# NLMK Group's Strategy

Learn more about the role of each element:

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- **Rd**: Research & Development
- **Eu**: NLMK Europe
- **Us**: NLMK USA
- **Oe**: Operational Efficiency
- **Ip**: Investment Projects
- **Sl**: Sales
- **Se**: Safety & the Environment
- **It**: Information Technology
- **Rm**: Risk Management
- **Ls**: NLMK Lipetsk Site
- **St**: Stoilensky
- **Lp**: NLMK Long Products
- **Fn**: Finance
- **Kg**: NLMK Kaluga
- **Mt**: Maintenance
- **Pc**: Procurement
- **Lg**: Logistics
- **Eg**: Energy
- **Ak**: Altai-Koks
- **Vs**: VIZ-Steel
I was appointed CEO of NLMK Group by resolution of the company’s shareholders from March 12, 2018. This resolution stems from the successful execution of Strategy 2017 and transition to new strategic objectives. It was, and remains, a great honour for me to work in Oleg Bagrin’s team. Under Oleg’s stewardship, the Group has achieved the goals of Strategy 2017 and reclaimed its leadership of the Russian steel sector. It is thanks to these achievements we now have the opportunity to implement an ambitious development plan within the new cycle of our strategy. Implementation of projects within Strategy 2022 calls for the involvement of every individual within our team of professionals, with its industry-leading expertise.

It is essential the new stage of our development maintains the course we laid down in the previous stage, such as our focus on continuous improvement of business processes and ongoing reduction of our injury rate. These focus areas will always be in the forefront of our thinking. I believe transforming our company into the undisputed global leader in operational efficiency and occupational safety is a key target. Our new strategy is a set of new challenges that call for an innovative and daring, yet reasoned response from our team, as well as proactive thinking and dedication. We will grow and develop as a global company, creating new products and introducing innovations and best practices into our business processes.

There are very interesting times ahead. The business model of industrial production is changing rapidly, and we must change along with it if we are to guarantee our ongoing success. We need to ensure that innovation management is an ongoing efficient process in place at NLMK Group facilities across the globe. I see my mission as president and CEO of one of the world’s leading steel companies as bringing NLMK Group’s leadership to a new level by achieving our strategic objectives, increasing employee engagement in the continuous improvement process, consolidating and strengthening the NLMK team of professionals and ensuring it has the most favourable working conditions possible.

Yours sincerely,
Grigory Fedorishin
President and CEO
Of NLMK Group
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PLANs FOR EUROPE

At a meeting of NLMK International’s Board of Directors, President and CEO of NLMK Group Grigory Fedorishin inspected operations at NLMK Clabecq and recapped the development priorities established by the team and confirmed by the Group’s Board of Directors.

▶ «Firstly, we need to increase our presence in the market segment of high value added niche products,» Grigory Fedorishin said, “Q&T (quenched and tempered) plate and DQ (direct quenching) plate account for 30% of NLMK Clabecq’s sales volume and deliver 60% of added value. Secondly, we need to further increase operational efficiency. We must improve the reliability and productivity of the mill, bringing it back to the levels achieved at this site a few years ago, and then surpassing them. This will lay a strong foundation for further development of the facility, including the potential for investment.”

Grigory Fedorishin expressed his confidence in the team at NLMK Clabecq and spoke highly of the Remontada project (‘big comeback’, taken from the Spanish), which aims to increase employee engagement in operational efficiency projects.

BE MINE

Stoilensky has begun quartzite mining on the Southern bank of the Stoilensky deposit

▶ The development of this site and the overall expansion of mining operations will enable a 10% increase in production output year-on-year to 38 million tonnes in 2018, covering NLMK Group’s growing need for iron ore. The launch of the pelletizing plant at Stoilensky and projects aimed at increasing steel production at the Lipetsk site create a greater demand for quartzite, which is feedstock for the beneficiation plant.

Sergey Napolskikh, General Director, Stoilessny, said: “Previously, only small amounts of rich ore were being mined on the Southern bank. In line with our mine development plan, we dewatered the deposit, removed power lines from the mining area and stepped up stripping operations in 2016 - 2017. This enabled us to build a new loading point and proceed to full-scale mining. The mine development project includes reconstruction of the mine logistics scheme. The new scheme will enable a reduction in raw material delivery costs and ensure the cost effectiveness of quartzite mining.”

Stoilensky plans to extract more than 1.5 million tonnes of quartzite and 750,000 tonnes of rich ore from the Southern bank in 2018.

ENGAGE TURBO

NLMK Lipetsk boosts captive energy generation to 59%

▶ The boost in captive energy generation is possible thanks to the launch of the new 60 MW No. 5 turbine generator unit. The company has high hopes for this generator, as not only will it improve the reliability of the energy supply, but also reduce energy procurement costs. Total investment in the project exceeded RUB 1.8 billion (~$31 million).

Sergey Chebotarev, NLMK Vice President, Energy, said: “This project enhances the safety and stability of the Cogeneration Plant, and reduces the operating costs for electricity and heat generation. This will enable us to increase the efficiency of our energy-generating facilities, and increase the share of in-house power generation to a record 59%.”

IN POSITION

NLMK-SAP Co-Innovation Lab pilots 3D employee positioning system

▶ The Lab team together with National Centre of Internet of Things (NCIT) have managed to create a system enabling real-time tracking and analysis of employee positioning and equipment operating mode changes. The pilot system was developed on the basis of a complex production environment, for which a hot-dip galvanizing line at NLMK Group’s Lipetsk site was selected. The prototype was developed in a record time of just 3 months. The new solution was created using the SAP Cloud Platform and RTLS-UWB positioning system, together with 3D imaging technology and LoRaWan wireless communication technology.

Elena Demyanova, NLMK Group Vice President, IT, said: “The employee positioning system is one of the first projects of the NLMK-SAP Co-Innovation Lab. This system not only helps us analyse large quantities of data, it also helps to prevent accidents in the workplace and improve operational efficiency. I hope that in a short time we will progress from pilot to full-scale roll out.”
Mr Bagrin, in 2012–2013 your team developed Strategy 2017. What was its main purpose and did its goals seem achievable?

Let’s go back to where it began. Before Strategy 2017, NLMK Group was expanding rapidly, both organically and through acquisitions. Lipetsk was our only major production facility when I joined the Board back in 2004, with steel output of up to 9 million tonnes. By 2012, when I was elected NLMK’s CEO, we operated 19 production sites across seven countries, with combined steel output close to 15 million tonnes. This growth strategy was based on just three simple ideas we felt would confront the challenges the industry sent our way: upstream integration, business diversification and downstream operations close to end customers. This was the underlying concept behind our growth and the evolution of our assets’ portfolio with the Lipetsk site at its core: we acquired Stolensky, Altai-Koks, NLMK Long Steel, NLMK Europe and NLMK USA. This explosive growth culminated with the launch of NLMK Kaluga in 2013.

A knock-on effect of this rapid growth was a drop in efficiency exacerbated by a major crisis on the steel market. We felt we were on the right track, investing, expanding and diversifying our business and building vertical integration. So why
did our profitability plummet? Why did NLMK generate negative cash flow in 2011-2012? The crisis, the challenging market conditions were taking their toll; but what was the root cause? The bottom line was we were too fixated on growth to pay due attention to business fundamentals. We needed to build efficient processes and teams, train and appoint new leaders. Otherwise even the very best laid would come unstuck. So operational efficiency became the driving force behind Strategy 2017. While our existing development logic still held true stemming from the structure of our operations, this new element was entirely dependent on us as a team. By our hand almost any facility can be made to operate efficiently, or to the contrary.

In 2012 we could see NLMK had such huge potential for gains from efficiency initiatives that we had no doubt we would deliver on our Strategy 2017 goals. We also understood that the Group needed to undergo a massive transformation to achieve this, one that would transcend the production process and bring change to absolutely everything we do.

**STRATEGY 2017: TARGETS**

1. Leadership in operational efficiency
2. World-class resource base
3. Leading positions in strategic markets
4. Operational safety and personnel development

**HOW DID YOU GO ABOUT TACKLING INEFFICIENCY?**

We left no stone unturned. You can break any process down to its building blocks and reassemble it, out with the superfluous and in with the new. If it works out then you move on. When the desired result was achieved in the upstream, we turned our attention to the rest of the business, first to other sites and then functional areas.

**WHAT WAS THE BIGGEST CHALLENGE OF THESE PAST FIVE YEARS?**

Convincing people changes were necessary and, even more importantly, that we could implement them. Humans tend to fear change, to be intimidated by the unknown. Imagine you're in the mountains and are confronted by a thousand meter vertical rock-face, and you don't have a clear topo of the route. Your first feeling will be trepidation: "I have no chance. I'd better get out of here." This is your initial reaction and it's natural, because this fear allows you to take control and confront any naivety or euphoria, as it sets some boundaries. Next, reasoning kicks in. You realize that even though the rock-face is vertical, there are some faults in the rock you can use to build a route. Then it's down to technical ability and physical training, but these are only resources. It has to start in your mind: with doubt and anxiety brushed aside by will and reason; you see where you can wedge your foot or grab a hand hold. A kilometer-long climb is a step by step process, which is equally true of everyday life and business.
On the whole, the key factor was undoubtedly the team’s unwavering belief that we would succeed, belief in its own ability. We didn’t allow ourselves to be intimidated by technology or organizational decisions.

What helped you to deal with the difficulties you faced?

Teamwork and a sense of humor.

How did you convince your employees to share your belief in the need for change and to kick off the transformation process?

Change can only happen if a team has a common goal. Leadership, cooperation and support must be common values. Only then can the team function as one, and the company as a single production chain stretching from Altai to the USA. These values are incompatible with the hierarchies that came before, where every plant was like an island with its own P&L, its own interests, ways of doing things and ideas about technology. There were many barriers to break down and replace with bridges. We created functional areas linked by Group-wide standards in areas like finance, sales, procurement, HR, investment and HSE. We added some areas too, such as controlling, risk, and operational efficiency. The result was a divisional and functional matrix, with clearly defined responsibilities for functional and divisional leaders as well as site managers. A lot of effort went into process design, cutting down micromanagement. For the management, from CEO to the shop floor, we launched shared goal-setting, or MBO, based on the Group’s priorities, for example increasing efficiency. The game changes fundamentally when you understand everyone is working on a shared idea, rather than in the interests of an individual plant. Solving the Group’s problems begins at home. This is the idea behind the continuous improvement.

What proved most to be important during the execution of the strategy?

Keeping on an even keel and keeping the faith. When doubt clouds the minds, then you might begin to waver yourself, as there are no ready answers. We took radical steps that often went against the grain of existing practices or conventional wisdom. The team held firm in its belief and its resolve to make NLMK better, and the results soon followed. For example, I recall discussions with Sergey Filatov and Konstantin Lagutin on how we could achieve the world’s most efficient blast furnace operations, and how to supply it with captive iron ore, without spending billions of dollars.

I remember Sergey Filatov walked the floors explaining what productivity and fuel consumption our blast furnaces would achieve. Blast Furnace No. 7 was producing 8,000 tonnes per day and he promised 12,000. He asserted we could make an extra million tonnes of pig iron each year, while saving one million tonnes of coal and idling one or even two furnaces to boot. The initial reaction was disbelief, even outright cynicism, but today the Lipetsk site has the best-performing blast furnaces in the world. Blast Furnace No. 7 produces more than 12,000 tonnes per day, and we use 2 million tonnes less coking coal than in 2012.

When Konstantin Lagutin proposed High Pressure Grinding Rolls (HPGR) at Stoiленsky, people laughed at the idea. The technology was employed largely in Australia, and what little experience there had been in Russia had been unsuccessful. At the end of the day, iron ore concentrate output at Stoiленsky is up by almost 2 million tonnes through HPGR.

NLMK is currently taking stock of the results of Strategy 2017. Has the decision to back operational efficiency and continuous improvement paid off?

Absolutely. Last year’s results showed net gains from Strategy 2017 projects exceeded $1 billion, with around 70% generated by operational efficiency.
initiatives. This wasn’t driven by the market or anything short-term, this came about through structural transformation. We implemented over 3,000 operational efficiency projects, a twelfold increase in just five years. Of course, Strategy 2017 wasn’t only focused on operational efficiency, it permeated every process and penetrated into other areas, including employee development, occupational safety and investments. At first, the emphasis of NLMK’s Production System was lean manufacturing that reduced resource consumption or increased productivity, and initial projects were mainly proposed by management delivering sizeable gains. These were ‘quick wins’. The next stage was scaling up the Production System across the Group. We needed to get as many employees involved as possible to embed continuous improvement into our culture, making it a common practice. TO WHAT EXTENT HAVE YOU EXHAUSTED THE POTENTIAL FOR FURTHER IMPROVEMENT? Efficiency is a renewable resource and NLMK has significant improvement potential. Continued growth creates new opportunities, and the march of progress contributes as well. NLMK Production System has only been rolled out for a small part of our people. Considering the total number of employees and improvement projects that have been offered, involvement stands at only about 6%. The importance of change is still filtering through the Group, as all the way to the line management and foremen. They too must stand up and be counted, as agents of change and true leaders. We have a team led by Tatyana Averchenkova working on this challenge. We are also establishing NLMK Corporate University in pursuit of this goal. It will provide training for 6,000 managers from all levels and all Group companies every year.

WHY MANAGERS? Social systems are fractal in nature. Whether a company, country, or school, leadership will always permeate through the entire system in the end. Organizations mirror the attitudes, practices, and values employed by its leader or leaders. It won’t happen overnight, it takes time for a system to absorb ideas and values, but you’ll notice the effects in a year or fewer. If a leader is passive the organization will pick up on it, and the opposite is also true. We are demonstrating our commitment to this belief in the design of our Corporate University. We can’t change overnight how tens of thousands of employees approach their work, but we can change how hundreds or thousands of managers behave. They will pass on these new skills, attitudes and ideas to their teams. The more leaders we can involve in the process, the greater the chance of success, and the quicker the ‘frozen core’ will thaw out; those lacking the motivation, those who resist attempts to engage but could nevertheless be important conduits of change. Today, the University is being designed primarily with management training in mind, but who knows, perhaps five years down the line it might open its doors to every employee. WE CANNOT CHANGE THE BEHAVIOUR OF TENS OF THOUSANDS OF EMPLOYEES OVERNIGHT, BUT WE CAN CHANGE THE BEHAVIOUR OF HUNDREDS OR THOUSANDS OF THEIR MANAGERS.

YOU FREQUENTLY DISCUSS INCREASING MOTIVATION AND ENGAGEMENT OF MANAGERS AND EMPLOYEES. BUT HOW CAN THIS BE ACHIEVED? HR technologies make a reality of what we could have only dreamed about in the past. We can perform rapid analysis and modelling of the entire organization. Our new IT system lets us to take a closer look at any of our 50,000 employees, individually or grouped according to criteria like position, site, profession, skillset and so on. This coordinate grid allows us to simplify our organizational structure. In 2012, NLMK had 12-14 management levels; while today we have seven between line-work and CEO. We have plans to bring this down to five, making communication even faster and more direct still.

Our new HR system lets us implement competency models and introduce tools for training and appraisals. This will help to employees achieving faster career progression, being results-driven and engaging in personal development. Appraisals based on competency models and management standards help us understand how well an employee or manager is performing. Alongside the results from MBO, this gives us a rather impartial view. It is our duty to encourage employees that demonstrate strong performance and exceed the expectations of their role, offering them career growth opportunities. A transparent and coherent system of career progression with provisions for both upward and lateral steps is under development, while human capital committees are being set up in all divisions too.

HR technology is preparing the ground for a more equitable social contract between employee and the organization. Employees that demonstrate results and strive to uncover their potential can be sure that doors will open for them.

