SIBUR for Clients
ISSUE № 22

POLYLAB'S VECTORS

SIBUR's new research centre, PolyLab, was launched at the Skolkovo science park in May last year. One and a half years later, the centre's specialists have spoken about the projects they have been working on and their experience engaging with market players.

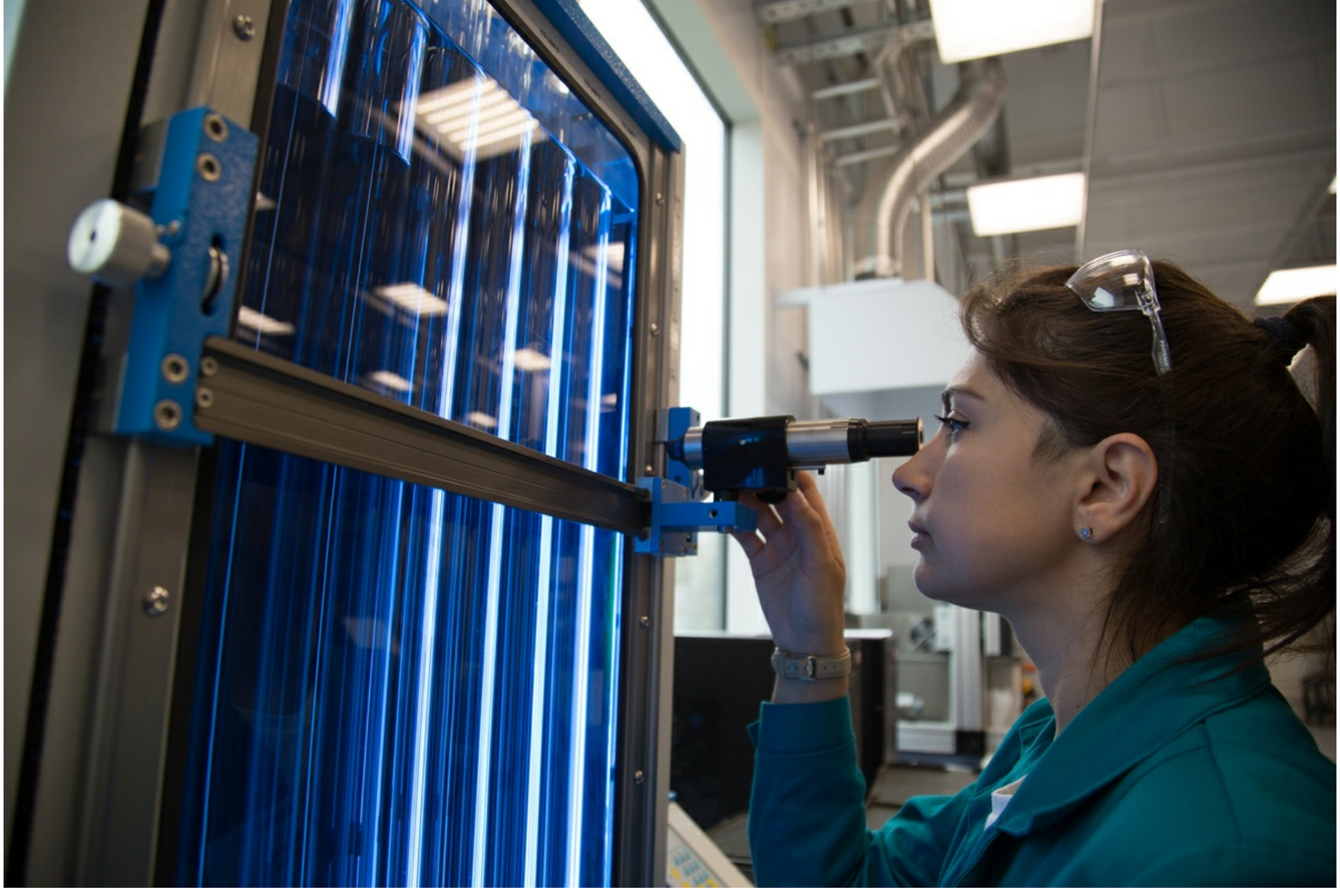
Bringing new products to market

KONSTANTIN VERNIGOROV

CEO of SIBUR PolyLab

"Right now and for the foreseeable future, PolyLab will focus on launching ZapSibNeftekhim's products on the market," highlights Konstantin Vernigorov, the centre's CEO. "Its key new products include polyethylene and polypropylene, polymers used in films, pipes, fibres, packaging and consumer goods. They represent a new grade assortment in the Company's portfolio, but before going to market, the product needs to pass laboratory and industrial tests. The client needs to understand how to use it."

