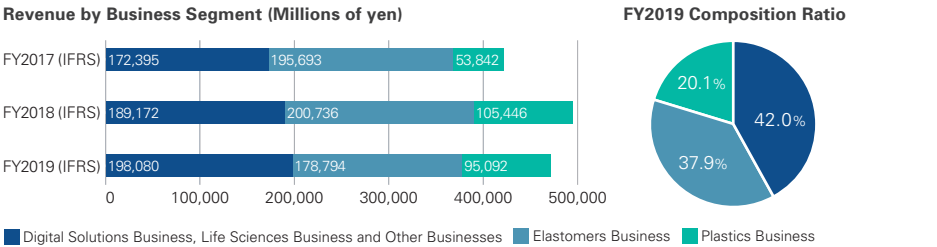


Business Domain

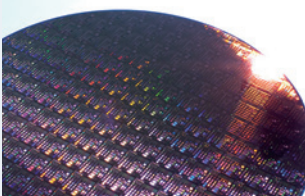
The business domains for JSR Group are Digital Solutions, Life Sciences, Elastomers and Plastics Businesses.

In each of these domains, we are developing business activities based on mid- and long-term perspectives.

JSR Group has reclassified its disclosure segments effective from FY2018, the fiscal year ended March 31, 2019. Please refer to page 3 for details. Pursuant to Paragraph 1 Article 120 of the Rules of Corporate Accounting, the Company's consolidated financial statements have been prepared in accordance with International Financial Reporting Standards (IFRS) effective from FY2017, the fiscal year ended March 31, 2018.



Digital Solutions Business



Semiconductor Materials
Lithography Materials

- Photoresists, Multilayer materials, etc.

Advanced Electronic Materials

- CMP slurries, CMP pads, Thick-film photoresists, photosensitive insulation materials, etc.

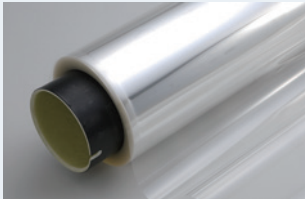


Display Materials
LCD Materials

- Alignment films, Protective coatings, Color pigment dispersed resists, Photosensitive spacers, Insulating layers, etc.

OLED Materials

- Insulating layers, Planarization layers, etc.



Edge Computing

- ARTON™ (Heat-resistant transparent resin), etc.
- High-performance UV curable resins, etc.

Life Sciences Business



Research & Diagnostics Reagents

- Beads for clinical diagnostics, Research reagents, Magnetic beads, Latex beads

Bioprocess Materials

- Amsphere™ A3 (Protein A chromatography resin)

Contract Services

- Drug discovery, development and manufacturing

Elastomers Business



Synthetic Rubbers

- SSBR (Solution polymerization styrene-butadiene rubber), ESBR (Emulsion polymerization styrene-butadiene rubber), BR (Polybutadiene rubber), IR (Isoprene rubber), etc.
- NBR (Nitrile rubber), IIR (Butyl rubber), EPM/EPDM (Ethylene-propylene rubber), etc.

Thermoplastic Elastomers (TPE)

- RB (Butadiene type TPE), DYNARON™ (Hydrogenated polymer), TR (Styrene-butadiene type TPE), SIS (Styrene-isoprene type TPE), EXCELINK™ (Olefin type TPE), etc.

Emulsions

- Paper coating latex, SB latex, Acrylic emulsions, Binders for batteries, SIFCLEAR™ (Water-based, durable, stain-resistant emulsion), etc.

Plastics Business



- ABS resins, AES resins, HUSHLLOY™ (Anti-squeak material), etc.

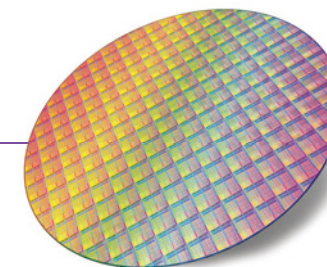
Other Businesses



- Procurement and sales of chemicals, next-generation research, etc.

Business Strategy

Digital Solutions Business ~Semiconductor Materials~



Corporate Issues

The semiconductor market is expected to grow in line with the full-scale introduction of 5G, IoT, and autonomous driving. Consequently, it is likely to bring about major changes in a wide range of fields including electronic components, industrial equipment, and automobiles. JSR is contributing to transformation in this field by developing cutting-edge materials that support semiconductor evolution and offering these to semiconductor manufacturers around the world.



Officer in charge of Electronic
Materials Business
Yoshikazu Yamaguchi

Semiconductor Materials Business Approach

JSR Group will develop and provide cutting-edge materials that contribute to the evolution of semiconductors in a growing market driven by innovations in digital technology, such as with the development of IoT and 5G. In advanced lithography materials for the 10 nm node, we continue to maintain a large share of the global market. In addition, we are focused on product development and improvement of production technologies for EUV (extreme ultraviolet) photoresists, which are now being used for high volume manufacturing in 7 nm node devices.

We continue to expand our product portfolio with peripheral materials including CMP materials, cleaning solutions, and advanced packaging materials.

Initiatives

Amid expectations of heightened semiconductor demand driven by faster communication speeds and increased data communication and capacities, the Semiconductor Materials Business is working to maintain and expand its share of the cutting-edge lithography materials market, which encompasses state-of-the-art 7 to 10 nm node processes. The Group is also putting resources into the development and sales of EUV lithography materials for 5 nm and subsequent node processes. At the same time, JSR Group is concentrating on enlarging sales of semiconductor peripheral materials, especially advanced packaging materials, cleaning solutions, and CMP materials used in cutting-edge semiconductor manufacturing, and broadening its product portfolio to achieve business growth that outperforms market growth. A newly constructed plant for functional cleaning solutions for state-of-the-art semiconductors in the U.S. is aiming to start up operations in FY2020. The new plant will establish a supply framework of functional cleaning solutions for state-of-the-art semiconductor manufacturing processes, as JSR Group endeavors to further expand its business in semiconductor materials.

