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🗞 NOVARES

I. ABOUT NOVARES

1. Novares at a glance: key figures



2. Key corporate information

Novares is a global plastics solutions provider that designs and manufactures complex components & systems serving the future of the automotive industry. The company designs and produces cutting edge automotive parts and specializes in technical plastic injection that contributes to cleaner lighter more connected, user-friendly cars.

Headquartered in France, the Group is present in 21 countries, runs 42 manufacturing plants, 7 Skill centers, 5 Technical centers and 17 customers service centers, around the globe, to partner with customers.

Novares promise

Novares' offer to its customers is built on the three pillars of **global proximity**, **reliable execution** and **pragmatic innovation**. Novares is close to its customers, optimizing logistic costs and ensuring on-time deliveries. Using advanced technologies, Novares produces cutting edge, ergonomic designs and stylized products for performance, comfort and safety. The Group teams up with customers on methods, processes and best practices that exceed industry standards and requirements.

Balanced customer base

Novares delivers to all the major players in automation across the world, including final OEMs car manufacturers such as Dongfeng Peugeot-Citroen, PSA, Renault-Nissan-Dacia, Ford, Fiat Chrysler, Daimler, Audi, Toyota, General Motors, Jaguar Land Rover, BMW, SAIC, Daimler, Audi, and Volkswagen, as well as suppliers (Tier-1) such as Yanfeng Johnson Controls (YFJCI), Faurecia, IAC, Continental, Visteon. Novares' customer reach covers over 50 different vehicle brands and 400 different model programs.

Steady profitable growth

In 2017, Novares achieved a record sales level of €1,179 million and strong organic growth of +10.4% reaching €1,179 million. Novares' objectives are for revenue growth of over 7.5% between 2018 and 2019.

Novares has a solid financial balance sheet including: (under French Generally Accepted Accounting Principles) +14% sales with EBITDA trebling between 2012 and 2016. Novares' ambition for the future is high: (under International Financial Reporting Standards), +20% sales and EBITDA + 33% between 2016 and 2019.

To note: from 2012, Novares was strongly focused on limiting financial debt despite growth needs: Key Plastics' acquisition debt represents 52% of the Group Net Debt. The financial leverage is now at 1.9 x EBITDA versus 2.6 EBITDA marked at the end of 2016, thanks to \leq 32 million Free Cash Flow generation (after capex).

Strong order book

With an order book of 5.5 billion euros, equivalent to five years of sales, Novares is trusted by its customers. It has a balanced customer base, so is not over-reliant on a few customers.

Global sales

A truly global player, Novares has a balanced base regional portfolio, selling to markets from the US and Mexico, through Europe and Africa to China and India. Thanks to its local presence across the main global auto production hubs, it has generated 37% of sales in fast-growing markets.

Seven product lines...

The company product ranges are organized into seven product lines each covering distinct product areas: Engine Components, e-Powertrain; Exterior Paint and Surfaces; Handles; Air Vents and Decoration Trims; Bezels and Clusters; and Interior and Car Body Trim.

...giving a well-balanced product portfolio

The diversified portfolio is balanced, with each product line having a critical size and a leadership position. Economies of scale give cost reduction benefits and Novares maximizes cross-selling opportunities.

3. Perfectly aligned with market trends

Novares is perfectly positioned to respond to the challenges and opportunities of today's global market, which is shifting to lighter vehicles and components, global supply chains and hybrid and electric vehicles. It is also ready to exploit the new growth areas of smart surfaces inside cars and the rapid expansion of autonomous driving capabilities.



Key trends in the automotive industry.

II. NOVARES INNOVATION APPROACH

1. Dedicated philosophy & investments

Novares know-how depends first and foremost on innovation. One of Novares main focuses is to never stop inventing. The Group takes pride in creating a start-up-like culture inside Novares and in valuing entrepreneurship. This is the reason why Novares has partnered with Station F to launch its newest innovations.

The biggest start-up campus shares Novares' values: being self-starting, results-driven, courageous, and collaborative. And Novares feels that this will all be needed in the future of the automotive industry. Novares' global organization allows the Group to quickly integrate new ideas and solutions into its work, and its partnerships with start-ups and new technology businesses gives it the edge in offering highly customizable products and systems to market at a very fast pace.