WE BEGAN OUR INTERVIEW WITH A QUESTION ABOUT STRATEGY 2017 AND IT’S TIME TO RETURN TO THE TOPIC FOR OUR LAST QUESTION. WHAT ARE THE KEY OUTCOMES OF STRATEGY 2017, AND WHICH IS MOST IMPORTANT FOR YOU PERSONALLY? We’re currently taking stock of the results from five years of Strategy 2017 execution. The Board of Directors will review final figures in March, but it is already clear all four strategic objectives were achieved. We rose to the most important challenges of this five-year cycle, restoring the efficiency of the business, achieving self-sufficiency in iron ore, and improving safety. The figures speak for themselves. Compared to 2012, we have increased steel output by 2 million tonnes, reduced the cost of production by 25%, doubled our profitability, leverage is down to...
a minimum, and the injury rate has dropped by 50%. Company profits in 2017 reached a post-2008 high. Our results for 2017 showed net gains from Strategy 2017 projects exceeded our $1 billion objective. We will see further gains of about $200 million during 2018 driven by recently completed investment projects, including Stoilensky pelletizing plant and integration of PCI technology at Lipetsk’s BF Shop #2.

We have kept every promise we made to the shareholders and even went beyond. This enabled NLMK to restore shareholder trust, which is vital as that ultimately is what public companies are competing for. NLMK has regained its leadership among Russian steelmakers in market value terms as a result.

The most important outcome of Strategy 2017 for me personally is clearly the breakthrough in the quality of our processes and our teams. As I’ve mentioned, this is prerequisite to the execution of any strategy. We boosted the attention we devoted to developing our people, we became closer-knit and more confident in our abilities, displaying managerial daring and grit. We have become a single team, and proven ourselves capable of rising to any challenge, no matter how complex. 2018 sees the beginning of a new five-year strategic cycle. NLMK’s technology, the quality of our team, the scale of our business and, most importantly, the unique potential for growth and efficiency our company enjoys within the steel industry will open up a multitude of opportunities. After these past five years, our team today has the right, the duty even, to set more ambitious goals than ever before. I’m sure we’ll still achieve them!

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Since 2006: Rolling capacity increases to 14 m t.

2008: New 300-tonne BOF, new ladle furnace, and degasser facilities, overhaul of off-gas ducts at the Lipetsk site.

Steel production increased to 2 mtpa.

2009: Rolling mill upgraded at NLMK Dzerzhinsk. 4.2 m thick plate produced for wind turbines and shipbuilding in Northern Europe.

Program to improve efficiency of NLMK Europe Strip. Business returns to profitability.


Stoilensky pelletizing plant launched.

BOF production at the Lipetsk site increased by 1.8 m t.

High Pressure Grinding Rolls (HPGR) introduced at Stellitec, Production capacity increased to 76 m t of iron ore fines.

New stage of Environmental Program 2020. Investments exceed EUR 1 billion (~$1.1 billion).

NLMK wins ‘Industry of the Year’ at Platts Global Metals Awards.

Stoilensky pelletizing plant launched. BF production fully supplied by all types of captive iron ore.

Compliance featuring two top pressure recovery turbines at the Lipetsk site. 44 MW of electricity provided by excess blast furnace gas pressure.

In 2015: SOGEPA – strategic shareholder in NLMK Belgium Holdings.

In 2015: SOGEPA’s stake increased to 25.3%.

In 2016: HDG-1 at Sharon site upgraded, HDG-2 at Sharon Coating restarted. Hot-galvanizing capacity increased to 1.8 m t.

High Pressure Grinding Rolls (HPGR) introduced at Stellitec, Production capacity increased to 76 m t of iron ore fines.

New stage of Implementation for Production System. Development of continuous improvement culture and increase in staff engagement.

In 2017: Co-Innovations Lab with SAP: Development of innovative IT solutions for the steel industry.

Implementation of pulverized coal injection (PCI) technology at the Lipetsk site. 90% of blast furnace capacity covered. Coke consumption reduced by 30%, natural gas consumption by 15%.

Construction of briquetting plant begins at the Lipetsk site. First 300,000 tpa of briquettes supplied from blast furnace production waste. Production cost of pig-iron and environmental impact both reduced.

Construction of Corporate University in Lipetsk.
The NLMK Group management team met in Moscow to take stock of Strategy 2017, and to designate areas for development over the course of the next five years.

Oleg Bagrin announced to the assembled team that all of the objectives have been achieved. He recalled that long-term planning had been essential during development of the Strategy due to the quite challenging situation in which NLMK found itself at the starting point in 2012–2013 when, in the space of the preceding four years, profitability had shrunk from 30% to 11%. During this time, the company had financed major technical upgrades, resulting in a significant increase in debt load, which in the middle of 2013 was more than double EBITDA. A reaction from the market was inevitable, and NLMK Group, which had for a long time held the lead among Russian steel companies in capitalization terms, fell to second position in 2014.

It was amid these difficult conditions that the Strategy 2017 objectives were formulated. Three of these were financial: to be first in efficiency, to develop our resource base, and to lead the way in strategic markets, and one was non-financial: to be ahead of the pack in sustainable development, which encompasses environmental issues, production safety, and human capital. “Not only did we state these as our objectives, we also quantified them. Judging from the results at the end of 2017, we can conclude that the net gains of Strategy 2017 will exceed its target of USD 1 billion,” Oleg Bagrin said.

“Our non-financial objectives have also been successfully met, our biggest achievement being a 47% reduction in the injury rate compared to 2013. As a result, the company has regained its leading position in the Russian steel industry.”

Tatyana Averchenkova related how the operational efficiency team had begun the strategic cycle with two optimization programs which were only just ready to go, and aimed primarily at management. It was hard to envisage at the time that, by the end of 2017, the financial gains realized by this area would stand at almost
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Konstantin Lagutin talked about the major investment projects under Strategy 2017. In terms of developing NLMK Group’s resource base, the company faced the challenge of achieving 100% self-sufficiency in iron ore. In order for this target to be attainable, it was essential to increase ore production and processing volumes at Stolensky, in addition to cutting consumption of costly resources at the Lipetsk site. Konstantin Lagutin highlighted the key projects that contributed to realizing this objective: the construction of a pelletizing plant and accompanying thickening unit, and the upgrading of the four sections of the beneficiation plant and integration of new High Pressure Grinding Roll technology. Pulverized coal injection facilities were built in order to reduce consumption of costly coke and gas. A crushing and sorting plant for processing steelmaking slag was also opened, and construction of a briquetting plant is set to be completed next year.

The gains that these projects have already achieved indicate that the investment program to develop the company’s raw material base has been successfully fulfilled. In the next strategic cycle, Konstantin Lagutin is calling for NLMK Group to focus not only on increasing ore production volumes, but also on the quality of production, and for project management standards, which are rightly described as the best in Russian steelmaking, to be applied throughout the Group, including at its international sites.

The results achieved by NLMK Group in sales were unambiguous in nature. As Ilya Guschin reported in his address to the team, we exceeded our target for sales volumes, primarily due to successes on the American and European markets, but the resulting financial effect failed to match the figures set out in the Strategy. This was largely connected with a contraction in the Russian market caused by macroeconomic factors which had an impact on investment opportunities, population incomes, and, as a result, the construction business, to which we supply the majority of our products. Nonetheless, taking into account the total number of contracts concluded by NLMK Group sales team over the five-year period, we can see that an average of 100 deals were made each day. Sales volumes at this level meant that it was possible to maintain production capacity utilization in Russia, which in turn partly contributed to the attainment of such strong performance in terms of operational efficiency. And even though Russian sales fell short of forecasts, NLMK Group still achieved an increased market share in all key product groups.

The past strategic cycle has seen the formation of a strong sales team representing the interests not of disparate sites, as was previously the case, but of the Group as a whole. We also succeeded in developing our sales channels: now, NLMK does not only work primarily with distributors, it also has an active presence in direct retail sales. And if, in recent times, we have concentrated our efforts on increasing sales volume, in the future we will need to switch our focus to quality, targeted sales in smaller shipments. It is also essential that we promote the digitalization of our operations. Ilya Guschin has high hopes for a major project to create an operational calendar scheduling system that will make it possible to put an order from a client into production as soon as it arrives by automating planning capacity utilization.

Stanislav Tsyrlyn discussed the HR strategy outcomes. This was a strategy based on four key goals: developing our people and providing them with the best possible career opportunities, controlling costs while increasing workforce productivity, employing the latest HR practices, and working closely with the business. From the very beginning we set out on a path to create a unified, centralized HR service. This required a complete transformation of our approach to human resources and the recruitment of many new employees and managers. The reorganization was a success: all companies within the Group now have a maximum of seven management levels. Hundreds of different job titles have been reduced to no more than forty.

An HR business partner institute has been created, and continues to evolve. An important tool to have emerged in the area of talent development is that of career committees, which engage in a detailed evaluation of professional competences and draw up individual career development plans. A talent pool for the first five management levels will be fully established by the end of 2018. Seven hundred employees from different functional areas of the company have been involved in our reengineering project, which has already had a significant economic impact. Workforce productivity has risen much more quickly than staff costs, while the average salary of employees has also increased – an important factor in motivating staff to engage in future development. At the next stage, the HR function needs to become an active part of the NLMK Production System in order to unlock the potential of our employees and help instill a culture of continuous improvement.

Stanislav Tsyrlyn highlighted the creation of NLMK’s Corporate University in 2017 as a key advantage from the point of view of human capital, since the main objective of

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the University is to transfer not only experience, but also its own kind of DNA – the cultural component of our company. It is significant that the organization of this strategic session was undertaken in its entirety by the Corporate University, no external contractors or consultants were involved.

One extremely important topic, which was discussed in a separate, dedicated session, was the improvement of occupational and industrial safety. NLMK Group Vice President for Occupational and Industrial Safety and the Environment Viktor Yotogobetsky explained how processes within this functional area had been restructured in a bid to make the company one of the world’s safest. By the end of 2017 it was already clear that the company had achieved results in line with the best global practices by reducing the occupational injury rate at Russian assets to no more than 0.6 lost time injuries per million man hours worked. With the help of new tools we have succeeded in engaging people in occupational safety and in developing a safety culture. During the period from 2013 to 2016 we more than halved the occupational safety and in developing occupational health and safety issues, we have seen the emergence of all kinds of innovations: Sergey Likharev’s integrated supply chain management program, the scheduler for production and sales discussed by Ilya Guschin, Dmitry Kolesov’s maintenance management system, developments in distribution, a new sales channels service, and product and digital innovations,” Grigory pointed out. A separate discussion was devoted to digital innovation. “The IT landscape at NLMK Group is changing,” was Grigory Fedorishin’s characterization of this process. Entire “innovation clusters” have emerged: a Data Analysis and Modeling Directorate, an NLMK-SAP Co-Innovation Lab, an NLMK-SAP Co-Innovation Lab,

Parallels between how to deal with risks at production sites and how mountain climbers avoid danger were drawn by invited speaker Andrey Volkov, Scientific Director of the Moscow School of Management SKOLKOVO and President of the Russian Federation of Mountain Climbing.

He shared several examples from personal experience of when his group had found themselves in a critical situation in the mountains. As a rule, these situations occurred primarily because the climbers had failed to make an independent assessment of the risks at hand, instead relying, for example, on information from the previous group, stopping to spend the night in a potentially dangerous place, and in this way placing the responsibility for their decisions on other people. In Andrey Volkov’s view, efforts to reduce risk levels should be made in three areas: training to install automatic reactions in standard situations, careful assessment of possible risks and analysis of successfully avoided dangers, and development of human capital (health, qualifications, and group communication skills).

All participants in the session were invited to identify difficult issues in occupational health and safety before breaking into groups to come up with possible solutions. Summing up the results of the discussion, Oleg Bagrin thanked everyone for their engagement and thought-provoking proposals. All were listened to, and many will be included in the occupational and industrial safety improvement program that will form part of Strategy 2022. Mr. Bagrin stressed that it will be impossible to transform the situation until every manager is aware of the extent of their personal involvement in addressing occupational health and safety issues, can gauge the level of risk and danger on-site based on their own personal experience, and changes their attitude towards these problems. He called upon all present to make their personal responsibility to increase safety levels in their part of the production process and in their own activity.

Ongoing work on the upcoming Strategy 2022 is in its final stages. Grigory Fedorishin invited Group managers to think about which key areas should determine the direction of the company’s development in the future. A team under his leadership has already spent over a year working on ways of organizing the strategic process based on the “bottom-up” principle, conducting strategic sessions with Group divisions and functional areas, and analyzing key markets and products. “We have developed a large portfolio of ideas and projects which, in my view, should be sufficient for the next five years and beyond,” Grigory Fedorishin said. “Another of our qualities is the sustainability of our business model. The fact that it has been possible to realize the objectives of the previous strategy in spite of such extreme changes in the market over the course of the last five years is a testament to the quality of our assets and to the quality of our team in sustainability terms.”

Four key areas for development have been provisionally specified: high-efficiency production and processes, a world-class sales portfolio, further cementing of our powerful advantage in terms of the production cost of our steel, and leadership in sustainable development and safety – this is the same goal that we set for the present five-year period, and it will be transferred unaltered into the next strategy. “We have established benchmarks for our company in different areas that reflect our best shape – the way that we have performed in our best months. Consequently, we know that this shape is attainable: whether it relates to our consumption rates, productivity, or maintenance downtime. We have discussed this with everybody responsible for these processes. These targets have not been imposed from above – every manager has acknowledged that they can be met. It will be hard, because it’s difficult to stay in top form all of the time, but it can be achieved,” Grigory added.

In order to achieve our goals in these areas, we have decided to use three sets of tools available to us: operational efficiency, investment growth, and innovation. “While the first two are well known to us, the third, innovation, is the newest and most challenging area. We have seen the emergence of all kinds of innovations; Sergey Likharev’s integrated supply chain management program, the scheduler for production and sales discussed by Ilya Guschin, Dmitry Kolesov’s maintenance management system, developments in distribution, a new sales channels service, and product and digital innovations,” Grigory pointed out.

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and a Modeling Center under NLMK Group’s subdivisions.

As part of the session, Co-Innovation Lab Head Kirill Sukovskiy gave a talk on “Financial robots.” The Lab itself is a project that NLMK has been developing for over six months now in collaboration with IT company SAP. NLMK was the only company with whom SAP were prepared to work in a partnership of this kind. The first two ideas that our developers worked on this year were in the currently promising field of machine learning. Kirill and his colleagues succeeded in teaching computer models to compare invoices with bank statements. In a very similar vein, a project to forecast cash flow was adopted for NLMK Group’s finance team. After analyzing historical data on how counterparties have paid in the previous period, the computer was able to predict with 80% accuracy when a counterparty would pay their next invoice. A computer was able to predict with 80% accuracy when a counterparty would pay their next invoice. A computer was able to predict with 80% accuracy when a counterparty would pay their next invoice.

In order to progress to the next level, a deeper integration with strategic partners and the implementation of an integrated supply chain management system was required. A management delegation from partner group UCLH was invited to the strategic session to discuss this project. Representatives from Freight One, which specializes in railway transportation, and transport holding T. A. Management, which specializes in maritime cargo transportation and port terminal management, spoke about the specifics of their businesses. Session participants then formed groups to discuss opportunities for synergy with logistics partners. The best ideas proposed by NLMK Group team leaders will be studied in detail and integrated into Strategy 2022, which is presently being put together.

**NLMK Group has been developing a partnership with global IT firm SAP for over six months**

Summing up on the topic of digital innovation, Grigory Fedorishin noted that at this stage, each of the structures presented is very much in need of internal clients, and invited colleagues from the various subdivisions to contact them with their ideas. The full transformation of NLMK Group into a digital giant remains some way off, however.

Indeed, the company presently faces a different challenge. As underlined at the session, digital transformation is not a goal, but rather a tool for achieving the ambitious targets that NLMK Group has set itself.

**Significant innovative changes lie ahead for NLMK’s logistics function,** too. Vice President for Logistics Sergey Likharev reported that in 2017, the volume of freight handled by NLMK Group stood at 72 million tonnes. He also pointed out that, as he was addressing the session, 140 trains and 15 ships were transporting NLMK cargo. Cost optimization, work to reduce the accumulation of stocks in the supply chain, and intra-group coordination were all identified as processes where significant results had already been achieved. In order to progress to the next level, a deeper integration with strategic partners and the implementation of an integrated supply chain management system was required.