Progress of Mid-Term Business Plan

Operating Results for FY2019

Although the semiconductor memory market remained sluggish, logic devices began to recover in the first half of FY2019. Year-on-year revenues were up, bolstered by strong sales of state-of-the-art photoresists and expanded sales of new products such as EUV photoresists and cleaning solutions. The Semiconductor Materials Business was largely unaffected by COVID-19, which began affecting other markets in the last few months of FY2019. Operating profit increased despite greater costs associated with expanding sales of cleaning solutions. As a result of the above, revenue for the Digital Solutions Business for the fiscal year under review was 144,805 million yen (a 1.8% year-on-year increase) while operating profit was 30,917 million yen (a 5.3% year-on-year decrease).

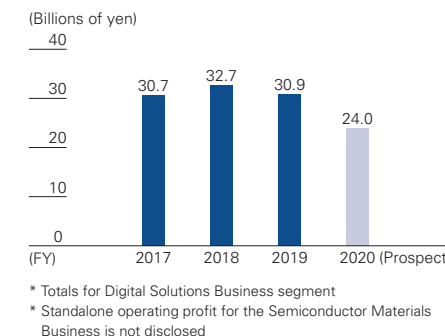
Progress under the JSR2019 Mid-Term Business Plan

The Semiconductor Materials Business achieved sales growth outperforming the market through the expansion of sales of peripheral semiconductor materials, such as CMP materials, highly functional cleaning solutions, and advanced packaging materials, in addition to lithography materials, especially JSR's globally competitive state-of-the-art photoresists. EUV photoresists Manufacturing & Qualification Center N.V. –a joint venture manufacturing EUV photoresists that was set up in Belgium with imec, a research institute in cutting-edge nanoelectronics technology– began production in 2017 and is steadily increasing the supply of EUV lithography material products that support 5 nm and subsequent node processes for cutting-edge semiconductor manufacturers.

Revenue



Operating Profit



* FY2020 forecasts are as of April 2020. Please refer to the JSR website (https://www.jsr.co.jp/jsr_e/ir/library/presentation.html) for the latest forecasts.

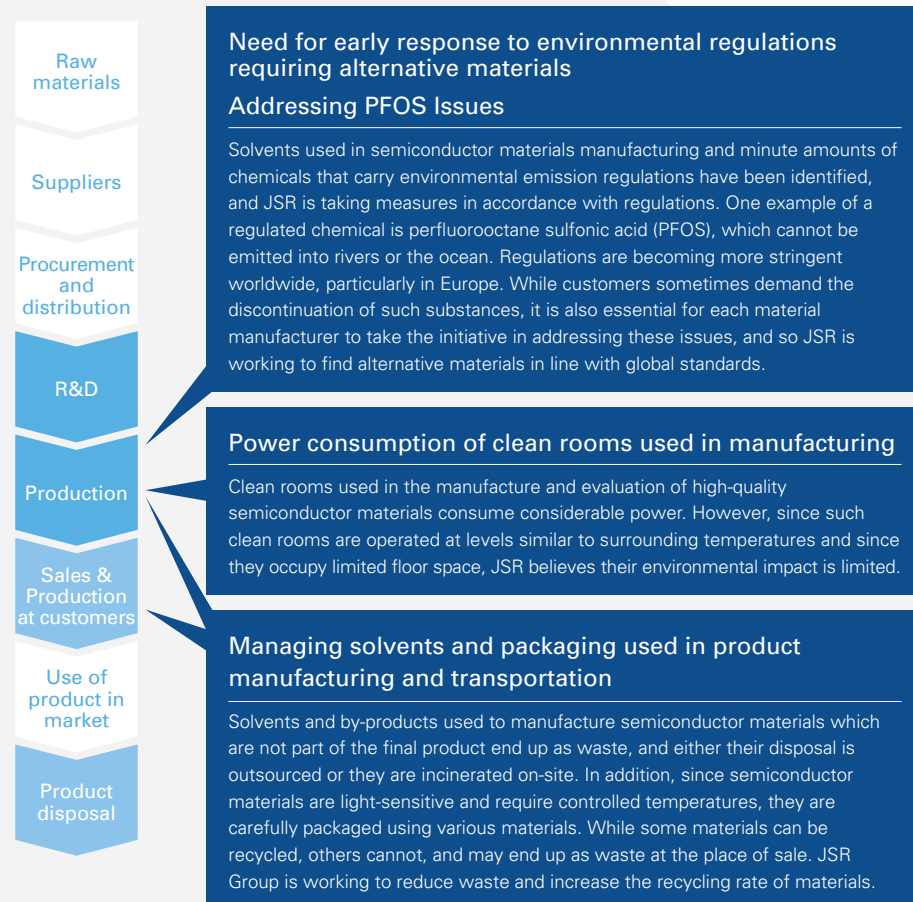
Business Strategy

JSR Sustainability Challenge

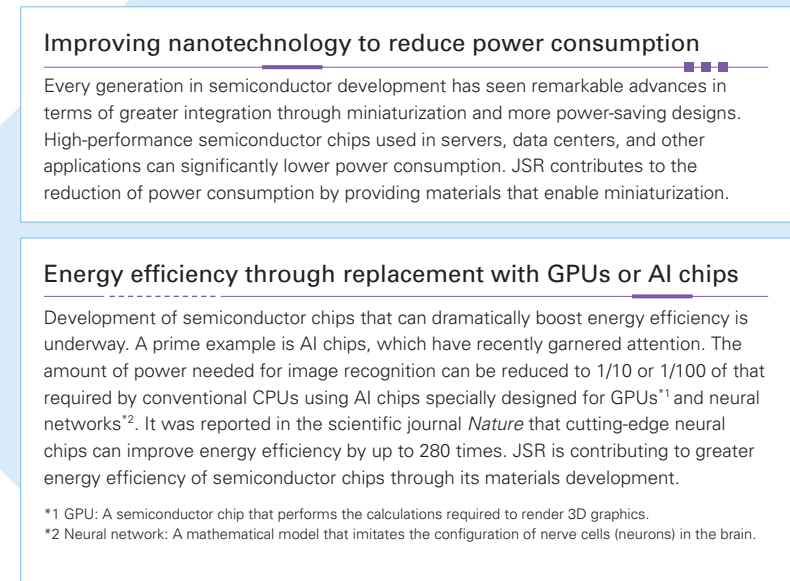
Negative impacts identified in the Semiconductor Materials Business segment were the use of solvents and emissions-regulated chemicals in the manufacturing process and the use of some non-recyclable packaging in transportation. The Group is working to replace emissions-regulated

substances. At the same time, JSR products contribute to the miniaturization of semiconductors and the realization of high-performance GPUs and AI chips which reduce power consumption and boost the energy efficiency of semiconductor chips, thereby having a positive impact on society.