Today, the Group specializes in plastic injection and has a global innovation impact. Novares skills and know-how cover the entire life-cycle of product development from "**build-to-print**" (industrialization of a concept developed by the manufacturer) to "**full design**" (design and development by the equipment manufacturer). In addition, the merger of Mecaplast with Key Plastics (US based plastics specialists) in December 2016 significantly boosted the group's development capacity.



Novares International R&D strike force

Product skills combined with market-specific know-how.

Today, Novares employs **580 engineers and technicians** across **7 Skills Centers** and **5 Technical Centers**, applying simultaneous engineering. Fulfilling its commitments, the Novares group invests **5.2% of its turnover** per year in R&D and innovation.



Each year, this investment effort modernizes its laboratories and entities entirely dedicated to research, and maintains and updates its product development tools.

In addition to modernizing Novares central Skills Centers, which are responsible for developing and designing products, Novares sustains its know-how by investing on an international level and close to the market. **5 Technical Centers, supported by the central Skills Centers,** propose **variations of its standard product ranges**, according to the specific requirements and constraints of each customer and market. To reach the right level of skills in the 5 Technical Centers, Novares makes significant investment in long-term training programs and laboratories, e.g. the aeraulic test bench in Chennai, pressure cycling test bench in Wuhan Technical Center, and 3D laser scanning in Gebze Technical Center, etc.

Novares Group strives to ensure that each innovation corresponds to the future essential needs of the automotive industry. Novares' innovations are closely linked to new mobility and business models such as car leasing, sharing, and new powertrain techniques. **The company's focus caters to current market trends and to creating innovations for the development of clean, light, connected, user-friendly, and autonomous cars.**



Innovation based on market needs.

Novares focuses 2/3 of innovation-related projects on the reduction of carbon dioxide emissions and reduction of vehicle weight. Its innovation focus is aligned with industry megatrends.

In this respect, Novares collaborates closely with its partners. Over the past few years, approximately **10 co-innovation type contracts**¹ were entered into on themes such as hybrid plastic-textile solutions for esthetic engine covers, plastic materials reinforced with carbon

¹10 co-innovation contracts: surge Noise Engine, Plume Exterior (lightening of door trims by chemical foaming), air Bump Gen II, air guide study, full engine encapsulation study (thermal & acoustic), variable water outlet \in 7, thermostatic water outlet, NVH for AIS, plastic oil pan with gearbox flange, get know-how on aluminum tool with ceramic grain, use of PP with carbon fibers for interior trims, hybrid cover (plastic-textile).



fibers or new injection processes. Thanks to these multidisciplinary and collaborative methods, Novares has achieved convincing results.

In 2017, 29 patents were filed and the list continues to grow. **In January 2018, Novares achieved a total of 131 active patents filed** (including 56 patents under registration). This confirms Novares' dedication to continuous improvement and innovation.

2. **Project focal points & innovation topics**

Over the past 3 years, Novares has created Demo Cars (previous Nova Cars were known as "Smart Mecaplast Trends", SMT1 and SMT2) enabling global car manufacturers to visualize and experience turnkey innovations ahead of market timing. These innovations have met current and future challenges from the automotive sector, by imagining the market in the future, from 2020 to 2025 and beyond, and particularly for *Engine* technologies.

Novares' capacity to produce quality products is reinforced by continuous testing and a trials process (4 labs, an acoustic center) and this guarantees customer benefit from all the latest techniques. In addition, Novares' design and engineering uses the latest computer-aided programs such as CAE (Computer-Aided Engineering) and CAD (Computer-Aided Design). It organizes in-house photo typing, testing and validation capabilities. The Group's expertise goes from design, production, and assembly through to decoration. Design and development is aligned with customer needs.

For the Nova Car #1 project, Novares was fortunate to collaborate with Prototype Integrators (Genaris, Etud Integral), new technology partners (Quad) and start-ups (FlexEnable, Actronika, Efi Lightning).

Novares and its partners have contributed to the success of Nova Car #1. Novares' highly collaborative and creative spirit is one of the Group's strengths – which has enabled an innovative joint product to come to life.

PROTOTYPE INTEGRATORS



Genaris Group is a cluster of specialists and innovative companies that operate as an interconnected organization with a common platform. It offers advice, engineering, prototype manufacturing and 3D services and supports customers along their technological and industrial innovation cycle.



Etud-Integral offers know-how in the following areas: creative processes, technical concept creation, digital simulations, ergonomics, engineering and prototypes up to moving vehicles. It comprises three streams of expertise: product innovation, technological innovation and industrial innovation.