"SIBUR PolyLab analyses to what extent the product and its derivative properties meet our clients' requirements," said Konstantin Zuyev, expert at the Pipe and Fibre Product Processing and Development Team. "A standard laboratory can only test the basic parameters of a product, but cannot understand how it will behave in production, assess its processability, i.e. nuances or challenges that clients might face. PolyLab addresses these tasks. Our test equipment is as close as possible to actual industrial equipment, showing us how a product behaves within a process, its profile, and how its processing or manufacturing technology needs to be adapted to obtain a high-quality output. In fact, this reduces clients' risk, as previously they had to allocate time and production resources to work this out."



An expert review at the centre.

Over the last year, the platform homologated 50 batches of polyethylene and polypropylene from ZapSibNeftekhim, representing about 40 thousand tonnes of products, including 60% being materials used in the highly sophisticated and challenging applications, such as films or pipe extrusion.

SIBUR POLYLAB ANALYSES TO WHAT EXTENT THE PRODUCT AND ITS DERIVATIVE PROPERTIES MEET OUR CLIENTS' REQUIREMENTS

SIBUR PolyLab is a platform for cross-industry discussion, with an actionable dialogue established with partners at the interface between science and manufacturing. This powerful combination lets us test materials and improve formulas together with our customers. Rapid feedback fr om Production helps us finetune the process and end up with a product that meets market requirements as closely as possible.

"Over 2019–2020, we used this framework to test various processes for all of the polyethylene (PE) and polypropylene (PP) grades produced by ZapSibNeftekhim," explained Stanislav Rosinkevich, senior technical service manager at SIBUR. "All-in-all, 11 PP grades and 21 PE grades were successfully tested. The joint efforts of PolyLab and the Sales and Technical Service helped to launch the entire grade assortment planned for the period, effectively position the products in the market, inform clients on the ins and outs of processing the products and provide recommendations on equipment parameters."

ARKADY DVORKOVICH

Chairman of the Skolkovo Foundation

Arkady Dvorkovich,
Chairman of the Skolkovo Foundation:

– We are happy that SIBUR PolyLab, a unique and important project for the petrochemical industry, is based at Skolkovo. The company is working on groundbreaking new materials, production solutions and recycling technologies in close cooperation with Skolkovo's startups and partners, while scouting for technologies for its own processes and for SIBUR's other R&D arms, e.g. NIOST.

We see huge potential in the joint developments of PolyLab and industry-specific laboratories at the Skolkovo Institute of Science and Technology (Skoltech), namely the Centre for Design, Manufacturing and Materials and the Centre for Hydrocarbon Recovery. We are expecting disruptive solutions from these joint efforts.

Under the sustainability concept, SIBUR and Skolkovo are working with industry leaders and are being supported by relevant ministries to run Russia's first accelerator for environmental technology startups. Over 850 applications from 190 cities around the world have already been received, while industry partners are heavily involved in the initiative, with pilots planned to be launched at partner sites in early 2021. I am convinced that we will succeed in delivering on our most ambitious environmental protection, sustainability and energy plans.

Developing existing grades

Another important task at SIBUR PolyLab is to develop the Company's product portfolio. SIBUR is already well-equipped to develop new product grades based on a finished product prototype made using available equipment, which considerably shortens the laboratory granule test stage. Specialists at SIBUR's research centre always focus on product parameters that are highly valued by consumers, such as strength, transparency and elasticity, considering them early on. Then, PolyLab models the key methods of processing materials into a finished product on its pilot lines. A 1–2 tonne pilot batch of the product helps to find optimal solutions for the polymer's composition, properties or for the parameters of the processing technology. This helps accelerate the product development process for a specific application.

