENT ASSETS	**73,892**	**73,351**
	- of which, inventories	9,530	10,355
	- of which, trade receivables	31,482	30,800
	CASH ASSETS	**25,992**	**26,655**
		102,518	103,051
LIABILITIES	**EQUITY CAPITAL**	**70,056**	**70,420**
	NON-CURRENT LIABILITIES	**7,668**	**6,450**
	- of which, non-current financial debts	6,867	5,657
	CURRENT LIABILITIES	**24,793**	**26,181**
	- of which, current financial debts	1,716	3,080
	- of which, trade payables	14,498	10,486
		102,518	103,051

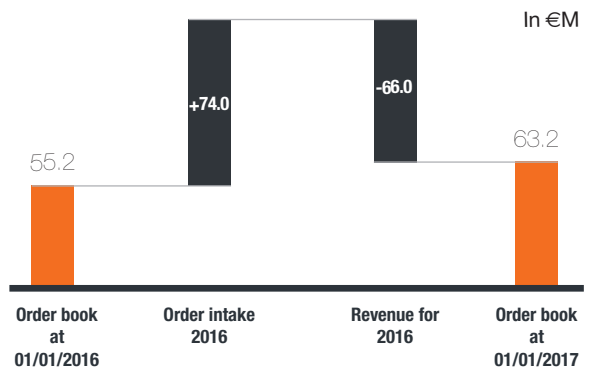
Shareholders' equity stood at €70 M on December 31, 2016.

Consolidated data - IFRS - €k

	2015	2016
Consolidated Net Income	(837)	163
Operating cash flow before finance costs and taxes	1,494	4,878
Change in WCR related to operations	(1,074)	681
NET CASH FLOW FROM OPERATIONS	**760**	**4,679**
Net cash flow from investment	(3,057)	(3,599)
Net cash flow from financing	(1,781)	(1,971)
Impact of currency fluctuations	202	91
CHANGES IN CASH POSITION	**(4,078)**	**(892)**
OPENING CASH POSITION	**29,555**	**25,678**
CLOSING CASH POSITION	**25,678**	**24,886**

Operational cash flows made strong progress at €4.7 M (against €0.8 M on December 31, 2015). These broadly cover the year's net investments (€3.5 M) as well as financial interest paid over the fiscal year (€0.7 M). Finally, free cash flows stood at +€1.1 M (against €2.3 M in 2015). Cash net of debts was stronger at €18.0 M on December 31, 2016 (against €17.4 M on December 31, 2015).

The Group is in a very strong financial situation for seizing new external growth opportunities, while at the same time remaining highly selective.



Outlook for 2017: on the road to a new financial year of growth

Building on an order intake that achieved a new record in 2016 (€74 M), the Group started the 2017 financial year with an order book worth €63.2 M (96% of the 2016 revenue).

This high level of visibility on activity should allow the Group to deliver a new financial year of growth by maintaining a sustained focus on controlling and optimizing costs, and consequently economic performance.

The Group, therefore, intends to continue consolidating its positioning and visibility as a benchmark player, in particular for major customers in the antenna systems market. With its new product on 5G (marketing launch of the StarLab 5G in June 2017), the Group will benefit from a solid technological lead and a high-quality product that fully meets the expectations of the Telecom market.

Mini-Compact Range

A global presence

Microwave Vision exports more than 90% of its production outside of France. The Group spans Europe, Asia and America through 20 locations in 10 countries.

MVG Industries
17 avenue de Norvège
91140 Villebon-sur-Yvette
FRANCE
Tel: +33 (0)1 69 29 02 47

MVG - Corporate HQ
47, boulevard Saint Michel
75005 Paris
FRANCE
Tel: +33 (0)1 75 77 58 50

MVG Industries Bretagne
Technopole Brest Iroise,
Z.I. du Vernis,
225 rue Pierre Rivoalon,
29200 Brest
FRANCE
Tel: +33 (0)2 98 05 13 34

ORBIT/FR Europe GmbH
Hans-Pinsel-Str. 7a
85540 Haar
GERMANY
Tel: +49 (0) 89 7099959-0

Orbit/FR Israel
1 Gesher Ha-Ets St.,
P.O. Box 12096,
Emek Hefer Industrial Park,
38777-01 Emek Hefer
ISRAEL
Tel: +972 74 713 0130

MVG Italy
Via Castelli Romani, 59
00040 Pomezia (Rome)
ITALY
Tel: +39 06 89 99 53 11

Research and Production center in France

MVG Sweden
P.O. Box 35
44121 Alingsas
Gothenburg
SWEDEN
Tel: +46 31 402 430

Rainford EMC Systems Limited
Unit 400,
Haydock Lane,
Haydock WA11 9TH
UNITED KINGDOM
Tel: +44 (0)1 942 296 190

MVG Hong-Kong
Suite 702, 7th floor
Cyberport 1
100 Cyberport Road
Pok Fu Lam
Hong Kong SAR
CHINA
Tel: +85 229 896 128

MVG India
N° 414 Cunnigham Road
Level 4 Prestige Centre Point,
560052 Bangalore
INDIA
Tel: +91 70 22 98 12 16

Production site in Israel

MVG Japan
#101 Confort Musashi-Nakahara,
2-10-32, Shimokodanaka,
Nakahara-ku, Kawasaki-city
211-0041 Kanagawa
JAPAN
Tel: +81 44 948 9301

Orbit/FR's Corporate HQ
650 Louis Drive,
Suite 100
Warminster, PA 18974
UNITED STATES
Tel: +1(215) 674 5100

MVG, Inc
2105 Barrett Park Dr.,
Suite 104
Kennesaw, GA 30144
UNITED STATES
Tel: +1 678 797 9172

AEMI
1320 Air Wing Road,
Otay Mesa, CA 92154
UNITED STATES
Tel: +1 (619) 449 9492

mvg
Microwave Vision Group

Contact: finance@mvg-world.com
http://investor.mvg-world.com/fr