Negative impact



Positive impact



Business Strategy

Digital Solutions Business ~Display Materials~



Corporate Issues

The spread of 8K broadcasting technology is fueling continued growth in the LC panel market and creating demand for new LCDs with high resolution, high brightness and lower power and energy consumption. JSR will continue to offer customers solutions that fully leverage its new digitalization-centered development methods.



Officer in charge of
Display Solution Business
Keisuke Wakiyama

Display Materials Business Approach

LC panel manufacturing typically uses a high-temperature curing process ranging from 200°C to 250°C. JSR has developed new alignment films and peripheral materials that reduce environmental impact in the manufacturing process by enabling lower-temperature curing and launched sales of vertical alignment films last year. The Group will develop and supply innovative materials used to make 4K, 8K and other high-resolution LCD panels, and enhance business sustainability through the development and marketing of new products such as organic EL panel materials.

Initiatives

Targeting continued growth potential for LCD panels in the Chinese market, JSR will maintain its focus on sales of competitive alignment films and insulating films for wide-screen LCD panels while addressing structural changes in customer industries. To this end, business management functions were transferred from Japan to China, the main market, and a system was put in place to enable efficient information gathering and quick, frontline decision-making in that market. In addition, sales offices were established in Beijing, Hefei, Chongqing, Fuzhou, Shenzhen, and Guangzhou to reinforce sales and technical services, while a new technical center in Shanghai reinforces technical support capabilities.

Progress of Mid-Term Business Plan

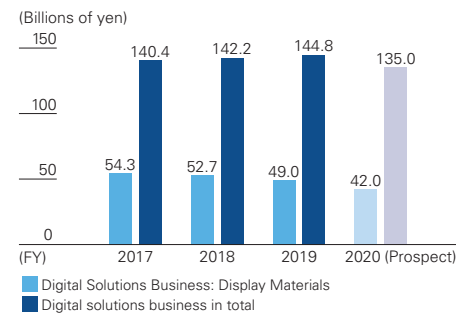
Operating Results for FY2019

Sales volume of alignment films and insulating films for wide-screen TV LCD panels for the Chinese market grew, but the impact of operational adjustments, including the abandonment of production by some customers amid structural changes including the shift of LCD production to China, resulted in lower revenues from the previous fiscal year. This fall in revenue and other factors also caused a decline in operating profit from the previous fiscal year.

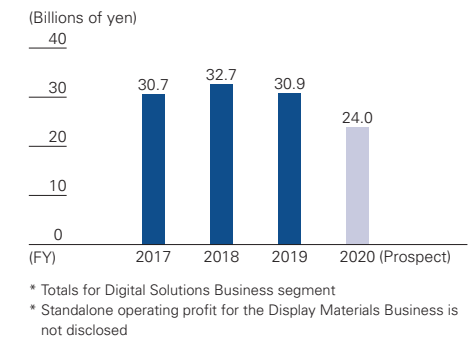
Progress under the JSR20i9 Mid-Term Business Plan

JSR focused resources on the Chinese market, where LCD panel production volumes are growing, and expanded sales of its competitive alignment films and insulating films intended particularly for wide-screen ultra-high-resolution LCD panels. JSR Micro (Changshu) Co., Ltd., a joint venture manufacturing company established to promote sales in the growing Chinese market, is expanding production of display materials. At the same time, many South Korean and Taiwanese LCD panel makers who buy JSR display materials have begun adjusting or preparing to shut down production line operations due to their waning competitiveness in the face of Chinese manufacturers.

Revenue



Operating Profit



* FY2020 forecasts are as of April 2020. Please refer to the JSR website (https://www.jsr.co.jp/jsr_e/ir/library/presentation.html) for the latest forecasts.

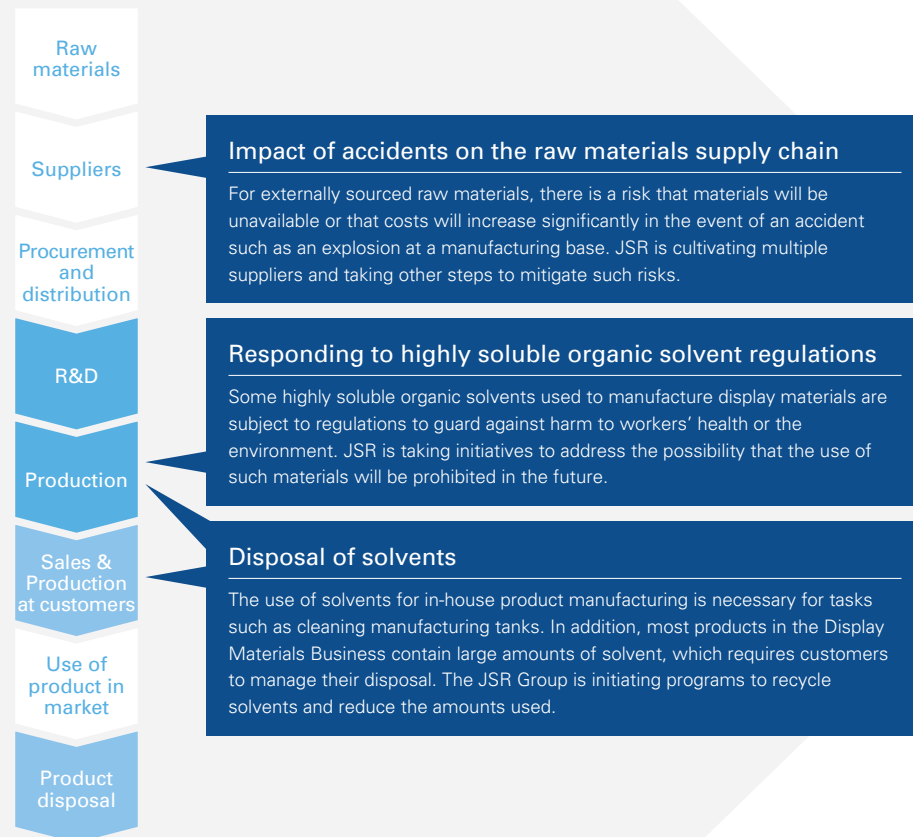
Business Strategy

JSR Sustainability Challenge

Negative impacts identified in the Display Materials Business segment included highly soluble organic solvents subject to regulations that are used to manufacture products, as well as the fact that, since most products contain solvents, waste is inevitably generated when they are used by customers. There is also a need to address the risk that some necessary raw materials could become unavailable due to accidents or other interruptions in the supply chain. JSR is exploring

