MAGAZINE FOR PARTNERS OF
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A Magazine
for Transmashholding Partners

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Happy Journey!

Fundamental approach

Oktyabrsky Electric Car Repair Plant (OEVRZ, St. Petersburg) has successfully completed overhauls of two road-rail buses RA1 and RA2.

The road-rail buses manufactured in 2007 have undergone the first stage of scheduled overhauls at OEVRZ. Solutions used have enabled qualitative improvement of the car's aesthetic perception, ergonomic and operational characteristics. Plant's specialists have painted the body with advanced paint materials in corporate RZD colors. The undercarriage was renovated. Floor covering in the passenger compartment was renovated and modern comfortable seats were installed. Road-rail buses were fitted with new energy-efficient LED lamps.

Thus, the plant has mastered a new activity — overhaul of road-rail buses. RA1 and RA2 that have undergone repairs are planned to be operated at the October railway.

Production

Unique innovation

Tver Carriage Works (TVZ) has presented a production prototype of a modern baggage and mail car.

64–4505 car is a representative of a new rolling stock type for TVZ. In terms of its specifications, it is superior to available market counterparts.

Unlike its competitors, the new car has large capacity — 26.8 tons, which is 4.8 tons more compared to those in operation. Use of new baggage and mail cars will help carriers cut costs. They have a compartment with a service department for operating staff and a cargo compartment. Their service life is 40 years. This new development is fitted with a unique integrated monitoring system. It may control up to 10 baggage cars forming part of a train at once. In case of unauthorized access to any car, an alarm will be sent to the operating staff's compartment. Car's design enables operation of a loader with cargo with a total weight of 5 tons in the cargo compartment. This helps eliminate manual labor and decrease handling time. Special focus is made on work conditions for a service team. The compartment and service department meet the most up-to-date job engineering requirements. There is a cooking area with a stove, refrigerator and microwave. Car's design speed is 160 km/h.

"Over a few last years, the enterprise has created new products and mastered new markets, — Director General of TVZ JSC Andrey Solovey said during the presentation. Plant's specialists have created double-deck cars with sleepers and seats, designed and built the first makeup of a new-generation electric train, mastered production of metro cars and built two low-floor tramways together with Transport Systems — one— and three-section. The new baggage and mail car will also supplement the product range of our enterprise. I am sure that our customers will appreciate it."

Test

Powerful and cost-effective

New 2TE25KM freight main-line locomotive is on operation run.

The locomotive has been designed together with the specialists of Transmashholding, Bryansk Machine Building Plant and RZD. Compared to mass production diesel locomotives, 2TE25KM enables an increase in the weight of goods trains transported and reduction of operating costs. This is achieved thanks to an increased diesel capacity factor and adhesive weight. The driver's cab complies with all up-to-date safety and comfort requirements. There is a passive safety system that protects the engine crew in case of an emergency collision and an air conditioning system. A self-contained heater ensures additional heating. New vibration cushioning materials are used to improve work conditions of the engine crew. Ergonomics of the driver's cab and diesel locomotive as a whole has been improved.

One of the key benefits of the new diesel locomotive is its ease of maintenance thanks to accessibility and production effectiveness of its major assemblies. This solution helps decrease this diesel locomotive's standby for maintenance and repair.

Diesel locomotive's tests will end in April 2015, following which production of a development batch will begin.

Co-operation

Joining forces

Transmashholding has signed an agreement for co-operation on foreign markets with the Ministry of Economic Development.

The document has been signed by Minister of Economic Development Aleksey Ulykaev and President of Transmashholding Andrey Bokarev.

According to the document signed, the Ministry of Economic Development has expressed its intent to provide the holding with the broadest consulting, information and organizational support, assist in the establishment and development of foreign economic relations.

Currently, exports account for some 10% of Transmashholding's sales. Not only the rolling stock, but also diesel engines and a broad range of spare parts are manufactured for foreign consumers. Transport machine building products are classified as high-tech export.

Interview

Konstantin Konstantinovich: "Implementation of centralized manufacture of key components will bring enormous savings to our company"

KONSTANTIN KONSTANTINOVICH, PRODUCTION MANAGER OF TRANSMASHHOLDING, SPOKE ABOUT PRODUCTION DEVELOPMENT IN THE CURRENT SITUATION IN AN INTERVIEW TO OUR MAGAZINE.

— Konstantin Frantsevich, can you tell us about the way work of the production manager is arranged at relevant divisions of enterprises?

— Transmashholding has a technical department that comprises a production process technology administration and production system reforming and production support administration. The department exercises control over the achievement of enterprise's targets and their follow-up.