NEW TECHNOLOGIES PARTNERS



QUAD: SOLUTION TOUCH'N PLAY - a short cut panel for favorite features (patented). Quad Group is an independent group of diverse production companies built on the fluid exchange of ideas and talents. Quad Group is a collaborative platform for making a wide range of content for any medium through imagination, storytelling, and innovative technology.

STARTS UPS



FLEXENABLE: SOLUTION FLEX VIEW - exterior revolving mirrors & camera with an integrated flexible screen for rear view (patented).

FlexEnable works together with partners to drive innovation across video-rate displays, sensors and smart systems. Proven flexible electronics technology platform enables new product paradigms across multiple industries, including automotive, digital signage, consumer electronics, security and healthcare. FlexEnable's high-performance Organic Thin-Film Transistor (OTFT) technology is the lowest cost flexible electronics platform that enables glass-free, flexible displays and sensors.



ACTRONIKA: SOLUTION TOUCH 'N FEEL - a sensitive touch & scroll panel with haptic feedback.

Actronika also offers specific integration solutions through the co-development of projects with its customers. Through the provision of personalized support and expertise, it can provide its clients with a competitive advantage through the creation of haptically-enabled interfaces and devices. Its customizable solutions can be based on its modules as well as on the developments of new technologies. It can adapt to any level of product design and seamlessly manage haptic integration in products with minimal disruption of existing design processes.



EFI LIGHTNING: SOLUTION SNAKE'N LIGHT - an innovative mood lighting, with easy customizable design for OEMs. SOLUTION BIRD VIEW - smart and tiny roof bars which deliver load measurement and light communications (patented).

EFI Lighting develops creative industry-ready solutions to reinvent lighting in automotive applications. It is a subsidiary of the EFI Automotive Group founded in partnership with Brochier Technologies in June 2015. It designs and mass produces complete lighting assemblies compliant with automobile standards, integrating lighting surfaces or light guides and LED source modules. EFI Lighting benefits from the automobile know-how of EFI Automotive in terms of product and process quality as well as having a privileged access to the automobile market.

III. THE 3RD GENERATION: NOVA CAR #1



1. Trends & challenges in the automotive industry

There is an obvious shift in the automotive industry towards cleaner, lighter, more connected and user-friendly, autonomous cars. This poses new challenges to car manufacturers and their suppliers alike, and the need to expand automotive expertise well beyond its classical borders arises.

Connected cars need to have more and larger displays integrated into their dashboards, which is a challenge for manufacturers in terms of design integration, creating non-flat rectangular displays and the fact that Organic Light-Emitting Diodes (OLED) do not meet automotive ageing requirements.

Autonomous driving (from ADAS level 2 to AD level 4/5) brings challenges in cockpit design, especially for transitioning between normal drive and autonomous drive modes. The move towards zero emissions means ever reduced vehicle weights and air drag.

New ways of using cars such as rental and organized car-sharing mean automotive systems must be introduced so that users can learn to use them instantly and won't need to adjust mirrors and seat settings.

ADAS (Advanced Driver Assistance System) and AD (Autonomous Driving) both rely on systems using surrounding perception with object detection & characterisation, lane detection, critical situation analysis and driving action proposal/decision, whereas traditionally drivers relied on using vision through windows and mirrors.

360° augmented reality brings all-round vision with displays showing the same image for all users (driver and passengers) instead of driver-only information with mirrors and Head-Up Display (HUD).

The new systems bring reassurance for drivers in normal driving mode, with all-round vision of the sides and rear of the vehicle. In AD mode, all passengers have access to the same information.



All users need clear, visible information as to which mode the car is driving in, with markedly different displays, seat and steering wheel positions as well as lighting to ensure users are clearly aware of the different driving modes.

These are just some of the challenges Novares has been working on and that will continue to be central to the Group's innovation processes. Nova Car #1 showcases some responses to these challenges.

2. Innovative Concepts

With Nova Car #1, Novares has developed cutting edge technology, breakthrough innovation aligning with market needs for digitalized comfort and usage, collaborative augmented reality and driving assistance.

Here is a full description of the 16 Nova Car #1 innovations, 17 patents, including features and benefits listed for each.

2.1. CONNECTED & AUTONOMOUS CAR INNOVATIONS





BirdView (patented)

Novares has developed a sleek generation of roof bars, that use lighting to give information to both road and vehicle users. In parking mode, a blue flashing light makes it easy for a user to find the car. When loading luggage on the roof bars, green, orange and red lights indicate the weight of the load. When driving, other users see lights, blue indicating that the driver has chosen autonomous driving mode, orange signaling warning or turning. The innovation gives increased visibility & security and the vehicle identification makes it ideal for autonomous driving, car-sharing and other new mobility applications.