alternatives to highly soluble organic solvents and expects to expand their use going forward. JSR is also advancing products that enable customers to use low-temperature curing in LC panel manufacturing and developing new alignment films that increase the brightness of LCDs. In these ways, the Group is contributing to reducing power consumption.

Negative impact



Positive impact

Anticipated need to respond to highly soluble organic solvent regulations

While the use of organic solvents is currently not fully prohibited, JSR has been exploring alternative solvents in anticipation of possible prohibitions in the future and is prepared to offer these to customers. Marketing has not yet begun, but strong future growth in this area is expected as greater emphasis is placed on green procurement.

The latest products reduce energy required in the display manufacturing process

JSR has developed products that enable low-temperature curing in the LC panel manufacturing process, lowering curing temperatures from between 200°C and 250°C to around 150°C. This yields a 25-30% reduction in power consumed during the curing process at customer plants. The Group is conducting further research with a vision that all JSR products will function at a curing temperature of 150°C and is marketing these applications.

Reducing end-product power consumption by increasing brightness

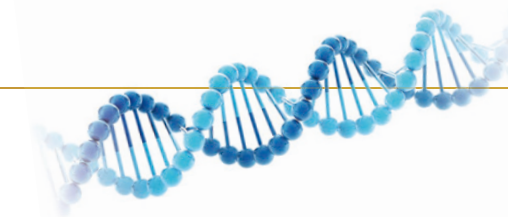
Newly developed alignment films boost display brightness requiring less backlighting and therefore lower power consumption. These alignment films, used in combination with insulating films in HD TVs, make it possible to cut power consumption by approximately 30%. This helps offset the increase in power consumption accompanying larger sized displays.

No.1 share worldwide for 4K/8K TV display materials

Sales of 4K/8K TVs, which are said to account for about 10% of the market currently, are expected to increase in the future. Alignment films manufactured by JSR are being used in 4K and 8K TVs on the market, enabling the Company to secure the top share of the global market.

Business Strategy

Life Sciences Business



Corporate Issues

The realities of an aging society have given rise to increasing medical costs and issues for elderly care, and society as a whole faces challenges in extending healthy life expectancy so that people can live without the need for frequent medical or long-term care. JSR is working on the development of personalized medicine, primarily in biopharmaceuticals and cutting-edge diagnostics to support a healthy and long-lived society.



Officer in charge of
Life Sciences Business
Tim Lowery

Life Sciences Business Approach

Following the additions of KBI Biopharma, Inc. (KBI), MEDICAL & BIOLOGICAL LABORATORIES CO., LTD. (MBL), and Selexis SA to JSR's Life Sciences Business, Crown Bioscience International (Crown Bio), a provider of preclinical drug discovery and development services, was made a wholly-owned subsidiary in 2018. This gives JSR a framework for supporting the entire biopharmaceutical development process, from drug discovery to manufacturing. JSR is now able to provide drug manufacturers with efficient services that can shorten the time from drug discovery to manufacturing, thereby helping to bring advanced healthcare to the market sooner.

Initiatives

The Life Sciences Business, positioned as the Group's third core business, has steadily expanded revenue to around 50 billion yen. Future growth will be led by new contracts for the development and manufacture of biologics (CDMO) by KBI and Selexis and for preclinical research and discovery services (CRO) by Crown Bio. JSR will also focus on expanded global adoption of both our research and diagnostic reagents and bioprocess materials. Finally, we expect stable growth of the diagnostic reagent and specialized antibody development businesses at MBL. The JSR Group established JSR Life Sciences, LLC in the U.S. in January 2019 and transferred the global management functions of the Life Sciences Business to the new company. From the U.S., a global center of drug R&D, JSR Life Sciences will accelerate decision making and guide segment-wide strategies across the U.S., Europe and the Asia-Pacific regions, including oversight of Group life sciences companies.

Progress of Mid-Term Business Plan

Operating Results for FY2019

The Life Sciences Business segment saw stable revenue growth, specifically in the CDMO business, led by Group companies KBI and Selexis, and the CRO business led by Crown Bio. Sales of diagnostic reagent materials, bioprocess materials, and other products also climbed. MEDICAL & BIOLOGICAL LABORATORIES CO., LTD.'s diagnostic reagent business grew steadily, contributing to overall higher revenue from the previous fiscal year. The segment saw a substantial increase in operating profit thanks to expanded revenue as well as realized benefits from business restructuring undertaken in the previous fiscal year.

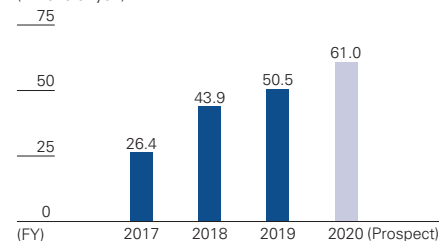
As a result, the Life Sciences Business segment posted an operating profit of 3,594 million yen (up 360.4% year-on-year) on revenue of 50,496 million yen (up 15.1% year-on-year).

Progress under the JSR20i9 Mid-Term Business Plan

JSR acquired Selexis and Crown Bio in 2017 and 2018, respectively. These companies, together with KBI, have constructed a framework that provides end-to-end process support, from preclinical discovery and development to production, primarily of biopharmaceuticals. As a result of these moves, the Life Sciences Business has steadily expanded its business, surpassing 50 billion yen in revenue.