Oleg Bagrin presented data from a survey conducted at the outset of Strategy 2017. The results show that the team that embarked on the Strategy believed its chances of success stood at approximately 70%. “There were dissidents who didn’t believe in anything at all – there must have been only one person who had 100% confidence,” Mr. Bagrin joked. He also emphasized that, in the common cause of realizing Strategy 2017, it was not just the contribution of individual people that was important, but above all the contribution of the team that our large, international company represents: “I’m extremely grateful to my team for this contribution, and most importantly for your engagement and for your capacity to rethink and to sacrifice some principles and convictions which were perhaps mistaken. The willingness to rethink, the willingness to change – these are the qualities for which I’d like to thank you the most. The most important outcome of this Strategy is that it is not about the past, but about the future; we have succeeded in creating the best team in the steel industry, without dissidents or skeptics, which will continue, calmly and confidently, to move forward. This is the most important outcome of our Strategy.”
The current strategic cycle is only just drawing to an end, and the goals of Strategy 2017 are close to being fulfilled. What, in your view, are its key outcomes?

I can single out two in particular: an internal and an external one. The first is that efficiency has become a part not only of NLMK Group’s strategy, but also of its culture. Engaging people at numerous different levels has yielded thousands of projects and initiatives. It has also changed their attitudes towards their own performance, and to the Company’s performance. People are eager to do something; to make a change and improve things. It’s not just about efficiency in economic terms. These engaged individuals are having a very direct impact, for example, on occupational safety. The result is that, within the five-year period that we are currently wrapping up, the balance between those factors which are manageable and those which are not has clearly shifted in favor of the former.

There has been an external change too, in the form of a significant increase in the Company’s competitiveness. This has improved in all aspects: the efficiency of production and processes, the qualifications of our employees and management, our product portfolio and quality, and our financial situation and stability. These structural changes are the foundation on which we will implement the next stage of our strategy.

What are the outcomes of Strategy 2017 for you on a personal level? How have you changed during this time?

Everything I’ve said above can be applied to me personally in equal measure. It’s a shift in the balance between the manageable and the unmanageable, accompanied by a sense of just how much you can change, and build on an already very strong platform – all of this has come about in the space of the last five years. And for me, the Company is a place where these kinds of positive changes and professional growth can happen.

Is there a sense that the potential of the company and its staff has increased? Or have we simply gained a better understanding of ourselves and our capabilities?

I’d have to say it’s the second. You know, it’s like when a child learns something, develops and starts achieving ever more impressive results. But the child in this case – that is, the company – was gifted to start with, and we’ve simply learned to find a common language, to understand its potential and how we can help it develop better.

How difficult is it to make changes in a company as big as NLMK Group?

Change is never easy. In Jim Collins’ book Good to Great, he compares change to a flywheel which is very heavy and takes a long time to get turning. But once it starts turning, it gains inertia, and this makes it difficult to stop. Over these last five years I’ve observed this flywheel in action at NLMK Group. To begin with, it stalled; not many people understood why all this change was necessary, and whether it was even possible. But at some point a feeling emerged that this was it: the right course had been chosen, and it was already too late to alter it, even if you wanted to.
get a hold of it and find a balance between the employee's interests and those of the company, then you’re already there. The most important thing is for somebody to be able to see the point of what they are doing and the results of their work.

WHAT HAVE YOU NOT SUCCEEDED IN DOING AS YOU HAD HOPE D DURING THIS FIVE-YEAR PERIOD? There’s a way of answering the question “Do you have any shortcomings?” that goes along the lines “Yes, I only know two foreign languages.” I’ll try to answer in a similarly positive manner. This five-year horizon isn’t our only chance to get things done. There are opportunities that are simply being pushed ahead into the future, and in the meantime there’s useful experience to be gained.

For example, we had planned more aggressive development within Russia, including with respect to premium products. This had to be postponed against the background of a weak market. In the next strategic cycle, if we see growth again, then we’ll return to this objective. Russia is our “domestic” market, and strengthening the Company’s position on it will always be a priority. All in all, we viewed growth very cautiously at the early stage of the strategy: the Company wasn’t in the best shape by 2013, and market conditions were also negative. That’s why we focused on growth from gains in operational efficiency.

At the same time, we have accumulated a significant portfolio of projects that we will be able to return to when the conditions are right – we call these “postponed opportunities.”

WHAT OBJECTIVES WILL THE UPCOMING STRATEGY 2022 INHERIT FROM THE CURRENT STRATEGIC CYCLE? Emulating best practices in the field of occupational health and safety will undoubtedly continue to be an independent strategic objective. This is a system that demands constant attention and updating. We are presently thinking about how to perfect it further.

Improving operational efficiency is one part of our strategy that remains relevant under any market conditions, and which ensures long-term development and enables the Company to retain a leading position in the industry. We are setting ourselves the goal of achieving an impact from improving efficiency over the course of the next five years that is comparable to the impact achieved under Strategy 2017.

In spite of the results that we have obtained in this area, the company still has significant internal potential for further increasing efficiency. One of the key challenges for the new stage of the strategy should be identifying this potential using new, more complex tools. In 2016 we began a new phase in the development of the NLMK Production System. This was oriented primarily towards people – training, new management skills, and changes to team relationships. Over the course of the next five years, the new system will encompass all sites, second and even third time round for some.

In time we plan to use tools which require a new level of cooperation and integration. For example, a major component of this involves supply chain management and integrated production planning. We also believe that there is significant potential for increasing efficiency by using digital technologies to analyze the huge quantities of data available from production processes.

HOW IMPORTANT A ROLE WILL DIGITAL TECHNOLOGIES, AND BIG DATA IN PARTICULAR, PLAY IN STRATEGY 2022? The potential for the use of data at NLMK Group companies is very high. A key feature of steelmaking is that it involves a large number of parameters which determine the characteristics of the process and the product. This distinguishes us from many other sectors which have simpler and more linear processes, and a much smaller quantity of data.

Our goal is to create a data map in which production is covered by a detailed system of analytics: all data will be accessible, structured, interlinked, and in active use. In my view, particularly interesting projects have the potential to arise at the point where different production stages intersect, where the exact properties of the end product can be predicted; not at the point of rolling, let’s say, but at the blast furnace or steelmaking phase, where the machine will be instructed whether or not to let the steel through to the next stage. When we succeed in uniting all stages into a single production chain, the effect will be many times greater.

WON'T BIG DATA KILL OPERATIONAL EFFICIENCY? IF COMPUTERS WILL BE ABLE TO INDEPENDENTLY PREDICT PRACTICALLY ALL PROCESSES AND PROMPT OPTIMAL SOLUTIONS, WILL THERE BE ANY NEED FOR EMPLOYEE INITIATIVES? Digital technologies aren’t a goal in themselves, but a tool to be used in combination with others; including an efficiency management system. There’s still a long way to go before computers will be able to predict processes with such high accuracy that we’ll decide to trust them with our dangerous production systems. And during this time there will be a lot of interesting work that wasn’t previously around: for example, machines will need to be taught by an operator. I hope that this will attract into the steel industry yet more young specialists who attach a lot of value to being able to use digital technologies in the real world and see real change being made.

ARE INVESTMENTS IN IT BECOMING A MAJOR EXPENSE? Investment in IT technologies actually became a substantial part of the investment programme quite some time ago, and can be measured in billions of rubles. If you add up everything that we plan to do, then IT investment in the future strategic cycle will be measured in tens of millions of dollars.

WHAT GOALS IS NLMK GROUP SETTING ITSELF FOR THE NEXT FIVE YEARS AS FAR AS PRODUCTION, PRODUCTS, MARKETS, AND SERVICES ARE CONCERNED? At this stage of the strategy, we have grown by increasing the efficiency of existing capacities and creating new ones, and we will continue to do that. As strong players, we are in an excellent position for “smart” growth in those areas of the value chain where we have solid competitive advantages. We are reviewing opportunities for geographical expansion of our production and sales – based on our assets in Europe, the USA, and India, and on markets that are attractive to us, one of which is Turkey.

TELL US IN MORE DETAIL ABOUT HOW THE COMPANY WILL GROW DURING THE STRATEGY 2022 PERIOD. There are a few alternatives for increasing steel production at the Lipetsk site. It has potential for growth at existing capacities, requiring significantly less investment than would be needed to create a new production facility. But this begs the question: what do we do with the additional steel? We have analyzed the potential of our downstream facilities in Europe, America, and India and concluded that these too have opportunities for growth. I can’t rule out the possibility that the increase in the production of end products could even exceed the growth in steel capacity at the Lipetsk site. At the same time, we are not planning on expanding our commercial brands, but on strengthening our global production portfolio and making it more complex, with new coatings, high-strength steel, premium electrical steel, steel for wind turbines, tool
Developing our product portfolio is not only our choice; it is what the market demands. Consumers no longer need metal in itself so much as they need a collection of characteristics and properties for their product; for example, material from which they can make an effective electric motor or wind turbine. It doesn’t matter who is selling it, what is it called, or even, in some cases, what it costs. That’s why we will spend the next few years in close contact with our clients, striving to work with them to develop and shape their requirements so as to be able to meet those needs with our products. Simply producing steel and hoping that it will find demand is not how we do things.

NLMK’s sales service is already doing a lot to establish feedback mechanisms and communication with our clients. The next step is to work on joint projects and even joint ventures. We already collaborate on this scale with large-diameter pipe producer OMK. Steel that we had never produced before was developed “to order.”

The transparent and sustainable business processes that we are building form a comfortable and coherent business environment. The Company’s strong competitive position means stable jobs. Company growth means new opportunities for personal growth. People will be able to find themselves working in entirely unexpected, new areas, and to forge interesting new career paths. In order to realize its strategy, the Company needs skills in developing new products, in digital technologies, and in managing cross-functional projects. And, to the extent that the Company is international and will grow beyond Russia’s borders, employees will be given the opportunity to change not only the substance of what they do, but also where they do it.

Horizontal career paths, incidentally, could at some point become a necessary requirement for managers seeking promotion. That means that it will be necessary to establish cooperation especially for this client. This kind of cooperation is set to become the norm. New channels for collaboration with the consumer will emerge, such as online stores.

The most important thing is for the company to remain a leader in the industry, efficient and stable.

The world has changed a lot in the last five years. Services, cooperation between people – all of this is now influenced by new technologies, and in the next five years the world is set to change even more. It’s already clear that the model of industrial production itself will be transformed. We will see the emergence of more and more companies which straddle the divide between sectors, and which blur this divide by creating new areas of activity. On the other hand, chains are becoming more direct, intermediaries, distributors, and warehouses are disappearing, and distances between producers and end users are becoming shorter and shorter thanks to digital technology and Internet tools. Products are being changed and customized “to order.” It is very important to take note of these trends, to try them on yourself, and to implement them, changing both yourself and the sector as you do so.

It is important to understand that these channels must not be all image and no substance. Everything will be firmly rooted in the physical world. We have asked clients many times whether it is important to them to be able to track production and delivery of their products. This certainly is important to them, but what’s even more important is how long their order will take to produce and when it will be delivered. That is, clients would prefer to receive their order in a week’s time without being able to track it, than to wait a month for it but be able to see where it is in the world.

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Konstantin Arshakuni on who within the company is building plans for the future, and how.

reparations for the new strategic cycle began long in advance of its launch. As far back as 2015–2016, senior managers were examining promising projects at our main asset, the Lipetsk site. They considered what could be done with our free (spot) slab portfolio, and the potential for growth in slab consumption on foreign markets. They looked at numerous options for how we as a company could grow: by producing more slabs, by building a casting and rolling complex (CRC), which would make it possible to convert cast steel directly into hot-rolled flats, or by producing new high-value-added products, and which ones exactly, among other possibilities.

Following this, a full cycle of strategic sessions got under way at each site: an internal discussion for the site’s employees only, and an external one involving representatives from major global companies specializing in equipment production, steelmaking services, and other fields. These sessions yielded thousands of ideas for the Group. A special tank was even installed at the Lipetsk site to collect the ideas generated there. It was filled to the brim within a day. Everybody was involved in coming up with ideas: representatives from major and auxiliary production sites, technology and sales departments, and representatives from other functional areas. Everybody made proposals as to what could and should
be done within their own area of responsibility. All of our contractors shared their views on the direction that we should be taking and how they could help us. We were sure to ask everybody: from our vendors, who sell steelmaking equipment, to consulting companies, who carried out technical or market analyses for Sberbank CIB, all of the ideas were taken on board and discussed. At the other end, all of the ideas that filtered through were elaborated and our European sites, as well as long production of flat products at Lipetsk was given to plans to develop concentrate and pellets. Consideration which we need to produce yet more additional production volumes be there, and do the proposed projects satisfy economic efficiency criteria? The Group has adopted this way of working with all manner of potential development ideas. In summer 2018, all development projects proposed by our contractors were passed to the Strategic Planning Committee (SPC). The SPC discussed key development projects for upstream production at the Lipetsk site and a large block of issues concerning Stolensky, which we need to produce yet more concentrate and pellets. Consideration was given to plans to develop production of flat products at Lipetsk and our European sites, as well as long products, electrical steel, and thick plate in Europe. In 2018, the SPC will be presented with projects for developing NLMK USA and its functional areas, including energy, sales, logistics, and so on, together with a consolidated Strategy 2022.

Much time has been spent working together with our international companies, which have seen practically no major investment projects in the last five years. This work required detailed discussion of all aspects of the proposed developments at these sites, and we have made many visits to them to see things for ourselves and communicate with the local teams. Our strategy for our international companies was the subject of a special session that took place in May 2017, which included consideration of specific presentations of investment projects, together with preliminary analyses and an assessment of their economic impact. This is a process that we have guided, while simultaneously arranging for research to be carried out to provide us with a clear impression of the strategic and economic feasibility of the development projects proposed by our European and American colleagues. How will the proposed projects impact on the overall vector of the Group’s development, will the demand for additional production volumes be there, and do the proposed projects satisfy economic efficiency criteria? The key distinguishing feature of Strategy 2022 is that it has evolved to be more balanced. Strategy 2017 was to a large extent focused on operational efficiency and developing our raw materials base. The Company is now ready to expand, in terms of the production volumes of both steel and its own raw materials, as well as in terms of sales volumes and significantly improving its product range. The next five years will see us focusing on the development of niche products: the speed of change in our highly volatile world is increasing at a rapid rate, transformations are taking place constantly, and it is essential that we remain at the cutting edge of technology and trends, including with regard to breakthrough innovative products. Overall, analysis of the market and current trends in the steel industry is providing us with a positive picture of the years leading up to 2022. We are highly confident that we will successfully implement those projects currently regarded by the Company as priorities by the end of the new strategic cycle. Neither is 2022 our final horizon; NLMK Group is already looking beyond this, and projects which aim even further into the future are already being considered. And one of the challenges of Strategy 2022 is to leave space for these to be effectively implemented.
NLMK 4.0

EXPERT TEAMS AT THE READY

Bruno De Cooman on the first results of NLMK’s R&D function.

ONLY SEVERAL MONTHS HAVE PASSED SINCE NLMK HAVE YOU GOTTEN YOUR NARRATIVE ON THE COMPANY AND YOUR MISSION IN IT?

We are definitely building our research and development function in a rather exciting environment. NLMK Group is very driven towards tangible, quantifiable results, and that’s a perfect approach when one is building an R&D function from scratch. In this situation, first, we’re going to gauge the need for research and then we’ll build the research function out of this need. Basically, it means that the research will be defined by corresponding projects. So what we have done first is build a core group of project managers, because those are the people who’ll organize and bring to fruition the projects that come to us. Each of them is an expert in a specific field, but we’re also interested in their ability to be flexible and act as project leaders. Then, with their help, we will build what we call the resource teams of experts. There will be four of them: computational simulation team (these are the people who’ll build theoretical models of all processes within a project); physical simulation team (they will do lab experiments, lab castings, lab rolling and tests in materials, that will allow us to do a lot of experiments on a small scale before we do anything in the plant); and then we will have the advanced microstructural analysis research team, because nowadays we need to have a very good understanding of what happens inside the material if we want to move forward. Finally, we’ll be creating a competitive intelligence team, which will be tasked to do competition watching, patent analysis, investigating trends in the industry so that we are not only doing research in our laboratory, but also following and leveraging the technological research of our global competitors.