At plants, production managers' offices form a part of the CTO's or chief engineer's office.

Production managers' offices at enterprises develop new product manufacture processes, update processes for serial production, provide the technical department with plans of organizational and technical activities targeted at a decrease in the cost of the output, reports, schedules of technological discipline monitoring and equipment inspection for process accuracy.

We process and follow them up. Besides, we conduct brief inspections for compliance with technological discipline together with plants' specialists. Technical department's specialists together with customer's representatives take part in technical audits of the enterprises of CJSC Transmashholding Group.

Another important task of the technical department is to redistribute production load between enterprises as required.

Much attention is given to interaction between specialists of all levels.

We regularly conduct meetings of the scientific and technical council of production managers, chief welders and chief metal-makers. We invite specialists of leading scientific organizations, developers and manufacturers of advanced processing equipment, accessories and tools to attend these meetings. They share their opinions and experience.

— What are the general principles that Transmashholding follows in its relations with vendors? Where is the focus in case of comparable technical capabilities of equipment?

— Holding's enterprises elaborate technical retooling plans, under which each plant files requisitions for certain equipment. We review the plan prepared by the plant and verify its feasibility. It is essential that these plans are made from the long-term perspective so that purchase of a machine is considered in the context of building a future production chain. Our task is to choose the best equipment option. For example, the plant

in Kolomna needed a machine to process a key part — block cylinder. This operation requires enhanced processing accuracy, so we decided to purchase a machining center by one of the world's leading manufacturers — WALDRICH COBURG.

Before its acquisition, we visited and audited three enterprises specializing in the manufacture of the similar equipment. Eventually, we opted for the manufacturer with the best offering in terms of value for money.

However, there are examples of the opposite. For example, many operations do not require high accuracy, so purchase of an expensive machine of enhanced accuracy will not be feasible. It should also be noted that today, the level of equipment's quality and specifications has leveled off on a global scale. Quite often, Taiwanese, Indian and Korean machines are as good as their European and Japanese counterparts. Many leading companies often order equipment from them.

I would also like to mention domestic machine tool builders. Currently, the

OUR TASK IS TO SELECT THE BEST EQUIPMENT

federal program for the development of machine tool building enterprises is being implemented. Certain advance is already evident.

In particular, we work with Ivanovo Heavy Machine-Building Plant that makes two machines for diesel engine production at Kolomna plant and SASTA plant that produces good turning machines. We have ordered a hone machine for block cylinder sleeve finishing at Sterlitamak plant. There are home tools manufacturers that are quite competitive even in terms of European standards.

— Transmashholding is currently implementing a program for setting up of unified key component manufacture centers at enterprises. Why has this step become necessary?

— Our holding was made of independent plants that were often subordinate to different ministries. Each plant had its own school of designers, engineers and production workers. This is why when we started to combine enterprises, we came across different engineering approaches. For example, without centralized production, today we have 25 types of only locomotive axes, which is why we decided to make new products based on a common reference platform.

Fundamental principles of reference platform engineering imply the use of modular design, common arrangement principles, unification of structures and technologies and a possibility to make prompt changes in the article's composition, which was virtually not done before. Now, it is possible to set up unified production that would make one or another part or assembly for all enterprises of the holding.

Modular design ensures 30% decrease in the new model creation time and

Car sidewall manufacture area, TVZ

product cost and 30% decrease in labor intensity of equipment's maintenance and repair with a nearly halved assembly cycle. Focus on a decrease in the assembly time is a common trend of global rolling stock manufacture.

For example, we have designed a new EP20 electric locomotive. Then, we intend to use it as the basis for the creation of EP3 for AC and EP2 for DC. The same is true of freight electric locomotives. 2ES4 and 3ES5 will be created on the basis of 2ES5. To make use of this modular assembly and reference platforms, the holding consolidates design offices. These centers of design excellence will develop articles with a sufficient level of unification. If we set up a center of excellence for locomotive bogie manufacture in Bryansk, we will also establish a design office there that will take care of their development. This bogie may be used both for electric and diesel locomotives with minimum changes.

Journal box manufacture area, NEVZ

Gear manufacture area, NEVZ

— How do you implement the program for setting up of unified centers of excellence and key component production at enterprises?

— First of all, we define the area of expertise of holding's production sites for the development of assembly production of homogeneous products with a high level of technological unification. Next, we set up allocated production of the component parts essential for the assurance of strong competitive power of holding's products. It includes bodies, traction motors and electric drives, bogie assemblies, control systems with software, locomotive diesels and other component parts. For example, NEVZ makes traction electric drives and motors for the entire holding, while locomotives' bogies are manufactured at BMZ.