"Hi 5!" Door (patented)

This sleek handle offers a new user 'door opening' experience thanks to its appealing design. The user puts his hand to the door handle and a lit door flap system opens. In case of failure of the user detection system, a 'key' system is still available. Door seals are used to bring out the door slightly when the user approaches his or her hand. This innovation can be set for new mobility uses, such as unlocked rear door for car-sharing and rentals. Its main appeal is the immediate reward of the car 'welcome'.





"Hi 5!" Pillar

This is a flush vertical door pillar with backlighting and integrated handles, offering a new user 'door opening' experience. The handle is flush with the lateral side of the car. Easy access is ensured by a keyless system, providing a friendly welcome. The handle appears as the user approaches, from a backlit secret chamber. The flush door handles combine several functionalities within a single package: traditional door opening, physical visualization of lock/unlock status, remote user detection, backlighting, keyless user detection and automatic flap systems.







FlexView (patented)

FlexView is a flexible OLCD (Organic Liquid Cristal Display) display integrated in the design of modern cockpits. The flexible display uses augmented reality to improve security. It is made with a plastic substrate which means it can be angled towards the driver or passenger seat, with a bending radius of almost 15mm. This innovation can be easily integrated into modern cockpits, and its flexibility means it is suitable for autonomous driving applications.





Touch 'N Play (patented)

Touch 'N Play allows users to place shortcuts on the dashboard 'on demand' and have easy access to their favorite driving commands or internet-based applications. It provides users with a personalized HMI (Human-Machine Interface). The touch pads are housed in decorative bezels. The user defines a location in any place on the bezel and assigns a chosen command or application to a chosen location found by a marker stuck on the bezel. By putting his finger on the marker, the user runs the command or the application. The shortcut can be added, moved and removed on demand. This innovation is also ideal for car sharing, each user can customize his or her own HMI and "clean" it for the next user when he leaves, or for fleet managers, who can add special commands for assistance calling or displaying return stations on the GPS.







This is an inner handle with touch opening and an integrated ventilation system, providing heating everywhere in the car. The Inner Door Handle (IDH) works electrically in normal times but it can also be used manually in case of emergency. This innovation combines all the features of a smart handle with integrated comfort control.



2.2 USER-FRIENDLY CAR INNOVATIONS





Touch 'N Feel

When the car engine is off, the surface of the device is completely black. When the start button is pressed, the backlighting comes on and reveals the touch commands. A vibrating signal gives a touch-sensitive 'haptic' feedback to the driver and allows him to keep his/her eyes on the road. An innovative algorithm provides the customized haptic feedback on-demand and creates a dedicated haptic signature as well. This innovation creates more comfort and automation for the user.





This is a slim and sleek air register with hidden flush mechanisms and lighting. The kinematic knob moves horizontally along the 15mm slot width. The air stream is positioned up and down more homogenously and the flow of noise is lower than on conventional registers. This innovation is simple to use and gives lower pressure drops and noise reduction while enabling climate control for all passengers. User profiles can be created with climate settings including temperature, airflow and air vent positions.





Snake 'N Light

Snake 'N Light is a lighting pipe that uses optical fibers to provide lighting 'stripes' for mood lighting. A single LED (Light Emitting Diode) light source is enough to illuminate the full-length of the pipe, and without hot points. The easily customizable design makes this suitable for manufacturers to adapt to complex shapes. This innovation gives mood lighting and a relaxing ambiance for long distance drives.







Silent Duct[™] (patented)

This is a porous air duct that absorbs noise in the engine. The component reduces noise by having a porous surface, but does not take up any extra space. Novares is working on enlarging the porous surface part of the plastic skin that covers the pipe from the engine. This innovation brings a significant reduction in engine noise.





2.3 CLEAN INNOVATIONS



Ultimate Decantation (patented)

This is an Engine Cam Cover that uses Venturi technology and provides oil separation efficiency at high speed. As the first company in the world that has introduced plastic Cam Covers in serial production in 1986, Novares has expertise in developing Cam Covers and oil separation systems. The new system gives high oil-separation efficiency even for smallest oil droplets (< 0,5 μ m) and maintains negative crankcase pressure in various operation conditions. The innovation enables increased engine efficiency, new combustion cycles, electrification and longer service intervals as well as being compliant with the most stringent regulations in the world.