FOR INTELLIGENT INDIVIDUALS WHO ALSO HAVE PERSONALITY TRAITS THAT MATCH THE NEEDS OF THEIR JOB, WHO ARE WILLING TO TAKE ON RESPONSIBILITIES IN ORDER TO MOVE THEIR PROJECTS FORWARD. SO WE WERE, AND STILL ARE, QUITE SELECTIVE. I DO, HOWEVER, KNOW THAT OUR COMPANY HAS MANY TALENTED INDIVIDUALS. I AM SURE THAT WHEN WE START RECRUITING AT THE EXPERT LEVEL, WE WILL FIND PLENTY OF HIGHLY MOTIVATED CANDIDATES WITHIN NLMK GROUP.

TELL US MORE ABOUT THE TOP-PRIORITY PROJECTS FOR THE R&D FUNCTION. BROAD INDUSTRIAL EVOLUTIONS TRIGGER THE EVOLUTION OF STEEL ITSELF. WILL WE BE ON THE CUTTING EDGE OF THIS PROCESS, MASTERING NEW STEEL GRADES?

Yes. Many things are happening these days, for instance, with the car industry. And it’ll be interesting to have somebody make a good study on electrification and what impact it has on car bodies. I think there are lots of opportunities there to look at an e-mobility for steel. Obviously, electrical motors require special steel and it is a very lucrative business for NLMK. I am sure that many of affordable electrical cars will be made of steel. After all, if truly advanced materials, such as carbon fiber reinforced composites (CFRC) are used to make car bodies, such cars will become very expensive, and only few people would be able to afford them. So we may end up in a situation where the car of the future actually requires more steel than today’s car. And it’s important evolution to notice today. For instance, the latest Tesla model has become slightly less expensive and starts at $55,000: its body is not made from aluminum sheet but steel. The new Audi A8, a car that used to make from aluminum sheet but steel.

IN THE PREVIOUS ISSUE OF THE MAGAZINE WE ANNOUNCED THAT YOU ARE WRITING BRIGHT MINDS INTO YOUR TEAM. DID YOU MANAGE TO FIND THE RIGHT CANDIDATES?

At this stage we’re wrapping up the recruiting. We found three engineers within our own company from Lipetsk: Oleg Goloboy, Sergey Golovko, and Alexander Siritia. Two other project managers are external candidates. One of them, Alexander Siritsa, recently joined our team, and we will be filling the fifth position soon. We have set very high requirements for these positions of project managers: the candidates have to have a PhD or Dsc to be able to contribute to high quality research. They also need to be able to speak English fluently to communicate with customers and colleagues from Europe or America. We are looking for intelligent individuals who also have personality traits that match the needs of their job, who are willing to take on responsibilities in order to move their projects forward. So we were, and still are, quite selective. I do, however, know that our company has many talented individuals. I am sure that when we start recruiting at the expert level, we will find plenty of highly motivated candidates within NLMK Group.

I THINK THERE ARE LOTS OF OPPORTUNITIES THERE TO LOOK AT AN E-MOBILITY FOR STEEL.

CAN YOU NAME SOME SPECIFIC PROJECTS YOU ARE READY TO PROCEED WITH? ONE OF THE THINGS WE’RE REALLY SUPPORTING IS THE ZAM PROJECT (HIGH-TECH ZINC–ALUMINUM–MAGNESIUM COATINGS), THAT’S AN ABSOLUTE MUST FOR THE OUR COMPANY TO GET INTO. MANY STEEL PRODUCTS ARE COVERED WITH ZINC. IN THE PAST, PEOPLE FOUND THAT IF YOU ADDED SOME ALUMINUM, YOU COULD GET EXCELLENT CRACK-FREE BENDING AND ACOUSTIC PROPERTIES. THEN, IF YOU ADD THE ALUMINUM LEVEL IN THIS ALLOY WAS QUITE HIGH. OVER THE PAST DECADES, RESEARCH WAS DONE ON TERNARY ALLOYS OF ZINC, ALUMINUM AND MAGNESIUM. THESE ALLOYS HAVE A TERRIBLE CORROSION RESISTANCE, AND YOU CAN USE THEM FOR THE CONSTRUCTION INDUSTRY AND CAR INDUSTRY. THAT’S A HUGE TREND GLOBALLY.

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I THINK THERE ARE LOTS OF OPPORTUNITIES THERE TO LOOK AT AN E-MOBILITY FOR STEEL.
need for research support, we will be involved. Other projects are in high-permeability steels. At this stage, our support is limited, because we do not have laboratories yet.

**WHERE DO YOU EXPECT TO HAVE THEM AND WHERE ARE THEY GOING TO BE LOCATED, IN LIPETSK OR IN BELGIUM?**

Right now this investment project is being developed. Considering that Lipetsk is the core production site of the Group, we feel that the main lab equipment should be located there. We are also considering the option of having the computational simulation team in Belgium, because there it’s easier to be closer to the software developers that make programmes we’re going to use, and there’s more expertise in that field.

**IN TERMS OF COMPUTATIONAL SIMULATION, ARE YOU PLANNING TO ALIGN YOUR PROJECTS WITH THE BIG DATA DEPARTMENT THAT IS EMERGING RIGHT NOW IN THE COMPANY?**

Yes, we are definitely looking into it. But it’s also important to understand the difference of these two areas. With Big Data (the word speaks for itself), you look at massive amounts of data that’s been generated in a process using the AI approach. Our computational team will be concentrating on modelling. Obviously, at one time or another, there’s going to be meeting of minds, because if you analyze the data from a blast furnace in great detail, it has to be related to what’s going on in the blast furnace. And what we do is modelling what’s going on in the blast furnace. So we’re in contact, and there should be convergence.

**LOOKING A BIT FURTHER INTO THE FUTURE, INTO THE COMPANY’S STRATEGY FOR THE NEXT 5 YEARS, WHAT WOULD YOU SUGGEST AS YOUR MAIN PROJECTS, MAIN IDEAS IN YOUR FIELD?**

At this stage, the research will need to be more closely involved with our customers to develop new products. And I think through research we can do this. It could, for instance, mean that we will try to work with automotive companies on advanced steel grades. One of the interesting evolutions that’s happening in the global industry is called “early vendor involvement” (EVI). This means that a steel company gets involved with a car company at the design stage of a new model to make sure that they can provide the right types of steel for certain parts. EVI makes sure that the car companies select the right steel-based solution. It could become the basis for long-term collaboration that cements the connection between the steel industry and its main customers.

**THE POWER OF BIG DATA**

Big data is the key to future gains in efficiency.

Analysts at global market intelligence firm IDC, which specializes in studying the world’s information technology and telecommunications markets, predict that the volume of data worldwide will have expanded ten times by 2025, and that a large amount of it will be generated by business. Experts today are in agreement: the concept of big data is set to become the key pillar supporting a new wave of innovation, and with it, global growth in productivity and competition.

These technologies are now being actively developed in Russia in telecommunications, banking, and the public sector. Unlike the telecommunications or banking sectors, NLMK possesses an enormous volume of data from its production lines. This includes terabytes of information about product production, the properties of materials, and how these are obtained. All of these data can be processed, analyzed, and applied to improve existing technologies. In practice, however, no more than 5% of the data collected is presently used.

In 2017, the Company created a directorate dedicated to data analysis and modeling. Andrey Arshavskiy, who heads the new area, talked to NLMK Magazine about what it is working on and what objectives it has set itself.

**WHAT ARE THE CHALLENGES FACING THE DIRECTORATE FOR DATA ANALYSIS AND MODELING AT THE MOMENT?**

In a nutshell, we are hoping to use modern analytics, machine learning, and optimization algorithms to reduce production costs and improve the efficiency of the Company’s production and business processes. We have studied NLMK Group’s production sites and formulated around 50 challenges with a total economic potential that can be measured in billions of rubles annually. We are already working on five of these challenges, and are set to begin work on another five in the near future.

In order to work effectively, we need to be able to establish a highly professional DataScience team, and to resolve issues with data accessibility and quality. Although we have succeeded in forming the nucleus of a team, there is presently a battle on the market for specialists in this field, and our requirements are significantly above the market average. Those joining us need to take on complex, atypical challenges, and it is vital that they quickly immerse themselves in the subtleties of the production process. We are also working to create an infrastructure for storing and analyzing the large amount of data gathered at different stages of the steelmaking process. In order to be able to generate economic benefits from these data using “advanced” analytics and optimization, we require a special class of computing resources. These will not only gather data from high-resolution automated process control (APC) and manufacturing execution systems (MES), but also process them in parallel using machine learning technology.

**HOW IS THE BIG DATA MODEL APPLIED TO STEELMAKING? COULD YOU TALK ABOUT SOME OF THE PROJECTS THAT YOU’VE ALREADY IMPLEMENTED?**

We began working on projects this summer. We are in the process of carrying out pilot tests for one of them, a project to reduce on the consumption of ferroalloys in the steelmaking process at NLMK Ural in Revda. The challenge for the team is to develop a model which will permit maximally precise control of ferroalloy consumption, in order to minimize use while sticking to the technical heat parameters. We gathered historical heat melting: heat assignments, temperature settings, data about the outcomes of
between late 2017 and early 2018. An impact from an integrated model can result in savings, but we are hoping for a bigger picture. This has so far added up to RUB 10 per tonne of steel. This has so far added up to RUB 10 per tonne of steel. This has so far added up to RUB 10 per tonne of steel.

The ferroalloys during secondary steelmaking help to control the process of adding alloying agents, and the resulting chemical composition of steel at the end of the process. A typical task is to achieve a certain level of quality and quantity of the end product. We are working on improving the quality of the end product.

The model is presently being implemented on the premises of the Lipetsk steel mill. The model returns a non-zero result, then we try to build a model based on the data available in order to satisfy ourselves that a solution is workable. If the model returns a non-zero result, then we begin full-scale processing, testing, and implementation.

We are also developing similar mathematical models for optimizing ferroalloy use at the Lipetsk basic oxygen furnace shop. In addition, we are carrying out a project to seek out the root causes behind seam, rolled crack, and other defects that occur during the smelting and hot-rolling phases. Projects have also been launched to optimize CHP operation and to reduce the amount of natural gas consumption.

The three projects to be implemented in the near future are:

1. To launch on an industrial scale a model to save on natural gas consumption. The projects that I’ve mentioned here have either recently got under way, or are in the pipeline for early 2018. Mathematical modeling is new not only to NLMK, but to production companies generally. We need to start by gathering experience, before we move on to large-scale development of solutions across a full range of potential areas.

2. To develop a model to determine the task, determining the list of required data, obtaining access to the data, the key stage of analyzing the data, machine learning and building the models, developing software for industrial use, piloting the results, fine-tuning following testing, and implementing the solution, including integrating it with existing IT and APC systems. This is followed by a period of continuously honing and optimizing the model. In order to reduce the risk of not achieving the desired result, we include a “null” phase in the project – the pilot stage. During this phase, we try to build a model based on the data available in order to satisfy ourselves that a solution is workable. If the model returns a non-zero result, then we begin full-scale processing, testing, and implementation.

WHAT OTHER PROJECTS IN THIS AREA ARE SET TO BE IMPLEMENTED IN THE NEAR FUTURE?

Of the 30 initiatives identified that I mentioned earlier on, we selected ten for implementation. From our preliminary calculations, we anticipate the economic impact of these projects to be around RUB 3 billion (~$52 million). The projects include several initiatives at the Lipetsk site, VIZ-Steel, and Altai-Koks.

One project will involve improving productivity on the hot-dip galvanizing lines by increasing the speed of the strip at the facility, while preserving the specified physical properties of the end product. We are planning to increase productivity at Mill 2000 at the Lipetsk site by using a selection of speed settings and regulating the rate at which slabs are released from the continuous reheating furnaces. At Altai-Koks we will be working on increasing the cold strength of coke. At the Vierchomer NLMK sites, we are planning to use a complete overhaul of the pricing model to achieve a reduction in scrap procurement costs.

We have begun work on predicting when blast furnaces will fail, as well as on optimizing operations at CHPs.
in 2013, NLMK Group was close to completing the active phase of building an international production chain, having ensured 100% capacity utilization of its Russian facilities. Russia, and shifted focus to boosting their operational efficiency, on organic growth of production, and on developing its niche capabilities and grow volume in these product/market capabilities. The Division has in 2013, NLMK Group was close to completing the active phase of building an international production chain, having ensured 100% capacity utilization of its Russian facilities. Russia, and shifted focus to boosting their operational efficiency, on organic growth of production, and on developing its niche capabilities and grow volume in these product/market capabilities. The Division has

**Strategic Highlights**

- **2013 Results:**
  - The Division stood up to the challenge as a result of joint efforts with the Lipetsk site, NLMK Europe Strip managed to improve the quality of slabs and plate, to grow sales, and to master the production of more advanced rolled products with high value added.
  - The new rolling stand in Donsteel enabled the plant to grow production and sales volumes, including "big size" heavy plates for its main customer segments – windmills and shipbuilding. The company enhanced its service delivery (for instance, with the rollout of "FastTrack" deliveries that demand premium pricing), and significantly improved product quality, emerging as one of the plants with the best brand recognition in the North European plate market.
  - Verona developed its HPA product offering, including heavy plate from ingots (HPHI), alloyed steel, and internally forged ingots that the plant had previously outsourced to third parties.
  - NLMK Europe Strip, and a 5 times reduction in lost time injury frequency rate over the cycle at NLMK Europe Strip, and a 5 times reduction in lost time injury frequency rate over the cycle at NLMK Europe Strip. Safety will remain our priority focus for the next 5 years as well.

- **2014 Objectives:**
  - To realize this target, NLMK Verona implemented new processes and equipment: it installed and commissioned a press manipulator, modernized its forging press, installed new austenitic and tempering furnaces for heat treatment. The new equipment and technology enabled the plant not only to expand its offering of premium products, but also to improve overall reliability of its operations.
  - To that point, the Strip and Plate Business Units in Europe were in a different phase of strategic development. While contributing to Group volume expansion by transforming Lipetsk slabs, these units were still dependent on cash injections, running at low capacity utilization rates and less efficient, and therefore facing a different business challenges.
  - In 2013, the market in Europe had not yet recovered to pre-crisis levels. With the many years of low capacity utilization and high labour intensity, the NLMK Europe Strip business was loss making and behind the Group benchmarks in Operating Efficiency (OE) indicators. So before focusing onto volume growth, La Louviere, Strasbourg and the service centers had to restore operating and manpower efficiency profitability and cut fixed costs. We And they accomplished this difficult transformation quite successfully. In early 2012, the European Strip business employed over 1500 people. By early 2017, the European Strip business had halved the number of its employees, more on services, logistics and product development, with compared to our larger competitors. We have seen the importance of knowledge exchange between units – as some units succeed, innovate or implement best practices we should be quicker in rolling out the lessons learned to other units rather than letting them discover on their own. We have also realized that any successful transformation required a full set of crucial levers. First of all, personnel should understand the motivation for the change. Secondly, people need to have very clear goals and be trained. Thirdly, people must have the tools and support necessary to achieve their objectives. And most importantly, management needs to "lead by example" for management. This gives out a clear signal to the team: the leaders are living the change they expect. It is common sense, but where we succeeded only partly, it is because we missed one of these elements. Conversely, where we succeeded, it is because we ensured all of the above.

**One of the most significant accomplishments for both divisions is an improvement in safety performance. Of course, one can never be satisfied with safety until zero accidents of any kind are achieved, but the improvement here has been really good – especially in NLMK Europe Strip with a 510 times reduction in lost time injury frequency rate over the cycle at NLMK Europe Strip.**

**What’s next for us? Our next cycle is going to be more about customer value.** We are a medium sized market player in Europe and have to be faster and easier to do business with competitors in our larger competitors. Thus, we will concentrate our efforts a lot more on services, logistics and product development, on innovation and new product capabilities. We will also continue to improve safety and operating efficiencies – especially reliability – this is in our Group DNA!
All of these changes in the way we approach our business, whether it is operational efficiency or safety, need to become embedded into our culture. Once they become part of our culture, we will continue to get better.

**HOW WOULD YOU EVALUATE NLMK USA’S PERFORMANCE?**

If you look back at where we were in overall performance five years ago vs. where we are today, there has been significant improvement in the overall U.S. operations.

The consistency, cost management, productivity, safety performance have all significantly improved at NLMK USA. We realize that we have to go to the next level in improvement to sustain the U.S. operations for the next five years. It is going to entail improving our quality, continuing to drive our operational efficiency program and increasing our product offerings because while we are doing all of these, our competitors are striving to get better as well. We believe that through customer service and our commercial efforts we have positioned ourselves to take additional market share in the next five years.