IN ORDER TO MINIMIZE EXPOSURE TO POSSIBLE ISSUES WITH DELIVERY OF COMPONENT PARTS FROM ABROAD, THE HOLDING HAS DECIDED TO MANUFACTURE ALL KEY ELEMENTS OF THE ROLLING STOCK ITSELF

Implementation of the Bryansk project is scheduled for 2013–2016. The traction gear box manufacture area has been set up as part of this project and production lines have been arranged completely. According to the plan, by 2018, it will make locomotive bogies for all enterprises of the holding. Besides, Bryansk Machine Building Plant faces quite an ambitious task of manufacture of 2TE25KM main-line

Area of NC machines for part tooling, DMZ

locomotives. It is planned to manufacture 200 locomotive's sections over the next year already, while earlier, the plant made 40 of them. This is the main project of BMZ, so considerable investments have been made to upgrade production in Bryansk.

Much effort is currently made to set up new metallurgical production sites. Today, we are considering the best place to arrange centers of excellence for cast parts of key components made of steel and cast iron.

When we choose a plant to set up a center of excellence, we also take into account the human factor — traditions of design and manufacture of certain parts. For example, the most skilled specialists of the holding in terms of bogies are concentrated in Bryansk. NEVZ used to make traction motors before, so the plant has rich experience of both development and manufacture of these components.

Machining center for the main-line diesel locomotive's main frame, BMZ

— What is the expected economic effect of the program? What is the lead time? Is it possible to evaluate intermediate results?

— We have been doing it since 2013 and we intend to finish it in 2017. This is a comprehensive process exposed to a host of factors. They include reduction of the period of engineering operations, decrease in preproduction planning and defect ratio.

It should be noted that each project, even acquisition of a certain unit of equipment, is analyzed with the feasibility study conducted for it. It is safe to say that introduction of centers of excellence will have a huge economic effect.

We enhance production organizational performance at the same time.

For example, let us consider milling of the diesel locomotive's main frame. Its machining used to take 35 hours; now,

thanks to simple organizational activities, this time has reduced to 16 hours. Labor intensity of part production has nearly halved. Besides, efforts are being made now to decrease this figure even further.

— How is the holding's policy transformed as related to modernization of the production complex in changing economic conditions? Is there any curtailment or redirecting to other vendors?

— The process of setting up centers of excellence has started before changes in economic conditions. Now, production quality has leveled off on a global scale and sanctions have only thrust forward the redirecting process that was already on the way. Many enterprises have entrusted various, but not very critical operations, to the equipment by Asian manufacturers. For example, recently, holding's manufacturing technicians have conducted an audit of Taiwanese enterprises and they are very happy with the quality of the output.

We have already worked with Korean and Taiwanese manufacturers and quite often, we opt for them. Of course, there are certain machines that cannot be reproduced in Asia. This is the precision equipment that we will have to continue purchasing from Europe or Japan.

In order to minimize exposure to possible issues with delivery of component parts from abroad, the holding has decided to manufacture all key elements of the rolling stock itself from the beginning to the end. For example, in new metro cars, the principal motion bogie reducer is made by German ZF. But there is an alternative to it — a similar reducer is made in Demikhovo. Thus, metro cars of Mytishchi plant may be fitted with Russian assemblies instead of German ones. A systemic approach to import substitution will help not only overcome the crisis, but also considerably increase the domestic output.