EVEN BEFORE SHIPMENTS START, THE COMPANY CAN ANNOUNCE THAT SUCCESSFUL COMMERCIAL TESTS HAVE BEEN RUN ON ACTUAL PROCESSING EQUIPMENT, PREPARE RECOMMENDATIONS FOR PARTNERS AND DRAFT REPORTS ON THE ACHIEVABLE PROPERTIES OF RELATED PRODUCTS

"When developing PP H039TF, a high-rigidity grade of polypropylene for thermoforming, we made the most of PolyLab's capabilities, resources and equipment," said Ilnaz Zaripov, manager at the Basic Polymers Division, SIBUR's Product Development Function. "When running a production test of the grade, we would have needed to produce at least 100 tonnes. If the first tonne showed that the product was not going to meet the clients' expectations, we would still have had the remaining 99 tonnes of the product on our hands. To minimise costs, we developed a formula, made a 300 kg batch of the product using PolyLab's equipment, tested the batch for all potential solutions, showed the results to the clients and only then launched its commercial production."

A similar approach considerably reduces the risks and financial costs associated with launching new grades on the market. Even before shipments start, the Company can confidently announce that successful commercial tests have been run on actual processing equipment, prepare recommendations for partners and draft reports on the achievable properties of related products. Dmitry Shastin, senior sales manager, stated, "The use of HD 03580SB high-density polyethylene (HDPE) in vials reduces the product's weight by up to 8% without affecting its resistance to vertical load. The stability of the product's properties, both within one batch and batch-to-batch, as corroborated by PolyLab, reduces the number of necessary production mode adjustments and, therefore, the amount of defects. Another example: when manufacturing films, a highly stable film bubble can be achieved by processing the HD10500FE grade, reducing breakage during the process to 10%. The controlled cross-linking of materials during processing increases extrusion line productivity by 5%–10%, reducing film production costs."

BIAXPLEN, SIBUR's subsidiary, took advantage of PolyLab's capacities to boost its mix of biaxially-oriented films.

BIAXPLEN, SIBUR's subsidiary, took advantage of PolyLab's capacities to boost its mix of biaxially-oriented films when a large food distributor asked the Company to produce an enhanced BOPP film. A detailed analysis and an R&D matrix are needed to design a material that meets specific requirements. Applying a similar solution to a production line entails financial costs; however, PolyLab's lines enabled us to vary several formulas and sel ect the best one. We conducted the tests and delivered an enhanced film product to the client.

SIBUR'S TIME-TO-MARKET USED TO RANGE BETWEEN 18 AND 24 MONTHS, WHICH HAS NOW BEEN REDUCED TO A PERIOD OF 6 TO 12 MONTHS THANKS TO POLYLAB

The flexibility and low cost of PolyLab's pilot lines have considerably expanded the scope of application for many products. "Last year," said Valery Panarin, Senior Expert at SIBUR's Basic Polymers Division, "we launched a new LDPE grade – LD 40200 FA, which was originally focused on the foaming segment. When the new grade came to market, there were calls for it to be tested in lamination too. Processing tests proved that the grade satisfied the requirements for this second use, so SIBUR was able to expand its production for both segments and thus increase the Company's share in the market."

SIBUR's time-to-market used to range between 18 and 24 months, which has now been reduced to a period of 6 to 12 months thanks to PolyLab. A significant reduction in time costs is the key impact of the new R&D arm. "The point is that PolyLab helped us find a common language with our clients and understand their needs and pain points, not torment them with additional tests, but offer them a finished and tested product and advise on the further course of action to take in order to produce a grade with the desired properties," summarised Alexey Sboev, Head of Marketing at SIBUR's Basic Polymers Division. "We focus on the finished product rather on granules and their properties."

Alexey Shadrin,
Director for Quality and Production System Development at Artplast:

– PolyLab's equipment is unique in Russia. It enables in-depth tests to be conducted to understand exactly how materials behave. When we had a question regarding the quality of SIBUR's polyethylene, we approached PolyLab. The centre's specialists ran all the necessary tests in our presence. Our experts were then able to see the spectrometry and chromatography results for themselves, helping us to understand that our problem was not related to the material's quality. PolyLab's specialists showed us the aspects of processing that required particular attention. This engagement helped us improve the quality of our products and strengthened our trust in SIBUR.