**WHAT HASN’T NLMK USA ABLE TO ACCOMPLISH AND WHY?**

While we have accomplished a significant amount of overall cost efficiency improvements and cost reductions, we have had some equipment failures. So, when you look at your efficiency, some of our working ratio numbers are not where we need them to be. Although we improved the stability of the operations, there is still room for productivity improvements. I also think there are some additional process changes that we can make that will help reduce our cost in operations. So, we will continue to strive for that in the next five years.

The nature of the equipment that we run, the age of the equipment, the processes that we use lead to several quality issues that we have to get over. We have recognized that as a limitation that we are going to be addressing in the next five-year strategy.

When it comes to safety, what we did not accomplish is that we did not get to zero accidents. This is always the goal when it comes to safety. We do not want any of our workers to be injured. We want people to show up, contribute to the organizational goals and go home safe to their families. Until we get to that zero accident level, there are obviously failures in the system, and we need to continue addressing those failures.

From a sustainability standpoint, we always look for ways to leverage the U.S. business with what the Group brings to our global operation. NLMK has a market leadership in terms of low cost slabs. Coupled with NLMK USA’s business model of rolling slabs, it creates a very strong strategic link for the group. When we look at it, the global advantages become clear, and we should think of ways to find more and more synergies within that global footprint in the future.

**WHAT LESSONS DID NLMK USA LEARN?**

Any time you try to change culture in an organization, you have to be clear on the direction you are going and be willing to stay with it to achieve your goal. In working with the entire group, there have been changes that we made and then had to make additional changes midstream, which was confusing for the organization.

When you are trying to change culture and the way you approach your business, the lesson is: you need to have a clear, thought out direction everybody is onboard with. Then you proceed down that path, instead of deciding midstream that there is a different way of doing things and changing that direction.

**WHAT ARE YOUR PLANS FOR THE FUTURE (STRATEGY 2022)?**

In Strategy 2022, we focused on NLMK USA’s path forward. Strategy 2022 is based on productivity and quality improvements that will allow us to continue to grow. We focused on the markets that we cannot penetrate today due to capabilities and qualities of our products. We have identified these new markets where we will be able to take the volumes to the next level.

We have also developed projects to make our operations more efficient and improve our ability to make higher valued, better quality products more efficiently, which ultimately adds to the bottom line of NLMK Group.

As we continue to grow this business, our plans are to create an environment where people see that growth and where they are excited about looking for efficiency and productivity gains. We want to be a company where people are proud to work. A company where people feel valued and can earn a good living with good benefits. We are also looking to be a company that is a responsible social partner with the local communities where we operate.
One of the key goals of Strategy 2017 was to achieve a leading position in operational efficiency. Even though a significant part of the Strategy consisted of major investment projects, it was through operational efficiency projects that we managed to exceed our targets. The most significant of these included our contribution to increasing production volumes: hot-rolled steel, steel, and steel coil. These projects included our contribution to increasing operational efficiency, including our focus on increasing production volumes: hot-rolled steel, steel, and steel coil. This resulted in a 10% increase in our international divisions, where we’ve seen a reverse in operational efficiency indicators. As a consequence, in the next strategic cycle we’ll be setting ourselves some quite ambitious goals; for example, next year we are planning to close the gap that has opened up over this last year before pushing forward.

The very first step taken under the Production System was to establish a system of coordinates for operational indicators, after all, in order to influence these, it was necessary to understand which were key and which were not. And, of course, there was the use of lean production tools. As we approached the end of the cycle, two preconditions came into being which nudged us into a new developmental phase. First of all, we had tested the Production System tools and satisfied ourselves that they were efficient, and that we needed to make the transition from an approach focused on “implementing tools” to one based on “using tools to solve business challenges.” Secondly, we had already implemented the majority of the ideas that had been proposed by the engineering and technical services and by division and site heads. We needed to harness the potential of rank-and-file employees. What do I mean by this? Our operational efficiency program was based on major projects with a significant economic impact. Today, we are counting on projects with medium and small impacts. You can implement one large project worth a million, or a million small projects each worth a dollar; either way, you gain a million. That is why we are now ready to move from the bottom up; at this stage, our Production System allows us to involve more mid-level managers, line managers and workers in the constant search for potential improvements.

For this to work, people need to identify the problems that they encounter in their sections and the issues that they deal with every day, and learn how to recognize wastage. Our Production System will then help them to choose the tools they need to solve these problems.

Several Production System tools have been in operation at the company since as early as 2013; these include control cards, downtime analysis, and defective product analysis. Subsequently, more lean production tools emerged and, for the company to receive the maximum benefit, it was necessary to apply these as much as possible to business challenges. But here we encountered a certain amount of resistance from people, which we needed to address.

In mid-2016 we took the decision to move on to the next stage, and pilot a new developmental phase of the Production System at NLMK Kaluga.

We began to change our approach to rolling out Production System tools and to developing optimization programs. We demonstrated how to use tools to solve specific problems in the shops. Line managers worked together with staff to make sure that they appreciated their contribution to the end performance of their shop and the company, and to encourage them to get involved in proposing ideas and solutions for the problems that they faced personally. And in Kaluga we managed to achieve a fairly significant financial impact.

The Lipetsk site and at Stoilensky we have just entered the transformation phase. We plan to use the Production System at these sites to generate gains of more than RUB 3 billion (~$52 million). At this new stage of development, we are aiming for results not only in terms of “what” but also in terms of “how.” That’s why it’s important for us not just to achieve a financial impact, but also to establish a teamwork-based system at our sites and to build a partnership between production sites and the operational efficiency team. This is the only way that the Production System will stop being a collection of projects and start being a real system.

Not everything has been quite such a success, unfortunately. For example, we haven’t found it as easy as to start working with our international divisions, where we’ve seen a reverse in operational efficiency indicators. As a consequence, in the next strategic cycle we’ll be setting ourselves some quite ambitious goals; for example, next year we are planning to close the gap that has opened up over this last year before pushing forward.

Strategy 2017: The Results

We believe that we can achieve these goals because of the significant gains in ability that our team has made. We are now working more successfully with the different divisions. We have a project management system in place. And although our work was often misunderstood by division heads when we first started, we have now succeeded in establishing a cooperative relationship and in agreeing that more can be done to improve processes. We have used this understanding to set new goals for the next strategic cycle. Together with the divisions, we have come up with a technologically achievable standard for further improvements. After examining the statistics and identifying the best results and the conditions that were in place when these were achieved, we calculated a final figure for productivity and compared it with what we have now, asking the question: if we reach this level, how much money will it mean for the company? It is in this way that we assessed our internal potential, and used it as a basis to formulate operational efficiency goals for Strategy 2022. We will also be using the next strategic cycle to try out more complex waste elimination tools within the Production System, including launching a Six Sigma program. This involves the application of statistical analysis methods to improve processes. We have already gathered a sufficient amount of statistical data on different indicators to be able to do this. We will now go out to sites to show people how to process these data and teach them to influence operational results. This isn’t Big Data, but the principle is the same – it’s statistical analysis for the purpose of improving the figures. We are also planning to create an IT platform for an ideas bank – another example of infrastructure created to support “bottom- up” projects. We intend to launch the ideas bank in early 2018. Our objective for the next strategic cycle is to engage people in active participation, every employee should have at least one idea. So, in five years’ time, we should see a completely different company with a radically transformed production culture.
In the 2013–2017 strategic cycle, our service provided solutions to three key challenges. Firstly, we had to refine projects in the raw materials section of the strategy. In particular, we had to propose solutions for increasing concentration at Stolensky that were optimal in cost terms and efficient in terms of technical and economic indicators.

Secondly, we had to create a real factory for generating investment projects within the NLMK business system – an organizational machine employing finely-tuned technologies and applying best practices and tools to consistently achieve its targets. After all, what do we have before us? We had disparate subdivisions, or individual leaders with no unified standards for cooperation. All project management was concentrated in the hands of a single person – a vice president, or the first vice president, who would essentially make all the relevant decisions. For a company of NLMK Group’s size, this was an ineffective way of doing things. It was too subjective, with too small a throughput. That’s why we needed to standardize the project generation process and make it work effectively, with guaranteed results. Thirdly, and finally, we had to implement more than a hundred investment projects with planned deadlines and confirmed budgets. These projects had been designed to achieve three out of four of the company’s strategic goals: to develop a world-class resource base, to lead the way in operational efficiency, and to ensure key positions in strategic markets. Those are three separate projects, and any significant success could well have put the soundness of Strategy 2017 in doubt. Today, we have good reason to be proud.

Within the last four years, we have managed to achieve almost all of these, with 99% of investment programs fulfilled. Technically complex challenges and even those requiring unique creative solutions have been resolved. For example, we had to find a way of radically reducing the cost of a project to upgrade the Stolensky beneficiation plant without compromising the main objective of increasing plant capacity. The previous solution had been to go ahead and build a new section there.

Instead, we decided to introduce new High Pressure Grinding Roll (HPGR) technology into the plant’s existing sections. In order to bring in this technology, which was new not just to us but to Russia as well, we divided the project into two stages and began by installing the HPGRs in two of the four sections. Some mistakes were made in the planning phase, but we were quickly able to identify and rectify them.

The outcome was that we achieved the desired results in terms of capacity, efficiency, and cost. Capacity in each of the upgraded sections (we began by installing HPGRs in sections 1 and 3) increased by 15.5%. By the end of 2017 the same technology was in operation in sections 2 and 3. As a result, concentrate production at the beneficiation plant increased by almost 3 mtpa. This means that we now process 37 mtpa of ore (5 m more than in 2013) and meet 100% of NLMK’s ore needs ourselves.

Our project to build a pelletizing plant required different skills. Here, the challenge was not so much about creativity as it was about organization and management. At the start of Strategy 2017, the project was some way from the active implementation phase. The almost $700 million facility was scheduled to go online in just three years’ time, and we only had 5% of the working documents, while negotiations for the supply of equipment had reached a dead end. This was, perhaps, the largest and most challenging project of them all. But we succeeded in relaunching it, and entered the active construction phase in May 2014. Our successful completion of the project within the planned timeframe and the allocated budget is a testament to the effectiveness of our approach to project management, and to the reliability of the “investment project factory” that we needed to establish. In a sense, two factories were built at the same time.

We opened a network of offices devoted to investment projects in every division, including Europe and the USA, and trained more than 2,000 specialists within the company in project management standards. We broke the investment process down into implementation phases, explaining to employees what needed to happen in each of these and staffing the system with people. We have set up a system for monitoring project implementation, assigning a “gatekeeper” function to an investment committee made up of managers from different subdivisions. The involvement of higher-level managers has provided the process with additional force. All of this has allowed us to create a project management culture at NLMK, and to reduce the time taken to put investment projects together, develop them, and implement them. The successes that we have achieved in all of our endeavors are due to the fact that we have formed a team of the right people.

While we have been successful as a team, not all members of the team have yet managed to improve their skills to the desired level. This will come with time, however. For the most part, our team has made a big leap forward in skills and gained a great deal of experience; what is required of people now is more independence, leadership, and a readiness to demand more of oneself – in HR jargon, we need “self-starters.”

Unfortunately, the development of the Oracle Primavera P6 system hasn’t succeeded in making every one of our dreams come true. The system has been completed, and it works. It has even been acknowledged as the most complete and functional in the Russian steel sector. But it’s still being used by specially trained managers and by analysts from our biggest projects, and ideally we’d like to see it being deployed more widely, and its functions used to forecast implementation paths for all of our projects and alert us to deviations from them in the early stages. We haven’t succeeded in doing this yet, but we’re working on it.

The main lesson we’ve learned from Strategy 2017 is to avoid formalism in our work. Standards and rules are indispensable – they establish a framework and simplify our whole production process considerably; but if you make sticking to them rigidly a goal in itself and work to tick an array of boxes, this can lead to hurried and one-sided decisions. Everything looks right from a formal point of view, the ticks are all there, but it doesn’t do the job where it matters. That’s why I always ask my colleagues to avoid taking a formal attitude towards their work, and to immerse themselves more deeply in every aspect of the project – in the technology, the choice of suppliers, the planning and execution of the work, and other considerations.

The new strategic cycle will present us with more significant challenges. Strategy 2022 includes an enormous number of projects, at many more of our companies both in Russia and abroad, which are highly diverse from a technological point of view. There are also some serious HR challenges, with an increased burden on our project offices, which we will need to expand in spite of a shortage of highly qualified specialists.

Strategy 2022 envisages investment in increasing production, expanding our product portfolio, and improving product quality. One example is a project to build a stamp charging unit at Altai-Koks which will allow us to increase coke strength, thereby lowering the production cost of the end product. We are planning to increase ore extraction at Stolenskoye by a further 5 mtpa, and concentrate production by 2.5 mtpa. At NLMK Lipetsk we are overhauling a large portion of our blast furnace capacity, completing a refit of BOFs No. 2 and 3 with gas-exhaust ducts, and building a unique continuous casting machine.

Increasing iron ore production and overhauling our blast furnace and steelmaking capacities will enable us to increase steel smelting at the Lipetsk site by 1 m t for the production of higher quality products. The rolling stage will also be upgraded. We must also master producing steel with new kinds of coating. A major program will be implemented to ensure we can produce the latest electrical steel products.

We also have plans to invest in increasing capacity at our American plants, and to significantly improve and expand the product mix produced at our European companies. In order to enact our ambitious investment programs, we will develop the skills of employees at our engineering companies. NLMK Engineering and InAlNIAL. These design institutes will need to make the transition to new technologies, and the foundation for this transition will be mastery of Building Information Modeling technology, that is, digital modeling of facilities before they are built. In sum, new projects are on the way at all stages of production and at all NLMK Group companies. These are intended to take us to a qualitatively new level as a modern steel company.
**Strategy 2017: The Results**

### Key Investment Projects

#### 2014
- **NLMK Lipetsk**
  - Launch of a biochemical facility for coke and chemical operations (BCF)
  - Based on original Russian technology for deep biochemical purification of waste water from plants, theodolites, and other sources.
  - Productivity: 160 m³/hour.
  - Investment: RUB 2.2 Billion (~$38 million).
  - Impact: A twenty-fold improvement in the quality of treating waste water for reuse in the site’s closed-loop water cycle.

#### 2015
- **NLMK Lipetsk**
  - Construction of top pressure recovery turbine plant consisting of two top pressure recovery turbines (TRTs)
  - TRTs generate electricity using excess pressure from blast furnace gases produced in the process of making pig iron. The process does not involve burning fuel.
  - Investment: RUB 1.9 Billion (~$32.8 million).
  - Impact: 200 million kWh less electricity purchased per year.

- **NLMK Verona**
  - Launch of upgraded press equipment
  - Installation of new press and manipulator for forging 800 mm-thick ingots in three planes. An additional furnace has been built for heating ingots during the forging process, as well as a unit for hot cutting and cleaning the surfaces of plates.
  - Investment: RUB 0.6 Billion (~$10.3 million).
  - Impact: Production of 105,000 tpa of own ingots.

#### 2016
- **NLMK Lipetsk**
  - Upgrade of continuous hot-dip galvanizing line No. 1 (HDG-1)
  - Optimization of equipment, installation of control systems, upgrade of furnace component.
  - Investment: RUB 2.1 Billion (~$35 million).
  - Impact: 120,000 t of hot-dip galvanized steel (<10% capacity).

- **NLMK Lipetsk**
  - Launch of a crushing and sorting facility for processing steelmaking slags
  - Processing capacity: 2,4 m³ of slags. Up to 95% of metal extracted. Less iron ore and scrap required in production of pig iron and steel. These are replaced by ore recovered from production waste.
  - Investment: RUB 0.6 Billion (~$10.3 million).
  - Impact: Quantity of scrap (metallic inclusions) extracted from waste almost doubled.
Implementation of High Pressure Grinding Roll (HPGR) technology at beneficiation plant, first stage (sections 1 and 4)

HPGR not only crush the ore but also break up its crystalline structure. The downstream stages at StoiLensky receive ore that is more ‘ductile’ for the downstream stages at StoiLensky, breaking up its crystalline structure.

- **Investment**: RUB 27.0 million (~$453.5 million)
- **Impact**: 35% increase in gross dust emissions.