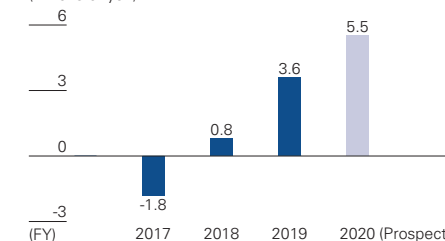
Revenue

(Billions of yen)



Operating Profit

(Billions of yen)



* FY2020 forecasts are as of April 2020. Please refer to the JSR website (https://www.jsr.co.jp/jsr_e/ir/library/presentation.html) for the latest forecasts.

Business Strategy

JSR Sustainability Challenge

A negative impact identified in the Life Sciences Business is that animal research is unavoidable in the development of pharmaceutical products. For this reason, JSR Group fully complies with international guidelines such as the 3Rs principles (replacement, reduction, and refinement) and conducts experiments appropriately to limit animal research to the fullest extent possible. The

Group is also working to develop artificial organs and organoids as alternatives to animal research. Moreover, the Group contributes to society through business efforts to enhance the efficiency of pharmaceutical development and realize personalized medicine tailored to each patient.

Negative impact



Animal testing and research

Given the current state of pharmaceutical development technology, animal research is unavoidable. It is crucial to adequately confirm the safety of a drug in animals before administering it to human beings. JSR Group performs animal testing and research services for drug evaluation on behalf of pharmaceutical companies. There are international guidelines, such as the 3Rs, which call for the ethical and humane treatment, and minimal use, of research animals. In addition, JSR Group supports its customers who are also required to comply with these frameworks.

Positive impact

Alternative animal-free testing

If technological advances enable the use of artificial organs as an alternative in toxicity tests, it will be possible not only to use fewer research animals, but also to conduct testing with something closer to human beings at the preclinical trial stage, thus increasing the chances of success. JSR Group is working to develop technologies that make organoids and other alternatives possible.

Contract Research (CRO) Business

JSR is working to boost the probability of success when shifting to human drug trials by conducting specialized animal testing and testing with animals that are as close as possible to human beings. Culturing the cancer cells of various patients in specialized mice and testing drug efficacy allows pharmaceutical manufacturers to develop drugs more efficiently, in a shorter time and at lower cost. Shortening the drug development period before release also means that current patients can benefit from effective drugs sooner.

Efforts to realize personalized medicine

JSR is aiming to realize personalized medicine offering healthcare in a more individually suited form. Biomanufacturing technology allows more tailored therapies to be efficiently produced and diagnostic technology that can ascertain in advance whether a drug is effective for an individual. JSR Group's strength is its ability to meet needs on both the biopharmaceutical development and the diagnostic sides, establishing technologies to stably produce biopharmaceuticals as well as technologies that support the diagnostic process, from the discovery of biomarkers to assess drug efficacy to the commercialization of diagnostic reagents.

Business Strategy

Elastomers Business



Corporate Issues

Sustainable development within the industry, typified by the SDGs and a focus on reducing impact on the environment, will lead to further sophistication and diversification of customer and social needs. We see this trend as a major business opportunity for our elastomer materials. There are technological demands for low-wear and high-durability materials due to the widespread use of conventional fuel-efficient tires and electric vehicles (EV).



Senior Officer in charge of
Elastomers Business
Kazushi Abe

Elastomers Business Approach

Solution styrene-butadiene rubber (SSBR) is produced using JSR's proprietary molecular design and manufacturing technologies accumulated over many years. JSR will offer new SSBR products to address diversifying customer needs. The Group will leverage its supply network of bases in Japan, Thailand, and Hungary to achieve sales volume that outpaces growth in the SSBR market.

Initiatives

Production of automobiles and tires, the segment's main customer industries, has currently come to a standstill due to the impact of COVID-19, and JSR is embarking on business restructuring to address the segment's profitability issues. At the same time, SSBR demand is increasing for use in fuel-efficient tires as well as expanding to new applications, such as EVs and all-season tires. To address rising demand, JSR MOL Synthetic Rubber Ltd. (JMSR) in Hungary will start commercial production in FY2020, enabling the JSR Group to supply SSBR globally from three sites in Japan, Thailand, and Hungary and thereby expand sales. Additionally, the JSR Group will boost the ratio of high-added-value products in the Elastomers Business portfolio, such as binders for rechargeable lithium-ion batteries that are experiencing growing global demand, while pursuing restructuring to raise the segment's profitability and ensure business sustainability.

Progress of Mid-Term Business Plan

Operating Results for FY2019

Global production of tires remained weak throughout the year due to a downturn in automobile production, particularly in China, compounded by temporary production stoppages or reductions at tire plants in Europe and elsewhere.

Amid these circumstances, the sales volume of SSBR, positioned by JSR as a strategic product, improved over the previous fiscal year, despite a year-on-year decline in worldwide tire production volume. Nevertheless, the segment recorded lower revenue compared to the previous fiscal year, as the segment's overall sales volume was sluggish and sales prices slid because of a deterioration in raw-material market conditions. The segment posted an operating loss for the full term as a result of the revenue decline, narrower price spreads, and the impairment loss on some fixed assets made in the fourth quarter.

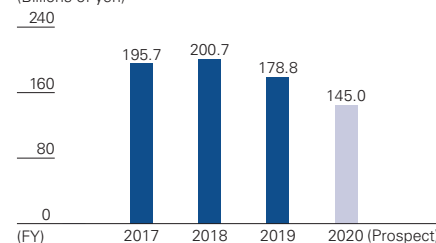
Consequently, the Elastomers Business segment posted an operating loss of 1,758 million yen, versus an operating profit of 7,421 million yen in the previous fiscal year, on revenue of 178,794 million yen (down 10.9% year-on-year).

Progress under the JSR20i9 Mid-Term Business Plan

Sales of solution styrene-butadiene rubber (SSBR) for high performance tires, for which global demand is climbing, remained firm. At JSR BST Elastomer Co., Ltd. (JBE), a joint venture in Thailand producing SSBR, first-phase and second-phase facilities achieved full output. JSR MOL Synthetic Rubber Ltd. (JMSR), a joint venture set up in Hungary, completed construction of a new plant that will start commercial production in FY2020 to address further demand increases.