Developing standards

Statistics show that with the current state of utilities, 27% of water and 15% of heat are lost during transportation. The reason for this is simple: outdated water and heat supply systems. Moreover, utility organisations are simply unable to adopt advanced solutions as standards lag behind the industry's advances.

PolyLab is actively involved in the effort to improve the regulatory framework, engaging with industry-related organisations and associations and participating in the development of comprehensive solutions for the construction and gas industries and the utilities sector. Quickly adopting new standards will promote the use of innovative systems and advanced materials in the utilities sector.

A GOOD AMOUNT OF POLYLAB'S RESEARCH FOCUSES ON THE PROCESSING OF PLASTIC PRODUCTS

"As a member of Technical Committee 241 (Rosstandart), PolyLab focuses on transforming the quality and performance of utility networks," said Ruslan Khairullin, Industry solutions manager. "Our involvement in the drafting and adoption of regulatory documents helps us shift the utilities sector's focus towards innovative, mature and cost-effective solutions. PolyLab's representatives also participate in the Expert Panel of the Association of Pipeline Systems Manufacturers, which discusses solutions related to the use of internal and external water supply and water disposal systems, including pipes, wells, tanks and pump stations." These efforts help the Company to forecast market evolution and promptly offer advanced solutions to processors. The industry's rapid response to changes in the utilities sector directly brings technical and economic benefits for the end consumer.

Environmental projects

SIBUR is among the chief champions of the circular economy in Russia. A good amount of PolyLab's research focuses on the processing of plastic products. "Sustainability projects address a long chain, from collectors and sorters of recyclables to the end consumer, and active collaboration between all stakeholders is key to this process. PolyLab is a central link in this chain, offering its polymer competences and R&D infrastructure to test the developed solutions in finished products, explore various options for feedstock sources and processing methods and sel ect the best. Stable compounds containing recycled materials can only be created with sophisticated technical tools. We are currently working on cutting-edge mechanical processing solutions with an implementation roadmap between six and twelve months," said Konstantin Vernigorov.

This year the centre's team has become the first in Russia to produce a grade that can be used in blow moulding – recycled high-density polyethylene (r-HDPE). This is a serious breakthrough, as the material can be used in packaging for household chemicals, an area wh ere recycled products have never been used before. "In 2020, we worked on developing recycled grades across different applications, including extrusion blow moulding, injection moulding and film extrusion," commented Stanislav Khvostov, PolyLab's manager. "We have developed the most detailed polyethylene formula for extrusion blow moulding. A number of pilot batches have been produced on the processing line, with tests underway at our clients' facilities. Next year, we are planning to scale up the production of these materials. Currently, the target percentage of recycled content in newly developed materials stands at 25%, but next year we are planning to increase its share in compounds to 50%."

SIBUR'S NEW GRADE ASSORTMENT CONTAINING 20%–25% RECYCLED POLYMER WILL BE PRESENTED AS EARLY AS NEXT YEAR

As Ilnaz Zaripov explained, “our product portfolio has a certain number of grades for various applications. We are currently focusing on

SIBUR’s new grade assortment containing 20%–25% recycled polymer will be presented as early as next year. The Company, however, is planning to expand the scope of its research beyond polyethylene and polypropylene. Maxim Remchukov, Sustainable Development Director at SIBUR, commented, “In 2021, we will expand PolyLab’s infrastructure in the sustainability segment from PP and PE to polyethylene terephthalate by purchasing preform blowing equipment. A virgin PET production project using 23.5% recycled feedstock is ongoing at our Blagoveshchensk site. We expect that in Q3 2021 PolyLab will start testing various sources of recycled PET to understand how recycled feedstock from different producers can affect the quality of finished products.”

Helping partners to grow

PolyLab is first and foremost a client-oriented platform open to cooperation and collaboration. Keen to foster the domestic market for plastics, SIBUR offers the centre’s equipment and capabilities to any company interested in using them.