Expansion of slab warehouse

Creation of new sections for cutting, inspecting, processing, and weighing slabs. Installation of new crane and weighing equipment, transformer substations, and cutting and positioning units.

- **Investment**: RUB 2.8 billion (~$44.8 million)
- **Impact**: warehouse throughput capacity increased to 2 mtpa of steel slabs, ensuring stability of supply for clients.

Implementation of a predictive management system for ore crushing and beneficiation processes

System gathers data from control and measuring devices on the current modes of these units in real-time, compares the data against historical data accumulated over the previous period, and issues instructions on how to adjust the equipment modes.

- **Investment**: RUB 1.7 billion (~$27.1 million)
- **Impact**: 1.7% increase in rare gas mix production to 160 m3 per month.

Replacement of turbo generator No. 5

Existing 60-MW hydrogen-cooled unit replaced with air-cooled unit, making system safer and more reliable.

- **Investment**: RUB 1.8 billion (~$27.9 million)
- **Impact**: creation of a unified center for training and improving the qualifications of managers at all NLMK Group companies.

Construction of briquetting plant begun

Capacity: 100,000 tpa of steelmaking briquettes. Used as feedstock in pig iron production, the briquettes are made from a mixture of iron ore concentrate, dust captured in blast furnace off-gases, and iron and carbon contained in blast furnace sludge.

- **Investment**: RUB 2.8 billion (~$44.8 million)
- **Impact**: more than 350,000 tpa of blast furnace sludge put back into production. Reduction of 9% (around 560,000 t) in use of iron ore pellets to produce pig iron, coke consumption reduced by 26,160,000 t, production cost of pig iron reduced by 2%.

Construction of NLMK Group Corporate University begun in Lipetsk

The site of a former cultural center will provide the location for a modern, multi-functional center, the core of which will be the NLMK Group Corporate University. The center will work as the NLMK Group Corporate Center, the core of which will be the NLMK Group Corporate University.

- **Investment**: RUB 3.0 Billion (~$46.5 million)
- **Impact**: 6% reduction in gross dust emissions.

Strategy 2017: The Results

2016

STOILENSKY

Use of 3D modeling to optimize ore extraction

Modern-Microzone mining software makes it possible to work with a 3D map of the deposit. This provides a more accurate impression of the deposit’s reserves, enabling rapid selection of the optimal approach to mining operations.

- **Investment**: RUB 16 million (~$275,000)
- **Impact**: online monitoring of the progress of mining operations.

NLMK LIPETSK

Construction of a new unit for producing krypton–xenon mix

Krypton-xenon mix is obtained from krypton concentrate. It is extracted during the production of oxygen and nitrogen at the plant’s air separation units.

- **Investment**: RUB 356 million (~$5.6 million)
- **Impact**: 1.7% increase in rare gas mix production to 160 m3 per month.

2017

STOILENSKY

Implementation of a predictive management system for ore crushing and beneficiation processes

System gathers data from control and measuring devices on the current modes of these units in real-time, compares the data against historical data accumulated over the previous period, and issues instructions on how to adjust the equipment modes.

- **Investment**: RUB 1.7 billion (~$27.1 million)
- **Impact**: 1.7% increase in rare gas mix production to 160 m3 per month.

NLMK LIPETSK

Replacement of turbo generator No. 5

Existing 60-MW hydrogen-cooled unit replaced with air-cooled unit, making system safer and more reliable.

- **Investment**: RUB 1.8 billion (~$27.9 million)
- **Impact**: creation of a unified center for training and improving the qualifications of managers at all NLMK Group companies.

NLMK LIPETSK

Construction of NLMK Group Corporate University begun in Lipetsk

The site of a former cultural center will provide the location for a modern, multi-functional center, the core of which will be the NLMK Group Corporate University. The center will work as the NLMK Group Corporate Center, the core of which will be the NLMK Group Corporate University.

- **Investment**: RUB 3.0 Billion (~$46.5 million)
- **Impact**: 6% reduction in gross dust emissions.

NLMK LIPETSK

Construction of briquetting plant begun

Capacity: 100,000 tpa of steelmaking briquettes. Used as feedstock in pig iron production, the briquettes are made from a mixture of iron ore concentrate, dust captured in blast furnace off-gases, and iron and carbon contained in blast furnace sludge.

- **Investment**: RUB 2.8 billion (~$44.8 million)
- **Impact**: more than 350,000 tpa of blast furnace sludge put back into production. Reduction of 9% (around 560,000 t) in use of iron ore pellets to produce pig iron, coke consumption reduced by 26,160,000 t, production cost of pig iron reduced by 2%.

NLMK LIPETSK

Construction of NLMK Group Corporate University begun in Lipetsk

The site of a former cultural center will provide the location for a modern, multi-functional center, the core of which will be the NLMK Group Corporate University. The center will work as the NLMK Group Corporate Center, the core of which will be the NLMK Group Corporate University.

- **Investment**: RUB 3.0 Billion (~$46.5 million)
- **Impact**: 6% reduction in gross dust emissions.
For us, the key objective of Strategy 2017 was to achieve leadership in strategic markets. We needed to gain access to, or increase our presence in, attractive product, sector, and regional segments. We planned to grow our share of the Russian market, increase the number of long-term contracts in our portfolio and, in addition, make greater use of the capacities in our European and American divisions. Very quickly, however, reality stopped corresponding to our expectations. Global consumption of steel products slowly declined, as did steel prices, contrary to analysts’ expectations that these would rise, or at least remain at their previous level. There were several external factors that put pressure on Strategy 2017, although three can be singled out in particular.

The arrival, earlier than anticipated, of new production capacity in China led to oversupply and a fall in utilization. China had imported steel right up until 2005; in 2006, Chinese steel production in China stood at just 420 million tonnes. By 2016, however, this figure had grown to more than 800 million tonnes. More than 600 million tonnes of steelmaking capacity were rendered superfluous. Chinese exports of finished and semi-finished steel products grew by one and a half times over the period 2014 to 2016.

The China factor, in combination with the strengthening of the dollar against the currencies of developing countries, caused a sharp fall in prices, in spite of analysts’ forecasts that these would remain at least at the 2013 level. In response, many countries started adopting protective measures, leading to a 30% increase in protectionism.

The situation on the Russian market was likewise challenging. Devaluation of the ruble and a fall in GDP and business activity in our key sectors led to a decline in the demand for steel. The rate of this decline was three times greater than the rate of GDP decline. For example, in comparison with 2013, 2015 saw steel consumption fall by 8% and GDP by 2%, and in 2016, steel consumption fell by 12% and GDP again by 2%. The leader in this race to the bottom would be the construction sector, the major consumer of rebars (down 23% by 2014) and of galvanized steel (down 12%).

All in all, the last five years in Russia have seen an accumulated loss in steel consumption of 14 million tonnes. With such an economy, we had to take a proactive approach in order to maintain the company’s leading position. We completely reengineered our business model, diversifying it in terms of both products and markets. This allowed us to acquire some obvious advantages: being geographically closer to our clients and able to react more quickly to their needs. The previous system, whereby clients sent us their orders, and we simply fulfilled them, was no longer adequate to meet the new challenges that we faced. We needed to make the transition from a simple service model to active sales, by developing the functional area of sales to end consumers.

As a result, we achieved almost all of our goals on the Russian market. Against a background of falling demand, we increased our share of the hot-rolled steel market from 13% in 2013 to 17% in 2017, our share of the cold-rolled steel market from 24% to 29.6%, and our share of the galvanized steel market from 17% to 21.8%. We also saw an increase in sales on the European and US markets. By achieving closer integration within the Group, we succeeded in increasing slab supplies to our international sites. Today, this accounts
for around 70% of slab exports. We have succeeded in penetrating new niche markets and in finding new clients. This is especially true of plate for offshore wind farms, abrasion-resistant and high-strength steels for the machine-building industry, and special steels for the production of large-diameter pipes. In Russia, we have collaborated with United Metallurgical Company (OMK) to create a high-technology chain for large-diameter pipe production. This has allowed us to access a new market for slabs in unique dimensions, which was previously dominated by imports, and acquire a 100% share of it. We have transformed our product marketing to include a deeper approach to market analysis. This has changed the pace of our work. Information exchange between our different subdivisions, and between Russia, exports, and our international divisions, has become considerably faster. As a result, by 2017 we had succeeded in increasing our share of sales of high-value-added products. Nonetheless, a number of factors had an impact on sales of flat products in this period, not all of which were dependent on us. For instance, supplies of hot-rolled steel to Ukraine shrank almost fourfold. EU protectionist policies forced us to abandon historically attractive export markets for cold-rolled steel and turn our attentions to the Asian market. In spite of these issues, we found a solution to every situation and continued with our development projects. Between the end of 2015 and the beginning of 2016, our company managed to increase sales volumes for galvanized steel, and our market share – in 2016 we had 20% of the market, and in 2017 our share was 21.8%. Long products likewise presented a challenge. NLMK Long also faced falling demand on the Russian market and intensifying competition from the introduction of new capacities. And although we didn’t succeed in meeting our sales volume targets on the Russian market for long products and metawear, we were able to offset this drop by increasing exports of billets, rebars, and wire rod. This increase in sales enabled us to increase utilization of our production capacity. Since 2013, utilization at all Group companies in Russia has grown by 3 p.p. to 98%. According to our estimates, this exceeds utilization at other steel companies in Russia. We fully understand that our clients’ main concern is quality, and we do everything within our power to meet their exacting needs and specifications. In 2017, a decision was taken to build new capacity for the production of premium-quality products. At our continuous hot-dip galvanizing line No. 5 (HDL-5), which produces 450,000 tpa of galvanized steel, there are plans to employ two baths to produce promising new varieties of coating, such as zinc plus aluminum, or zinc plus magnesium. A new pre-painting line (PPL-4) with a capacity of 150,000 tpa will specialize in premium high-class coatings, and in particular multi-layered coatings, for producers of white goods with a Printech decorative coating. Our future plans include work to develop both new products and our relationships with customers, which we are building for the long term. In fact, we have made customer satisfaction one of the most important target indicators for measuring the performance of NLMK’s sales service. We are continuing our efforts to become the most client-oriented company in the steel industry, and have focused our attention on expanding our sales network. Today, against the backdrop of a rapidly changing market, we are focusing not only on our direct trading partners, but also on the needs of the end consumer. In this sense, further developing the service capabilities of our trading house is a very timely step to take. All of this will enable us to enhance our collaborations by scaling our sales office and warehouse system for end clients and distributors. The advantages here are clear: the ability to accept orders and serve clients quickly, the capacity to process orders and dispatch them from the warehouse on the same day within the space of a few hours, and an extensive product mix make the sales office and warehouse a veritable supermarket for steel solutions. It is vital for us to establish rapid and flexible processes for meeting our clients’ needs: this is why we intend to develop our online sales team. We were one of the first to start creating an internet platform to allow us to work directly with our clients. Now, we have launched a new online platform, which is aimed at the end consumer. On the whole, we have started to develop our strategy, which is focused on creating new approaches and standards, and on providing a truly global service in which the needs of the client come first.
First of all, the safety culture among contractors is naturally more challenging from a management point of view. To begin with, of course, we had to persuade people of the importance of health and safety issues more consciously; not under threat, but rather under the guidance of a separate function devoted to occupational health and safety, and I was appointed to lead it. We have implemented a new occupational health and safety policy, which has become an emphatic statement of our goals and ambitions: to become one of the safest steel companies in the world through the use of effective risk management processes and the latest and best practices in the management of occupational health and safety issues, as well as the development of a culture of safety among all employees – from managers to on-site workers. We have begun to introduce advanced occupational health and safety tools, and new methods for training, developing, and engaging staff. This is all being done to ensure that people approach safety issues more consciously, not under orders, but with an appreciation of the importance that occupational health and safety holds for them personally.

We have set ourselves a target: to reduce the workplace injury rate (LTIFR) at the Group’s Russian assets to a level no higher than the workplace injury rate (LTIFR) at the Group’s international assets. And in the space of the four years from 2013 to 2016, we more than halved the injury rate in all respects, across all of our divisions. The Lipetsk site was twice declared the safest in the Russian Federation, in 2014 and in 2016. In 2017, however, we were less successful in this regard: the number of incidents at our sites increased, and, unfortunately, the consequences were grave. Both our employees and our contractors were affected.

Exactly a year after we had begun to implement our strategy, we were able, for the first time in the more than 80-year history of the company, to mark a calendar year without a single fatal incident among either our employees or our contractors, across the entire territory of NLMK Group, including our international assets. And in the space of the four years from 2013 to 2016, we more than halved the injury rate in all respects, across all of our divisions. The Lipetsk site was twice declared the safest in the Russian Federation, in 2014 and in 2016. In 2017, however, we were less successful in this regard: the number of incidents at our sites increased, and, unfortunately, the consequences were grave. Both our employees and our contractors were affected.

Earlier, before Strategy 2013–2017 was introduced, the decision-making process went as follows: is there a risky operation to be carried out? Then give it to a contractor to do. But at the end of the day, if there are risks involved, what difference does it make who takes them on? Whether it’s our employees or other people working on our sites, nobody has more than one life. Working with contractors is naturally more challenging from a management point of view. First of all, the safety culture among contractors is generally speaking at a lower level than among our own employees. This refers to qualifications and technical training, as well as to access to safe and serviceable tools and equipment. Contractors are still going to excessive lengths to cut costs, including when it comes to looking out for occupational health and safety. We decided to change this at a fundamental level.

Now, the qualification process for contractors is as follows: we have to be able to assess us as early as the tender phase what safety systems the contractor has in place, whether they have their own statistics and figures, whether they have an occupational health and safety specialist, whether the training and qualifications of the people who will be working for us have been verified, and whether they have the required experience. We want to be certain that these people haven’t simply been plucked off the street yesterday in order to do jobs that are often dangerous. This is another practice that we see, unfortunately. Contractors are now clear: if they can’t meet this minimum set of requirements, then they won’t ever be given the opportunity to work with us. Now that we have created a pool of tried and tested contractors, we are preparing to develop their occupational health and safety credentials.

We are presently developing a practical training program with their cooperation. We are also building and organizing various practical simulators, where contractors can verify the readiness of their staff for themselves before giving them tasks which are complex or associated with a heightened level of danger.

Our initial plan was to create a unified platform for safety requirements at each of our sites. But our company is an international one, and occupational safety requirements vary between countries. America has stricter regulations than Russia, for example. We therefore decided to build our own unified corporate system for everybody based on the latest and most stringent standards. We are now beginning to introduce some tools which form part of US Government requirements for carrying out repair work, shutdowns, operations involving different kinds of energy supply, and so on. From this we have derived a set of minimum requirements and, based on these, we have developed a methodology for assessing the maturity level of our companies.

Our sites are now carrying out self-assessments of their compliance with these requirements, which include areas such as working at height, operating heavy lifting equipment, working within confined spaces, and others. If the methodology identifies an area of non-compliance, then the site draws up a plan of action setting out what they need to do in order to reach the required level. We introduced this methodology over a year ago. This hasn’t given us long enough to solve all issues, of course, but we do now have a clear, step-by-step mechanism for bringing all sites in line with unified safety standards.

What’s next? For the new strategy cycle, we have been talking a lot about process automation. In projects carried out at NLMK Ural, we have succeeded in fully automating the extraction of metal samples from an electric arc furnace. This was previously a job done by hand; now, a manipulator is there to do it instead. There’s no longer any need for an employee to be in the danger zone, in close proximity to melted metal. This course of removing employees from danger areas, and of otherwise increasing the safe distance between staff and sources of risk, is one that we intend to continue to pursue in the future.

We will continue to develop our corporate occupational health and safety management system. We will strive to develop the skills of our employees at all levels. We are preparing to launch a substantial training program for middle management: a three-day course for managers of production units, where we will talk about commitment to safety issues and management using specific tools. We will also offer new types of training for on-site employees, designed to encourage them to consider their own priorities and habits, and to think twice about their actions and the potential consequences.
ELENA DEMYANOVA
Vice President for IT

A s a new company, NLMK Information Technologies became part of the Group in 2012. This centralizing move laid the foundations for the creation of a service company which could provide a broad spectrum of high-quality IT services for its internal customers – the Group’s companies. It was also important to ensure transparency in the operation of the IT service, the transition to a service model of management, the formulation of a list of IT services required by consumers, and the associated cost.