A synthetic media made of up to 70% recycled fibers that ensures high filtration performance at the lowest cost for the engine. Standard polyurethane gaskets have been replaced by a 3-point seal barrier reducing hot air ingestion and the possibility of leaks. Customers could save 10% of space and up to 25% of media filter cost compared with a conventional polyurethane gasket, with improved recyclability potential.





SpaceSaver Cooler (patented)

This is a conductive, plastic, water-charged air cooler integrated into air ducts that enables the reduction of CO_2 emissions by reducing air temperature. The challenge is to reduce CO_2 emissions while cooling the charged air. The standard heat exchanger is made of aluminum. Novares offers a conductive plastic heat exchanger that achieves the same performance as an aluminum heat exchanger but is lighter and gives more design freedom. There is more flexibility in the design of the shape of the cooler than when using metal. Novares uses a thermal conductive plastic heat exchanger that allows integration into complex surfaces, which saves space and provides efficiency. The innovation is an enabler for electrification and high-performance outputs.





2.4 LIGHTER & COST-EFFICIENT INNOVATIONS





Diet MuCell®

Novares' MuCell[®] engine Cam Cover concept provides weight-saving benefits for the engine. The cylinder's head cover is produced using a MuCell[®] process where gas is added during the plastic injection process to lighten and change the density of the material, which in turn reduces the head cover weight by 10%. Novares will begin launching this product in serial production this year. The innovation reduces vehicle weight, CO₂ emissions and plastic use.





This is an engine cover that ensures weight and noise reduction. This component features acoustic functions with pleasing aesthetics. The carbon beauty cover uses a carbon fiber recycled from old carbon parts that is inserted into the plastic, increasing its performance, reducing the weight of the cover by 10% and enhancing acoustics.







This is a degassing valve that reduces thermal management complexity on turbo-charged and electrified powertrains. The valve has only one tank to control degassing and uses a multi-temperature cooling circuit application. This compact, lighter space-saving innovation gives trouble-free operation, thus reducing maintenance. It can be used for e-Powertrain - hybrid and PHEV (Plug-in Hybrid Electric Vehicle) engines as well as for conventional turbocharged engines.



IV. INVESTING IN THE FUTURE

Novares fosters open participation in everything the Group does and aims at further integrating added-value modules in cars.



After the worldwide unveiling of Nova Car #1, between March 27 to 30, Novares will also take part in **Global Industry - Smart Industry 4.0 2018**, the European show that focuses on the industry sector's activities of the future, with the sponsorship of French President, Emmanuel Macron and a Ministers' delegation.

At the same time, and in support of R&D, the company is **also sponsoring a major digital hackathon** – a creative brainstorming competition where young engineers, designers and start-ups compete to win the 'best in class' innovation award. At this Global Industry Smart 2018 show, **Novares will connect with hundreds of start-ups from Station F and "Arts & Métiers Accélération", to network and introduce new talent to corporate, educational and start-up worlds, to bring new industrial projects to life.**

Novares' growth strategy through mergers and acquisitions (M&A) as well as innovation is also firmly on track: Nova Car #1 is the result of both organic innovation, owing to the company's 580 dedicated research staff, many patents and 5.2% of sales spent on R&D, and its various co-innovation partnerships. In addition, its M&A strategy, designed to consolidate and reinforce its position in conventional, hybrid and e-Powertrain cars, smart surfaces; mechatronics and the Chinese market, is under way through the activities of its investment arm: Novares Venture Capital SAS.

The venture capital fund, created in February this year and managed by the Group, allows Novares to invest in and develop close relations with technology businesses and start-ups with technical expertise in fields adding value to Novares products. For that, Novares will invest 50 million euros over the next 5 years.







WORLWIDE REVEAL



WE NEVER STOP INVENTING

CLEAN

- Ultimate decantation
- Entry Box concept
 SpaceSaver Cooler

LIGHT

& COST EFFICIENT

- Diet MuCell®
- Blacklite Carbon
- Easy Valve
- USER-FRIENDLY

CONNECTED

Bird View

Flex View

• Hi 5 Door

• Hi 5 Pillar

Touch'n Play
Touch'n Go

& AUTONOMOUS CARS

- Silent Duct™
- Touch'n Feel
- Slim'n Cool
 Snako'n Link
- Snake'n Light

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