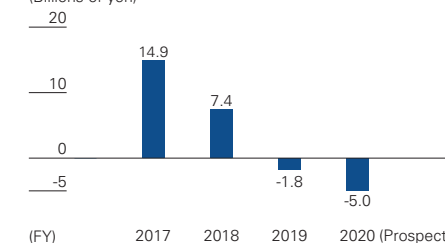
Revenue

(Billions of yen)



Operating Profit

(Billions of yen)



* FY2020 forecasts are as of April 2020. Please refer to the JSR website (https://www.jsr.co.jp/jsr_e/ir/library/presentation.html) for the latest forecasts.

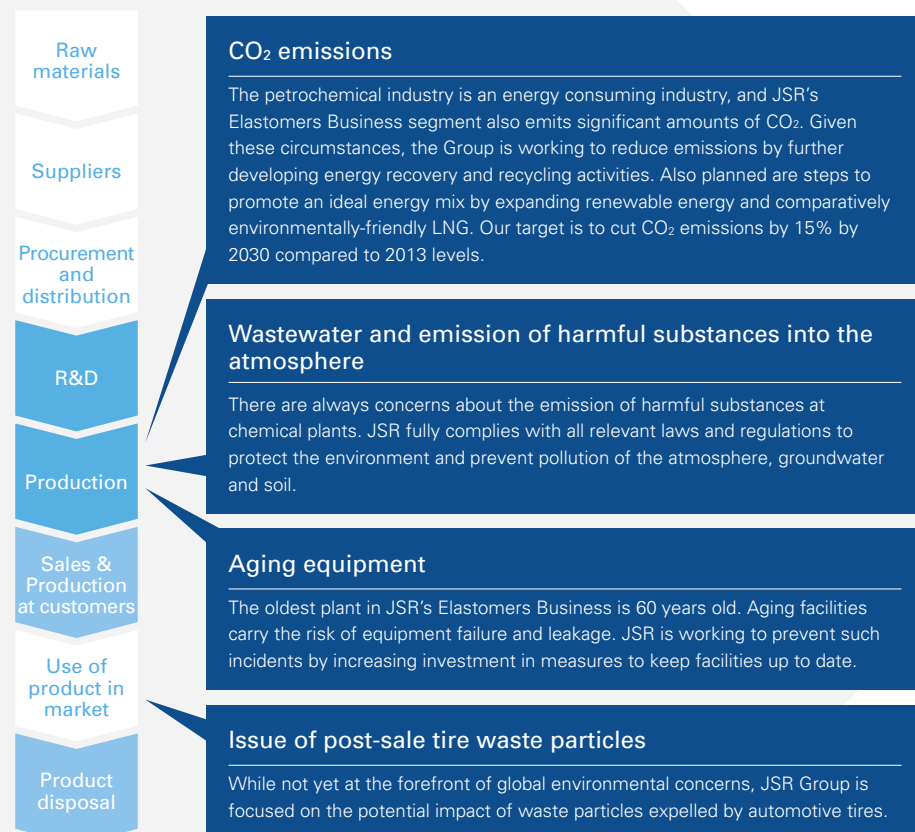
Business Strategy

JSR Sustainability Challenge

A negative impact identified in the Elastomers Business was the extremely high amount of CO₂ emitted during manufacturing. On the other hand, looking at the overall product cycle through use by the consumer, emissions are 2.3 times lower than at the time of manufacturing. Going forward, JSR will bolster positive elements in the segment by achieving longer product life cycles through the use

of new materials and taking steps to reduce CO₂ emissions during manufacturing. The Group is also addressing social calls for recycling by developing easily recyclable thermoplastic elastomers and tires that generate less waste particles.

Negative impact



Positive impact

Effect of CO₂ emission reduction with SSBR

By using JSR's SSBR in the treads of tires, it is possible to increase the total mileage and reduce the weight of tires, which leads to reductions in CO₂ emissions by improving fuel efficiency. It is expected that the reduction of CO₂ emitted by automobiles with fuel-efficient tires using JSR's proprietary SSBR will be 2.7 times* greater than the CO₂ emitted during manufacturing.

* Estimated based on Tyre LCCO₂ Calculation Guidelines Ver. 2.0 of the Japan Automobile Tyre Manufacturers Association.

New high durability materials

Demands on tires are diversifying to include not only improving fuel efficiency to reduce CO₂ emissions but also higher strength, wear resistance, and durability. JSR's new SBR is a polymer optimized through the combination of the Group's proprietary molecular design and hydrogenation technology. It offers high fracture strength, wear resistance, and durability, enabling a thinner tread and reducing the overall weight of the tire, achieving longer product life compared with other tires of the same thickness.

Thermoplastic elastomer

Vulcanized rubber is difficult to recycle without specialized methods. Using thermoplastic elastomers enables easy remolding with an ordinary injection molding machine or extrusion molding machine. Since scraps and defective products can be recycled and remolded, lower manufacturing costs, waste reductions and other environmental benefits are possible.

Tire waste particles

Improving tire durability leads to fewer tire waste particles.

Business Strategy

Plastics Business



Corporate Issues

Customer needs are diversifying, such as the demand for low in-cabin noise in line with increasing use of EVs, as well as calls for monomaterialization and solvent-free production to reduce environmental impacts and costs. The mission of Techno-UMG Co., Ltd., the core company in the Plastics Business, is to continue offering products that solve diversifying customer needs, such as materials yielding low-squeak noise or unpainted components which reduce environmental impact.



Senior Officer in charge of
Plastics Business
Kazumasa Yamawaki

Plastics Business Approach

Techno-UMG Co., Ltd. was created on April 1, 2018 through the merger of two companies: Techno Polymer Co., Ltd. (a wholly owned subsidiary of JSR) and UMG ABS, Ltd. (equally owned by Mitsubishi Chemical Corporation and Ube Industries, Ltd.). In FY2018 we were able to increase production efficiencies while reducing our investment to increase capacity by moving production items between plants.

Utilizing the manufacturing, development and sales capabilities of both companies, we will strive to expand sales of specialty products such as those which target specific problems, especially in overseas markets, thereby achieving synergies through the merger.