Added to these challenges in 2017 were the tasks of updating management processes for IT projects, creating a target architecture for IT systems, and putting together a strategy for IT development through 2022. We first developed a catalog of IT services. Our agreements with our clients in 2014–2015 included four services; in 2017 this number grew to more than 140. Our second step was to create a clear and transparent model for calculating the cost of our services, enabling both us and our clients to identify potential for optimization.

And third, we have launched several major new IT programs, among which I’d like to highlight the introduction of HR management systems based on SAP HCM and SAP SuccessFactors, the first release of which was in January 2017. The number of projects continues to grow. Whereas there was an average of around 30 projects in 2016, in 2018 there are plans for around 100 projects aimed at increasing efficiency – that is, the speed and performance of production and business processes.

In 2017 we conducted an audit of our cybersecurity system, as a result of which we are planning to begin implementing an integrated cybersecurity program from 2018. Implementing this program will help the Group to minimize risks associated with external threats (such as virus attacks), as well as internal ones (such as the disclosure of confidential information).

Working in partnership with SAP, in 2017 we also launched an important new area of operations, which will be essential to the future of the Group – a Co-Innovation Lab. The Lab’s objective is to seek out, develop, and implement breakthrough innovative IT solutions which can subsequently be rolled out across the company and possibly beyond. We have selected several ideas to turn into prototypes, which will work with company data and use internal business processes. Implementation of the selected ideas is now in its final stages – they include robotization of routine financial operations at the NLMK Group Accounting Center based on analysis of bank statements, forecasting cash flow, predictive forecasting of repairs on one of the sections of Mill 2000; and a positioning system for staff at one of our most complex facilities, the hot dip galvanizing line.

BETWEEN 2015 AND 2017, THE IT SERVICES QUALITY SATISFACTION INDEX SHOWED AN IMPROVEMENT FROM 95% TO 97%

These projects made use of such innovative solutions as machine learning and the industrial Internet of Things. There are always doubts about whether it is possible to make things bigger and better regardless of the circumstances, but on the whole I believe the work done by our team deserves a solid B+. As we are in essence a service function for the core business, increasing customer satisfaction is especially important to us: it is indicative of the quality of IT service development and of the service company itself. Between 2015 and 2017, the satisfaction index showed an improvement from 95% to 97%.

What are we planning to work on next?

The main thing is the implementation by 2022 of a strategy to introduce modern MES technology – a new generation of software for managing production processes. The basic NLMK Group chain will be fully digitalized. This will not only make it possible to view the parameters of any process in real time – as a whole or separately – but also, using digital replicas of entire companies and individual facilities, to model any production scenario, including with the virtual addition of new capacities and technologies. So far, only Stoilensky has been digitalized, enabling optimal planning of operations there, but 2022 will see the digital transformation of other NLMK Group companies and divisions.

We will continue to actively implement our new Agile/Scrum philosophy. With standard project technology, you start by designing the entire system, then implement it in full. As a rule, this kind of approach takes 9–15 months, and in the best case scenario the business gets the system in a year’s time. Over the course of such a long project, however, many changes take place, and these are often critical in nature. Agile/Scrum gives you the ability to make alterations to a project during implementation, as the world around you evolves together with the requirements of the business. We have used this technology in particular in our project to integrate Sberbank’s distance banking services with NLMK’s ERP system using Host-to-Host technology. Organizing the direct exchange of electronic documents has improved cybersecurity, and made banking services faster and simpler. Another team is using Agile/Scrum to create a new NLMK Group internal corporate portal.

The dynamic of its project portfolio requires NLMK IT to strengthen its team and develop staff skills; that’s why, in order to address the company’s shortage of professional resources, we’re opening a branch office in Voronezh in 2018 which will operate throughout NLMK Group.

Nowadays you have to run to stand still, but if we want to move further forward, we have to run faster each day, discovering new solutions and technologies. This is especially true in the world of IT.
Risk management as a functional area was developed during the implementation of Strategy 2017. We learned how to better identify and assess risks and, most importantly, how to manage them. The risk map today features 16 top risks, and a large research project on internal monitoring systems for the company’s key business processes is nearing completion – around 140 active monitoring procedures have been analyzed and assessed for efficiency.

A risk management culture is becoming established within the company. Risk management has already become a daily activity for the majority of directors and managers, who are making active use of their experience and sharing knowledge. We have also made our own contribution – for several years, business representatives, who we call “risk coordinators,” have been acquiring professional skills in the fields of risk and internal monitoring systems. This is important in order for our employees to understand how to act in non-standard situations, and to pass this knowledge on to their colleagues.

We are also reminding them of the company’s existing internal regulations on preventing corruption and fraud. In October we launched an online “Conflict of Interest” course jointly with the Corporate University on NLMK Group’s distance learning system, NLMK Webutor. It is now possible to complete a conflict of interest declaration electronically, making the process more convenient for users. It is gratifying to see that risk management has become a practical tool within the company. We aren’t standing still, however; we are actively working to translate some of our “manual” monitoring procedures into IT systems, which will reduce the number of formal actions required and increase the transparency of these monitoring procedures.

As far as our functional area and its role in Strategy 2022 is concerned, the key vectors to be implemented in the next five years are integration of the risk management system into the IT environment, integration of risk assessment and management practices into the business environment (including strategic, investment, and other risks), and the transfer of some of our monitoring procedures from external monitors to the business itself.

We have increased our share of the Russian high-value products market (cold-rolled flats, galvanized steel, pre-painted steel, and electrical steel). Production volumes of skip sinter, pig iron, steel, and hot-rolled flats have also increased significantly since 2013. At the same time, output of defective products has more than halved within the same period (from 2.53% to 0.93% according to data for the first three quarters of 2017). We have also succeeded in reducing the specific energy consumption of steel (by more than 3% compared with 2013). There is much for us to be proud of. We have launched two pulverized coal injection units, which have allowed us to reduce the coke consumption rate at blast furnaces Nos. 4, 5, 6, and 7. We are completing the construction on a briquetting plant at the Lipetsk site which will enable us to put ferrous wastes back into consumption rate at blast furnaces Nos. 4, 5, 6, and 7. We are completing the construction on a briquetting plant at the Lipetsk site which will enable us to put ferrous wastes back into production and reduce Fe costs. We have launched a new crushing and sorting complex for processing steelmaking slags. The reduction of our environmental footprint is also worthy of note. A new facility for biologically purifying waste water from our coke plant at the Lipetsk site is already in operation, as is a facility for cleaning emissions from the cast yard of blast furnace No. 4, and a new complex for processing blast furnace waste. As a result, total dust emissions have been reduced by more than 1,100 tpa, and specific substances by 30 tpa. In 2017, the Year of the Environment, we invested more than RUB 5 billion (~$60 million) in green technologies and conservation measures.

There was also much work to be done on increasing workforce productivity, improving staff professional development, and establishing a favorable corporate culture. Thanks to teamwork across the company, Strategy 2017 was a success.
A new important aspect of Strategy 2017 for Stoilensky was securing self-sufficiency for NLMK Group in iron ore. We set highly ambitious objectives: to build a pelletsizing plant, to increase the capacities of our mining and beneficiation operations, and, of course, to improve operational efficiency. We achieved 100% of these goals. We succeeded in building and launching one of the largest pelletsizing plants in Europe, with a pellet capacity of 6 mtpa. Projects to increase the capacity of our beneficiation plant were implemented in full, with High Pressure Grinding Rolls installed in all four sections of the plant. These have enabled us to increase the productivity of each upgraded section by 12.5%. A predictive system has been introduced for managing ore processing and beneficiation processes. In the long term, this will make it possible to increase the efficiency of our beneficiation equipment to 400,000 tpa of concentrate.

The second stage of a thickening facility was launched at Stoilensky in May 2017. We have made the transition from a free-flow system for warehousing tails – waste products from the beneficiation process – to a pressurized-flow system. This has led to a reduction in expenditure on transportation and water supply at the beneficiation plant.

One more project which has allowed us to ensure stability of production should be mentioned. We were faced with a bottleneck, in the form of two conveyors which transport ore to the beneficiation plant. Over 30 years of use, these had become outdated and succumbed to corrosive wear. An emergency shutdown of the conveyors threatened the production chain with collapse, not only at Stoilensky, but at all of the Group sites that depend on our concentrate. In 2015 we succeeded in replacing the old conveyors with new ones within a record timeframe. On the whole, I would assess this stage of operations positively. We have worked extremely hard, and I am pleased to say that we have made progress with our plans and kept to the deadlines that we set ourselves.

The most important thing that we have learned in this period is that before getting started on implementing a new project or introducing new equipment, we need to calculate all of the risks involved and assess our readiness for the task ahead. We need to see how the piece of equipment concerned is performing in other companies, not only in Russia, but also abroad, and apply these observations to our own situation. We also need to understand how to prepare our staff. The responsibilities of our employees, together with their knowledge and experience, are highly significant when it comes to launching a new piece of equipment or implementing new projects.

Stoilensky has some quite ambitious plans for Strategy 2018 and Strategy 2022. The planning documentation has been prepared and work has begun on expanding Stoilensky’s mining operations. This will enable us to increase extraction and transportation of quartzites to 37 mtpa, with the potential for a subsequent further increase to 47 mtpa.

Like the rest of the company, our division has had some ambitious goals to contend with. We have continued our work to shape the division into a unified production chain, in which each company – Vtorchermet NLMK, NLMK Ural, NLMK Kaluga, NLMK Metalware, and NLMK Ural Service – has its own goals, but shared results.

In global terms, we have succeeded in preserving jobs and utilization of capacity. Amid challenging economic conditions, an important decision was taken: the division not only strengthened its presence in exports, but also began intensive development work on a new sales channel – retail sales. This required the mobilization of a number of services – production challenges this ambitious can’t be overcome alone, especially when you are facing high levels of competition.

We learned an important lesson: it isn’t enough to set a goal – you must also be sure that your team is thinking and acting in sync with you. As far as production is concerned, analyzing the work that we have done has allowed us to identify and develop investment projects aimed at improving the quality of our products and our operational efficiency, and to establish the horizons of the next strategic cycle ahead of time.

Our focus throughout the present strategic cycle has been on improving our performance as a division. Vtorchermet NLMK increased captive scrap collection to 2.9 mtpa, providing NLMK Group with more than 60% of its scrap needs. Our steelmaking companies have successfully reduced consumption rates of metal, ferroalloys, and energy resources. Much work has been done to optimize energy modes at the EAF shops at NLMK tiral and NLMK Kaluga. As a result, we exceeded the planned impact of the optimization program by nearly two times.

Unfortunately, we did not succeed in fully preventing workplace injuries this year.
The success of Strategy 2017 is in large part due to the fact that it incorporated specific projects and quantitative results. The inclusion of clearly formulated goals is a cornerstone of successful management. Our functional area – finance and economy – tracked every stage of strategic initiatives. Our controlling team was in charge of assessing to what extent a given Strategy objective had been achieved, as well as adjusting the achievements of previous years to the pricing conditions of the current year. Controlling also bore the responsibility for preliminary and subsequent assessment of operational efficiency initiatives. This made it possible to properly allocate company resources to implementation of the most effective measures.

Other important aspects of our operations included continuous monitoring of the state of the markets, assessing the sales margins of a given product, and providing recommendations on the redistribution of products between regions. This facilitated the fulfillment of another Strategy objective – to achieve leadership in strategic markets. At the same time, we have not only assessed the impacts of Strategy 2017, we have also worked actively to increase our own efficiency. Controlling was put through a reengineering procedure, allowing us to optimize our functionality. We eliminated superfluous processes and reports which no one was interested in, and concentrated on doing what the Group really needed to be done: looking ahead, proposing scenarios for further development, and options for the most effective allocation of resources – ore, finished products, and utilization of equipment. For example, if now we see an increased margin for pig iron on the market, we can quickly decide what feedstock will be used to produce additional pig iron, whether we have additional capacities for production and, accordingly, determine what volume of pig iron we need to use for steel production, and what volume we can sell.

The Group treasury has also done a lot of work to increase its efficiency, a result of which was the high rating awarded by the independent auditing firm KPMG. On the basis of this rating, the Group treasury has been acknowledged as one of the most efficient, not only among its Russian competitors, but also when measured against international benchmarks.

I am pleased to note that over the course of this strategic cycle our Accounting Center has transformed itself from a unit responsible only for bookkeeping into a multifunctional center, which has grown to include back offices for HR, procurement, and sales. The Accounting Center has also led the implementation of a “Fast Close” project, which has enabled the Group to significantly reduce the time needed to prepare accounts and to emulate best practices in the market.

As far as areas for development are concerned, this strategic cycle has highlighted a range of issues which we plan to address in the near future. In order to be able to analyze data quickly and propose appropriate solutions, the data must first be gathered, and at present this process unfortunately takes up almost 50% of our time. We are already working firstly to automate data collection and processing to the fullest extent possible, and secondly to improve our professional data analysis and processing skills.

We are also thinking about creating a center of expertise, which will engage directly with Strategy 2022 projects, in order to be able to concentrate all calculations in one place and to keep track of the impact of implementing investment programs. The pilot project for the NLMK Production System at our Kaluga site has also shown that we can expect a very large number of ideas on operational efficiency after rolling the Production System out to all NLMK sites. The challenge for Controlling now is to organize support for the development of the Production System so that, on the one hand, the project has all of the resources that it needs, and on the other, there is no loss in efficiency with respect to existing projects.

Another key lesson that we learned was the importance of closer contact with our clients. This allows us to understand their needs and calculate demand based on trends in the global construction industry.

What will we focus on over the next five years? Our priorities for Strategy 2022 will remain unchanged. We will continue to reduce operating costs and to increase productivity using the latest practices, including IT technology. In the next investment period, we will be looking to balance the mill’s capacities by promoting a new, modern rebar facility. As far as our work as a team is concerned, we will be investing a lot of our energy in the development of the Production System and corporate culture.

**SERGEY SHALIYAEV**
General Director of NLMK Kaluga

NLMK Kaluga is a mini-mill with its EAF and rolling production facilities located in close proximity to both sources of raw materials and consumers of the finished product. Strategy 2017 set us the challenge of becoming the Russian market leaders in this segment. Another challenge was to achieve design capacity, because NLMK Kaluga is the youngest company in the Group. So how did we do? Within six months of the launch, we had achieved design capacity at our EAF shop, and within a year we had achieved the same at our rolling facility. Today, NLMK Kaluga’s efficiency figures are ahead of the average for its Russian peers. We have become the leading mini-mill, not just in Russia, but globally, in a range of key parameters, including the productivity of our equipment, heat series, and many others.

In my view, our work over this period deserves a solid A. The ramp-up period was a difficult time, but our employees succeeded in directing their efforts towards the common goal. Although everybody had differing levels of experience, training, and skills, we all came together to form a professional team. This is proven by the record figures that we regularly achieve. I added the minus to our grade because we had less success in mastering our range of sections – the solid demand for rebar meant that there wasn’t enough time. This is nonetheless a gap that we will close in the near future by acquiring practical skills in the production of sections. Plans for the mill would also have benefited from the inclusion of a warehouse for storing a wide range of finished products. This would help us to work more flexibly with our clients, including with respect to deliveries by road. It is clear now that a warehouse of this kind would make our work more efficient.
Anatoly Khebnev
Vice President, Procurement

hat was the most important objective of Strategy 2017? Becoming a high-efficiency producer of steel, in terms of both technology and costs, to allow us to compete with any other player on the steel market. And we have also contributed towards this common goal. In 2017, NLMK’s procurement was declared the most efficient in Russia. We were recognized in the “Economic Efficiency of Procurement” category. Naturally, we were very pleased to receive this award, because it showed that the market also appreciates the reliability of our equipment, while at the same time optimizing the cost of our maintenance system. All of these modifications should exactly what we will maintain within a given area as part of Strategy 2017. We have already completed the first strategic cycle, carrying out a major reorganization of how we approach maintenance and repairs – one of proactive maintenance, with predictive elements. This is yet another “smart” system to have captivated the modern world. It works on the basis of mathematical models and statistical data on equipment performance. Maintenance is carried out not according to a rigid timetable, but only in the event of changes in the characteristics of the machinery. This does not mean that we are moving away from preventive methods, however; instead, we will also continue to improve these further. A reactive system will remain in part as well, although this will become more manageable. In the course of the strategic period from 2019 to 2021, we will apply an integrated approach, which will allow us to determine exactly what we will maintain within a given system. All of these modifications should provide us with further improvements in the reliability of our equipment, while at the same time optimizing the cost of our maintenance services. Our task is to be more efficient in terms of the cost of repair work than our competitors, and to achieve the level of best global practices.