BEFORE YEAR-END, THE POLYLAB TEST LABORATORY WILL BE CERTIFIED BY THE FEDERAL SERVICE FOR ACCREDITATION (RUSACCREDITATION) FOR COMPLIANCE WITH ACCREDITATION REQUIREMENTS AND GOST ISO/IEC 17025-2019

Arthur Aslanian, senior researcher at SIBUR PolyLab said, “I would highlight four areas our services focus on: First, technical consultations. If clients need to choose processing or testing equipment and understand the ins and outs of how they operate and maintain this kind of equipment, we are always happy to offer our expertise and experience.

“Second, laboratory research. As practice shows, our clients are focused on processing materials into finished products and sometimes lack all the necessary testing equipment. The centre’s technical capabilities support a wide range of research.

“Third, product support. If partners encounter issues in processing or with the quality of their finished products, we help them to identify and address the problem by adjusting equipment settings, giving pointers on the choice of material or advising on the formula.

“Fourth, product mix expansion. I think this is one of the most promising areas. Often clients are willing to enter new market segments and ask for a formula and materials that would fit their target product solutions. We analyse existing materials and look for alternative solutions to help partners improve the quality of their products, expand their product mix and gain new market niches.

“Over the last year, we fulfilled over 40 applications across all these areas. More often than not, clients are interested in exploring finished products, the permeability of materials and physical properties of films.”

The centre’s specialists help their partners from PolyLab and conduct research at their request .

Before year-end, the PolyLab test laboratory will be certified by the Federal Service for Accreditation (RusAccreditation) for compliance with accreditation requirements and GOST ISO/IEC 17025-2019, proving its employee competence, the conformity of its equipment and reliability of its research. Many companies need test reports from an accredited laboratory, and PolyLab can act as a third party in disputes wh ere the results of other third-party tests diverge. Accreditation is also required for tests in the pipe industry.

OVER THE LAST YEAR, POLYLAB HELD ABOUT 40 DIFFERENT WEBINARS ON THE SIBUR BUSINESS PRACTICES PLATFORM, WHICH INVOLVED OVER 600 PARTICIPANTS

Furthermore, educational programmes make up an important part of PolyLab’s activity. Over the last year, PolyLab held about 40 different webinars on the SIBUR Business Practices platform, which involved over 600 participants. The webinars focused on the nuts-and-bolts matters that are really important for our clients: enhancing compounding productivity, using additives to modify film properties, finding the best injection moulding modes and keeping industry-specific technical documents. Some of the most popular topics among participants included Processing of Recyclables: From Material Collection to the Design of Finished Products, Polymer Biodegrading Into Microplastic, and Additives for Polymers.

We hold many joint webinars with SIBUR’s partners, additive producers and various equipment manufacturers. Some webinars involved globally renowned specialists, such as Andreas Thuermer and Ekaterina Troussard from BASF and Dirk Scheibner fr om Sumitomo DeMag. The audience is extremely interested in these collaborations.

“We carefully examine feedback fr om participants in our training programmes and try to adjust them accordingly,” said Dinara Gabdullina, Head of Laboratory at SIBUR PolyLab. “Participants are satisfied with the programmes but often request a heavier focus on their specific segments. Clients are eager to continue their training in our laboratories using the centre’s capabilities; unfortunately, we cannot hold in-class training due to the pandemic, but the programme is ready to go. It focuses on hands-on training, offering plenty of detailed information on our partners’ industries. We hope that the pandemic situation will improve next year so we can offer this training.”

Strengthening cooperation

It is no accident that PolyLab is based at Skolkovo – it is considered the Russian Silicon Valley. “To be honest, we didn’t expect this powerful impetus from being based at Skolkovo,” revealed Konstantin Vernigorov. “The very environment and vibe here give a boost to networking and collaboration. There are lots of startups at Skolkovo, and they often come to us and present their products. In the months before the lockdown, PolyLab hosted about 130 events in various formats: client meetings, startup meetings, conferences with industry partners and associations, as well as initiatives to join efforts between our industry and adjacent industries.”