JSR recently developed HUSHLLOY™, a product that suppresses the squeak noises that occur in plastic housings, contributing to in-cabin quietness in automobiles. The Group will take advantage of the compatibility of ABS materials with other materials to offer customers not only physical properties such as strength and heat resistance but other added functionality as well.

Initiatives

Techno-UMG Co., Ltd. will continue to take advantage of the accumulated production capacities, R&D capabilities, and marketing strength of the two former companies and realize synergy benefits through business and product consolidation. The company will endeavor to further enhance profitability by enlarging sales of specialty, high-performance products in overseas markets, such as HUSHLLOY™ anti-squeak material, PLATZON™ plating material, and VIVILLOY™ high color development compounds, with a particular focus on the automotive sector.

Progress of Mid-Term Business Plan

Operating Results for FY2019

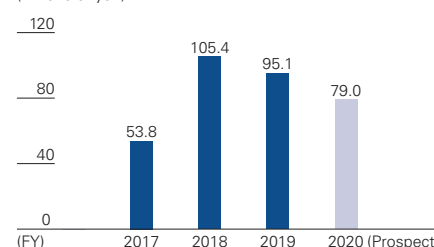
In addition to sluggish performance, especially outside of Japan, in the automobile industry, the segment's sales volume was pushed down by the impact of COVID-19 in the 4th quarter and sales prices fell due to a deterioration in raw-material market conditions. These factors caused revenue to decrease from the previous fiscal year, and the decline in revenue together with decline in price spread led to a lower operating profit. As a result, the Plastics Business segment posted an operating profit of 6,237 million yen (down 32.3% year-on-year) on revenue of 95,092 million yen (down 9.8% year-on-year).

Progress under the JSR20i9 Mid-Term Business Plan

Having completed organizational integration, Techno Polymer's product portfolio was realigned to center on the competitive, high-performance products of both companies. Going forward, JSR will work to grow the business by further expanding its lineup of high-performance products and expanding sales, especially in overseas markets.

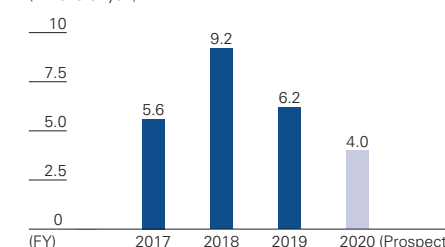
Revenue

(Billions of yen)



Operating Profit

(Billions of yen)



* FY2020 forecasts are as of April 2020. Please refer to the JSR website (https://www.jsr.co.jp/jsr_e/ir/library/presentation.html) for the latest forecasts.

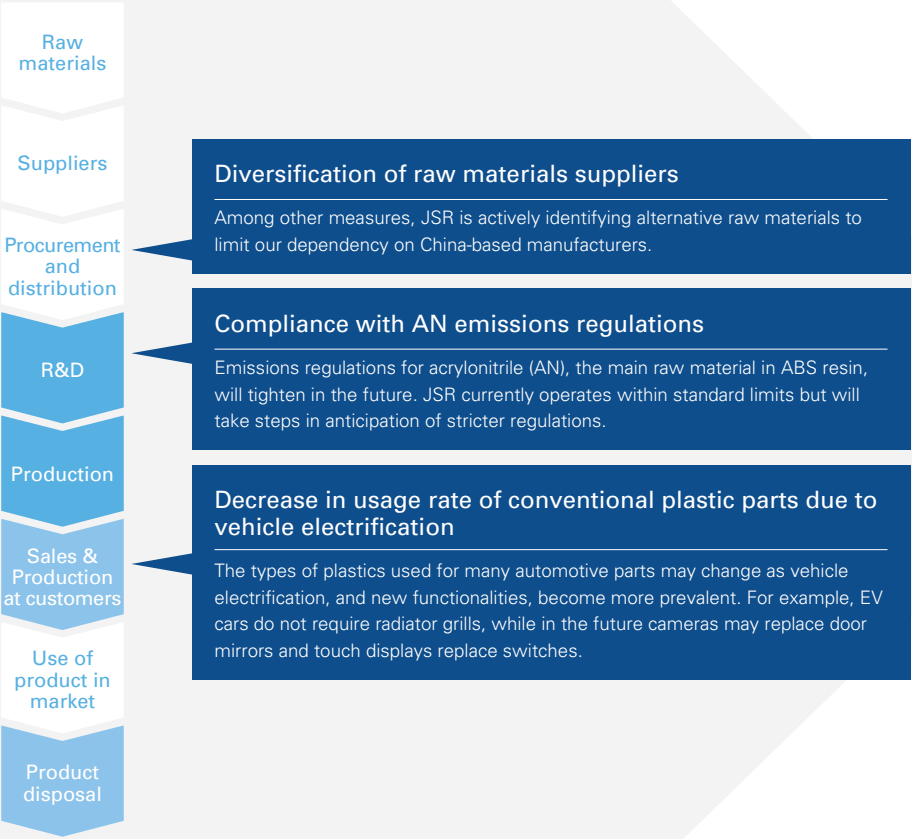
Business Strategy

JSR Sustainability Challenge

In the Plastics Business segment, acrylonitrile (AN) emissions were identified as a negative impact. JSR contributes to low in-cabin noise in automobiles by using materials to eliminate squeaks and reduce overall weight by replacing metal parts with plastic. The Group also helps to

reduce environmental impact through the incorporation of monomaterial parts, which ensures recyclability and requires fewer materials and solvents used in painting.

Negative impact



Positive impact

Exhaust treatment facilities at Yokkaichi Plant

In 2020, JSR Group will invest in treatment facilities to strengthen emissions control. The new facilities are expected to be more effective than existing facilities in reducing CO₂ emissions.

Monomaterialization

The use of unpainted plastics makes recycling possible. Using such materials to eliminate squeaks in automobiles not only ensures low in-cabin noise but also makes it possible to reduce the overall amount of materials. Environmental impact is also lessened in terms of reducing solvents for painting.