Our most important lesson has been about the meaning of leadership and how to work as a team. Work is a means for achieving this other than time, faith, and perseverance. Over the course of implementing the strategy, the most important lesson I learned was from my colleagues – it was about the meaning of leadership and how to work as a team. This has caused me to reassess many things in this respect. What plans are we making for the next five years? The work of any functional area – and procurement is no exception – involves an enormous number of transactional tasks, which are necessary, but which create no value for the company. A fundamental trend which I am presently looking at from the point of view of the global economy is the simplification or automation of processes, or even complete robotization. We would like to see our people engaged in more cerebral tasks than supporting the circulation of paper documents, for instance. From an operational buyer procurement should turn into a conductor of ideas, a coordinator, a generator of interesting projects and the means of supporting them together with suppliers. Collaboration with suppliers is extremely valuable in this respect, due to their unique experience, which we can and must also use, so that we can always be at the cutting edge of technology and employ the latest materials. It is only by doing this that we can retain our position in global steelmaking – at the forefront.

Where were we less successful? During this strategic cycle we began a transition to the next strategy for technical maintenance and repairs – one of proactive maintenance, at the heart of which is introducing tools for improved reliability. In order to develop these effectively, it is essential that we scrapulously gather data on machines, build connections between equipment malfunctions and our maintenance system, making the necessary adjustments to our regulations, precisely determine the actual remaining service life of equipment, and replace or repair only that part of a piece of equipment with a remaining service life that demands action. Diagnostic capabilities are extremely important in this respect. This is a winning strategy, which, once applied, will dramatically reduce production losses resulting from shutdowns for major, scheduled, and emergency repairs, as well as expenditure on replacing equipment with an adequate remaining service life. A significant amount of work towards such a system has already been carried out with help from international experts. But the transition to this strategy is also linked with an ongoing transformation of repair services and is sensitive to increasingly complex rules surrounding coordination and cooperation within the maintenance process. In addition to the structures in which new competency centers must emerge, entirely new professions are also required, such as end-to-end engineer or reliability engineer, and planning engineer. This area has not been mastered in full, although some of the work has been done and has achieved excellent results; for instance, a competency center has been established for automation – the Department of Process Automation. This is one of the best, if not the best, department for this field in the global steel industry. Maintenance and repairs as a functional area is approaching the next strategic cycle in good shape, and is ready for further change. A priority for us is mastering proactive maintenance with predictive elements. This is yet another “smart” system to have captivated the modern world. It works on the basis of mathematical models and statistical data on equipment performance. Maintenance is carried out not according to a rigid timetable, but only in the event of changes in the characteristics of the machinery. This does not mean that we are moving away from preventive methods, however; instead, we will also continue to improve these further. A reactive system will remain in part as well, although this will become more manageable. In the course of the strategic period from 2019 to 2021, we will apply an integrated approach, which will allow us to determine exactly what we will maintain within a given system. All of these modifications should provide us with further improvements in the reliability of our equipment, while at the same time optimizing the cost of our maintenance services. Our task is to be more efficient in terms of the cost of repair work than our competitors, and to achieve the level of best global practices.

INTRODUCING TOOLS FOR IMPROVED RELIABILITY IS AT THE HEART OF OUR PROACTIVE MAINTENANCE STRATEGY

Today, the key strategy for equipment maintenance is a system of preventive servicing and proactive repairs. We carry out maintenance work and replace equipment before the point at which it starts to break down. We do this based on statistical data regarding minimum time to failure, or based on the recommendations of equipment manufacturers. A high-quality preventive system of equipment maintenance is also the most important change to have been made in our functional area as part of Strategy 2017. We have already completed the first strategic cycle, carrying out a major reorganization of how we approach maintenance and repairs. This was connected with wide-scale reengineering and standardization of management, analysis, planning and budgeting processes, and centralization of the electrical, mechanical, and energy services at all sites. The company has achieved some good results in this area. We succeeded in raising efficiency by a very respectable amount, reducing the time and labor required to carry out repair work, increasing quality, optimizing staffing, and reducing the amount of downtime. An assessment of the results achieved in reducing downtime together with general indicators of reliability shows that, today, we are one of the world leaders in our field. In comparison with our steel industry competitors in Russia and the surrounding region, our figures for completing maintenance on schedule and for the quality of our work are among the best, but they are still far from perfect, and here we have some targets to set ourselves.
SERGEY LIKHAREV
Vice President
Logistics

As part of Strategy 2017 we were improving operational efficiency and reducing expenditure, optimizing reserves of raw materials, semi-finished and finished products, and developing the potential of our workforce. We set ourselves the goal of developing a motivational environment for professional and personal growth, engaging as many employees as possible in optimizing logistics and generating ideas.

Our biggest achievement was the creation of a system of key performance indicators (KPIs). This is fully integrated with our budgeting and management accounting systems. The tool enables us to plan our logistics costs while at the same time identifying areas for further optimization. Now when we talk about the potential for reducing costs still more, we can translate this clearly into concrete technical data.

This tool also enabled us to achieve a structural impact on EBITDA of more than RUB 400 million (~$6.9 million) a year that it has begun to deliver the anticipated results.

Our progress in improving the quality of our logistics services has unfortunately been more limited than we had anticipated. This is due firstly to a lack of resources caused by our focus on other targets, and secondly due to the fact that targets and the effects of improving service quality are very difficult to put into numbers. Consequently, it’s hard to establish benchmarks to work towards. This area will be made a key priority for us in the next strategic cycle.

Working on strategic projects has provided us with three major lessons. Firstly, enhanced attention to detail is vital. When a project is developed only at a superficial level, those issues that come to the surface when it is implemented in detail reduce either its effects, or the longevity of these effects. When we were implementing a satellite monitoring system for vehicular traffic, for example, it seemed that everything would be simple: you buy the equipment and software, install it, and the project will immediately result in substantial savings. This is exactly how it had all looked on paper. In practice, however, it turned out that insufficient thought had been given at the start of the project to the issues involved in integrating the various software systems, changing corporate routines, motivating employees, and so on. Project implementation was delayed by two years, and it is only this year that it began to deliver the anticipated results.

In order to engage our employees in improvement projects, we have implemented a very simple and effective process for handling initiatives. Simplified submission procedures, assistance with implementation, and changes to the incentives mechanism have increased the number of people getting involved in project activity, as well as the efficiency of the work that they perform. Previously, implementing one project achieved average savings of RUB 9,000 (~$155) this figure is now closer to RUB 9 million (~$1.5 million). In 2013, one ruble of bonus paid for an initiative translated into one ruble of savings; now, it translates into RUB 251 (~$4.5). We were among the first to conduct our own pilot test of a new system for accelerating the career development of high-potential employees (HiPo). While working with the HiPo service, we selected 27 employees who were engaged in critical optimization projects and, using individual coaching, helped them to develop and to achieve results. From this team, ten employees were promoted, five were enrolled in the talent pool, and two immediately advanced by several management levels. Within two years, for example, Yuri Savvin rose from the position of specialist to heading up the NLMK transportation logistics department.

In the area of operational efficiency, we have exceeded the goals set by international consulting company McKinsey in their baseline scenario for us in 2015. This was a five-year scenario, but we met our targets in just three. And I have no doubt that by 2019, we will even exceed the targets in McKinsey’s best case scenario.

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The second lesson is that everything depends on people. However attractive, important, and striking a project might be, if the people engaged in it don’t perceive the challenges involved as their own, and don’t treat the project as their baby, it can end up buried or delayed for many years, deliver a much reduced effect, or run into other problems.

Last but not least, the third lesson: close cross-functional collaboration is vital. We have come to realize that the potential for optimization that can be achieved by the efforts of our subdivision alone is practically exhausted. Further increases in efficiency are possible only through collaboration and coordination with other functional areas and external contractors. We already have successful examples of such collaboration – for example, our project to increase static loads on wagons. Previously, the average slab load on a single wagon was 62.4 tonnes. Then logistics experts came up with a new loading system; production specialists implemented it, and as a result, working together we increased the static load to 65 tonnes. The resulting total saving was more than RUB 400 million (~$6.9 million) a year.

Organizing constructive collaboration between every element along the entire chain – from ore extraction to delivery to the end consumer – will be our key focus in the next development phase. We will involve all of our individual areas of focus together beneath the umbrella of global supply chain management.
Our key objective under Strategy 2017 was to ensure a reliable energy supply for Group sites and to increase the efficiency of energy consumption. We needed to implement a range of investment and optimization measures aimed at improving our own generation capacity, increasing the use of by-products from energy facilities, and increasing the energy-efficient use of process equipment, and reducing the price of energy we purchase. Thanks to the joint efforts of the business community we have managed to achieve a gradual reduction in the cross-subsidization of electricity and the elimination of “last mile” lease contracts. In 2016, we signed a long-term contract for the supply of natural gas from Novatek. Where has this figure come from? At the Lipetsk site, for example, we have implemented low-cost technical measures which have increased the use of blast furnace gas by CHP boilers and the recovery cogeneration plant. The result is that we are able to rely almost entirely on coke and blast furnace gas, using them to generate up to 80% of the electricity we need. Significant savings (RUB 4.8 billion, ~$83 million) were obtained from reducing the price of the energy we purchase. Thanks to the joint efforts of the business community we have managed to achieve a gradual reduction in the cross-subsidization of electricity and the elimination of “last mile” lease contracts. In 2016, we signed a long-term contract for the supply of natural gas from Novatek. We have also devoted close attention to improving operational efficiency. We now anticipate that the actual annual impact of energy-efficiency projects and organizational measures implemented across NLMK sites in the 2014-2017 period will be in the region of RUB 7.6 billion (~$130 million, RUB 2.3 billion (~$40 million) more than estimated).

RUB 4.8 BILLION (~$83 MILLION) – THE IMPACT OF REDUCING EXPENDITURE ON ENERGY

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Pavel Lizogub
General Director, Altai-Koks

or us, the key challenge of Strategy 2017 was to achieve the quality of coke, in terms of hot and cold strength, required for the stable operation of our “larger” blast furnaces. The next stage of development was aimed at stabilizing the results achieved in this respect, improving coke quality in terms of average particle size, lowering the production cost through the implementation of introducing additive technology, and optimizing coal charge structures to achieve the best results in the “gross coke – Altai-Koks – NLMK blast furnace shop skips” production chain. All of this work, which has been carried out within a single process environment, is aimed at increasing the efficiency of our key “client” – NLMK Lipetsk’s Blast Furnace Shop No. 2, and, more precisely, at reducing the use of metallurgical coke in blast furnaces and optimizing total fuel consumption. Our second key challenge, which demanded an immediate solution, was linked to a deterioration in our raw material base with respect to coal and an increase in coal mining costs. Our objective was to introduce new coal charge preparation methods based on new technologies. The best alternative for Altai-Koks was coal charge stamping technology, which involved loading the charge into the coke furnace chamber in the form of a pre-stamped coal cake. This method makes it possible to obtain a very high quality of coke in a way that simultaneously expands the range of uses for coal, thereby reducing the production cost of the end product. This is a very significant competitive advantage. Everything I mentioned above has now been achieved. We have carried out a consulting project on the processes for obtaining and transporting coal, following which essential overhauls have been carried out with the objective of reducing the degree of crushing and increasing the average size of coke particles.

We have stabilized production of high-quality coke independent of fluctuations in the proportion of various components used in the coal charge, including additives (granulated pitch, petroleum-based coking additives, electrode coke) while simultaneously reducing the production cost. As far as coal charge stampling is concerned, we conducted a significant operation to monitor all presently existing technologies for stamping coal charges, visiting leading coke producers in Germany and China. After examining all of the options, we identified the optimal technology for the fifth coke battery complex at Altai-Koks. We have now completed the evaluation and selection stage and moved on the design, planning, and implementation stage. We have met the key challenges that formed part of the Strategy. We were, however, unsuccessful in meeting the target we had set for metallurgical coke production, this was the result of a shortage on the coal market of quality coking coal grades, as well as the setting of a joint target with NLMK Lipetsk blast furnace operations to achieve an optimal overall fuel balance. As part of Strategy 2022, we have set ourselves several priority objectives. Implementing coal charge stamping technology will be our key investment project over the next two years. Making the transition to coal charge stamping will increase productivity at the fifth coke battery and, as I have already noted, enable a significant reduction in costs per tonne of coke, with a departure from using expensive grades of coal which are in short supply. We will focus on optimizing our coke screening operation; more precisely, we will increase the amount of 40-60 mm fraction coke produced and improve its cold strength. In order to do this, it will be necessary to carry out joint industrial experiments with NLMK Lipetsk, and to conduct a serious analysis of the practicality of transitioning to a system of dispatching our product through a closed gross coke warehouse with differentiated dispatch flows according to fraction (~40 mm, 25-40 mm).

The launch of the third wave of the Production System in spring 2018 is another very important event for us. We will have much work to do in the coming years in order to engage all employees in the optimization process and in increasing production efficiency.
Strategy 2017 saw the Electrical Steel division working on a major challenge: increasing the competitiveness of Russian grain-oriented steel on foreign markets. This was no easy task, with a number of countries introducing restrictive measures against us during this period and a tightening of global energy-efficiency standards for equipment; producers found themselves facing more exacting demands with respect to all consumer preferences. This situation determined our development priorities – to rise to the level of current global quality standards.

Together with the sales service, we performed a monitoring study of our clients’ requirements, revised our product certification system, and applied stricter quality control criteria. Upgrading our internal standards required us to make adjustments to technology at all stages of production, including hot-end stages. The result was an increase in the output of steel with high-quality characteristics, including a low magnetic loss level – from 41% to 60%. We successfully overcame a technically demanding challenge to increase production volumes of thin steel with thicknesses of 0.23–0.27 mm from 27% to 61%, and expanded our offering of high-efficiency premium products from five to twelve.

Today I can say with confidence that, thanks to effective teamwork with NLMK’s functional areas at our divisional production sites, we have been able to buck the global trend of falling demand for Russian grain-oriented steel within a narrow timeframe and re-establish our portfolio of export orders. The results of audits carried out on top tier transformer manufacturers General Electric/Alstom, Siemens, and ABB, and the renewal of shipments to them confirm that our products have passed the test and adapted to the new market conditions. We have strengthened our position on both the domestic and the foreign electrical steel markets – we continue to cover 10% of the world’s grain-oriented steel needs, and are a leading supplier on the promising Indian and Middle Eastern markets. NLMK continues to dominate the grain-oriented steel segment in Russia and the CIS, and also leads the domestic non-grain oriented steel market with a share of 79%.

As far as optimizing business processes from production to logistics is concerned, we have achieved another significant result: the transformation cost of both grain-oriented and non-grain oriented steel has fallen by an average of 10%. By the end of the strategic period, NLMK Group had met all targets for increasing production of grain-oriented and non-grain oriented steel and was at full utilization capacity.

We didn’t manage to complete every challenge, however. We have not yet been able to make the transition to industrial production of high permeability steel. This is because we have yet to reach the point of obtaining the required high performance characteristics on a stable basis, and so we are continuing to develop the technology and to conduct experimental lots of trial lots together with transformer manufacturers. We believe that collaborating with our new R&D team will reduce the time needed for us to obtain effective results in this area.

The work that we have done as part of Strategy 2017 has shown us that, in order to maintain consumer interest in our products under intensively competitive conditions, we have to work proactively. We need to work closely with producers, and understand their long-term needs, as well as their current requirements, in order to be able to make our electrical steel the answer in all cases.

What’s next? We will continue our efforts to master high permeability steel production and to develop new grades of non-grain oriented steel so that we are ready to launch these products on the market in the new strategic period. We will increase quality and operational efficiency. We also have some new objectives: we want to set up production in strategically important regional markets, and develop a network of service centers. We are presently working with our sales team to develop the concept for these.
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