Further weight reduction of automobiles with ABS resin

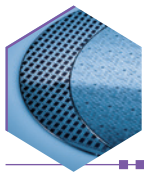
JSR can offer a 50% weight reduction by replacing metal components with high-hardness ABS resin, which has a lower specific gravity than metal. Subsequently, reduced vehicle weight will lead to an overall reduction in CO₂ emissions.

Diversifying plastics development for other in-vehicle product applications

Increased use of plastics in electronic component frames for safety equipment, such as radar, cameras and monitoring systems, is expected, and JSR is actively researching and developing plastics and alternative materials to address future industry requirements in a sustainable way.

Contribution to Advanced Technology Innovation

As 5G and other technologies accelerate digital transformation, demand for semiconductors and displays is increasing. In addition, there are calls to reduce environmental impact through lower power consumption and greater efficiency in the manufacturing process. In light of these demands, the Digital Solutions Business will contribute to society through continued innovation and the development of new materials.



Semiconductor Materials Business

Nanotechnology and power consumption

As mobile devices such as smartphones and cloud services enable a highly networked information society, and with the emergence of AI, advanced driver assistance systems for automobiles, and other elements of a smart society, semiconductor chips have continued evolving to offer faster processing, lower power consumption, and larger capacity. In collaboration with manufacturers in the global semiconductor field, JSR's Semiconductor Materials Business continues to lead the way in cutting-edge material technologies that enable the evolution of semiconductor chips.

It is said that if semiconductor circuit width can move from 14 nm to 7 nm, power consumption can be cut by roughly 40% while maintaining the same processing capacity. JSR will further refine its nanotechnology to support IoT, AI, 5G, and other elements of a smart society while lowering power consumption and saving energy.

In 2015, JSR established a joint venture with imec, a leading research institute in nanoelectronics technology, and began providing production and quality control services for extreme ultraviolet (EUV) lithography materials. EUV lithography is expected to be a key technology driving progress in the miniaturization and integration of semiconductors expressed by Moore's Law, even beyond the 7 nm threshold. Commercial production started in 2017.



Manufacturing joint venture (EUV RMQC)
* EUV Resist Manufacturing & Qualification Center N.V.



Display Materials Business

JSR's alignment films boast the top share in the world

LC displays are composed of a number of films made of high-performance materials. JSR handles many such materials, but has a competitive edge in the alignment films used in liquid crystal arrays. JSR Group boasts the top share of the global market for display alignment films for 4K and 8K displays, which promise strong growth potential.

In 2019, JSR developed and began marketing a new grade of alignment film that enables low-temperature curing in the LC panel manufacturing process. Formerly, customer production lines required curing temperatures of between 200°C and 250°C, but the newly developed film is capable of a much lower 150°C curing temperature, which results in less energy consumed in the manufacturing process and is expected to reduce environmental impact.

JSR has actively been promoting digitalization in the development of alignment films and raw material polymers by utilizing data analysis and simulations to reduce the number of trial runs typically carried out on customer production lines, which led to faster development times. Going forward, the Group will continue to develop sustainable materials by leveraging greater digitalization in the R&D division for the development of new materials.



Chinese manufacturing joint venture (JMCH*)
* JSR Micro (Changshu) Co., Ltd.

Contribution to Advanced Technology Innovation

The automotive industry is undergoing a major transformation. With the advancement of electrification and autonomous driving, vehicle chassis are required to be lighter and more multifunctional than ever before.

In addition, calls are growing for innovations to reduce the environmental impact of automotive tires including extending product life and reducing rolling resistance, which aids higher fuel efficiency. JSR will contribute to the transformation of the automotive industry through its Elastomers Business and Plastics Business.



Elastomers Business

Benefits of SSBR

Fuel-efficient tires are environmentally-friendly and yet maintain their ability to stop safely and securely. JSR Group's polymerization SBR (SSBR) solution has received positive feedback from customers. JSR Group designed SSBR using technology that more readily facilitates rubber molecules and tire reinforcing material molecules to bond tightly, which reduces internal friction and rolling resistance*. In addition, this is achieved without changing the characteristics of the rubber that enables the tires to stop. SSBR allows large reductions in environmental impact throughout the entire lifecycle of the tire, from the material selection and its usage and disposal.

Automobiles are expected to still require tires even after automotive engines are replaced with electric motors. Thus, demand for SSBR is high both in countries and regions where environmental standards are high, such as Japan and Europe, and in emerging nations where reducing transportation-related environmental impact is an urgent issue. Amidst the rapid pace of automotive electric motor adoption, SSBR not only adds lower rolling resistance to tires, it also contributes to wear resistance and durability, thereby helping to maintain long-term performance. In addition, SSBR helps in meeting the growing demand for all-season tires that can be used year-round by adding a degree of softness that ensures tires with safe stopping performance in the summer can also provide reliable stopping performance on cold road surfaces.

JSR has developed a new, highly durable SBR.

Optimized by combining JSR's proprietary molecular design and hydrogenation technologies, this polymer offers high fracture strength, wear resistance, and durability, enabling thinner treads, lower overall tire weight, and longer life compared with conventional tires of the same thickness. JSR Group is developing and marketing a series of new SSBR products offering the same kind of new added value.



SSBR before packing



Plastics Business

Monomaterials

The use of a single type of unpainted plastic makes recycling possible. By using anti-squeak materials, it is possible not only to ensure in-cabin quietness in vehicles, but also to reduce the overall number of noise suppression materials used. These plastics also lessen environmental impact by reducing the use of solvents in painting.

HUSHLLOY™ Anti-squeak Material

Friction at joints between plastic parts is a major design consideration because it can be the cause of unpleasant squeaking noises. HUSHLLOY™ styrene thermoplastic has revolutionary properties that prevent squeaking. In addition to reducing the upfront costs of implementing anti-squeak measures, HUSHLLOY's anti-squeak properties last for the lifetime of the product.

VIVILLOY™ Highly Colorable Material

Based on our proprietary polymer technology and experiences with other products, we developed a highly colorable material for paint-less applications. This product reproduces depth and vividness closely resembling paint for intricate applications and shapes. The elimination of the painting process contributes to lower overall cost and helps reduce environmental impact.



* Rolling resistance: Resistance in the direction opposite to the direction of tire rotation.