SETTING UP OF CENTERS OF EXCELLENCE WILL HAVE A HUGE ECONOMIC EFFECT

Standard assembly lines for electric locomotives, NEVZ

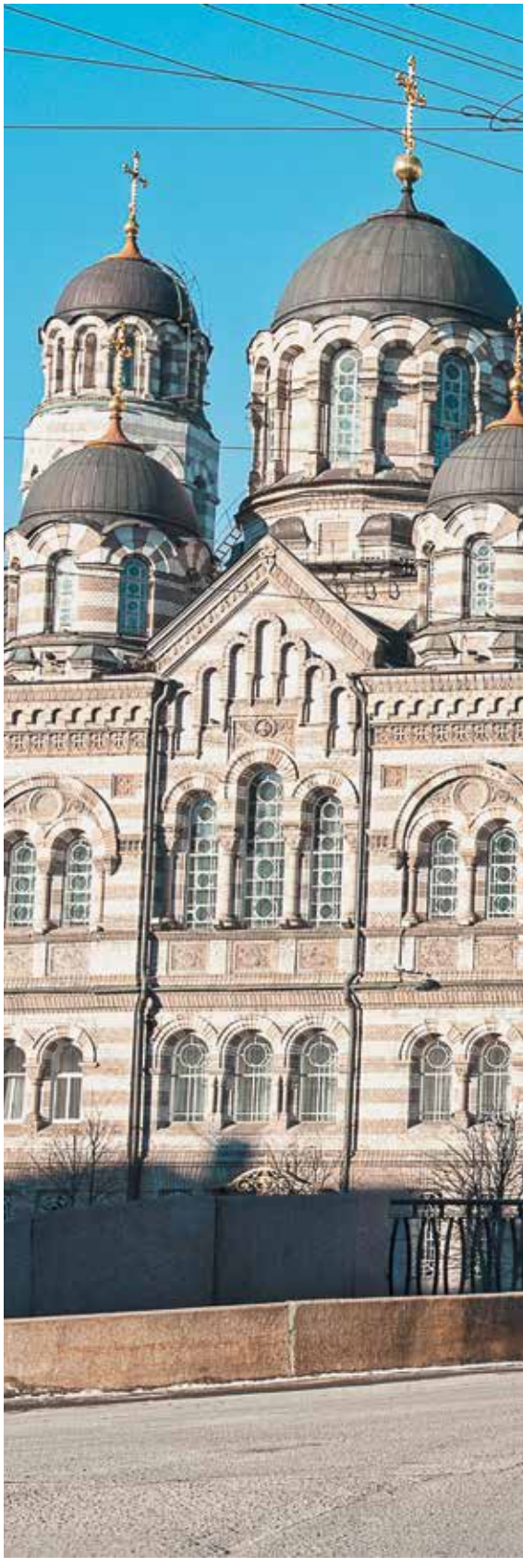
Reborn

IN DECEMBER 2014, OKTYABRSKY ELECTRIC CAR REPAIR PLANT DELIVERED TO THE CUSTOMER THE FIRST LM68M CARS THAT HAD UNDERGONE COMPREHENSIVE MODERNIZATION AT THE ENTERPRISE. AFTER REPAIR, THE TRAMWAY BECAME MORE COMFORTABLE, COST-EFFECTIVE AND SIMPLE TO OPERATE.

Over the recent years, urban electric transport has ceased to be a brand new line of activities for Oktyabrsky Electric Car Repair Plant JSC. The enterprise has mastered it; first, they learned how to repair and then — how to build modern metro cars from scratch. Last year, Oktyabrsky plant expanded the area of its expertise. By the order of the Transport Committee of St. Petersburg, the enterprise has manufactured four low-floor three-section tramways. Concurrently, the plant has mastered overhaul and modernization of LM68M tramway cars that meet the most up-to-date safety, energy-efficiency and comfort requirements.

CONSIDERABLE SAVINGS

LM68M tramway car upgraded by OEVRZ was manufactured as early as 1989 and it




3605

has serviced Petersburg and its residents for many years. It has found a new life at Oktyabrsky plant.

Unique design solutions have resulted in qualitative improvement in ergonomic and operational characteristics of the car and its design. OEVRZ specialists have managed to implement the most advanced achievements in the design and creation of long-lived structural components — load-carrying structures, wheel bogies. Application of a traction motor based on asynchronous motors has resulted in a dramatic (by 24–40%) decrease in energy consumption, while operating costs have reduced by 30%.

SAFETY AND COMFORT

Modernization has significantly changed the appearance of the tramway. Anti-vandal materials that meet the most stringent fire and health safety requirements have been used in its finishing. Not only do they reduce noise level, but also ensure reduction of tramway operating costs.

FOLLOWING MODERNIZATION, ENERGY CONSUMPTION HAS DECREASED BY 24-40%, AND OPERATING COSTS — BY 30%

Cars have become much more comfortable, including for people with disabilities. For the convenience of low-mobility passengers, the car has been fitted with a low-floor rear platform and wide doorways (1,450 mm). Seats with rubber coating and soft upholstery ensure passengers' utmost comfort on the way.

The car's equipment has been supplemented with the door clamping protection system, fiberglass lining of the passenger compartment and advanced information system. The passenger compartment is illuminated with LED lamps. To ensure safety of passengers and driver, the tramway has been fitted with audio and light alarms, radio communication and video surveillance system.

The driver's cab separated from the passenger compartment with a partition also looks different now. A new swing door leads to it and the cab is fitted with an air conditioner and ergonomic seat.

NEW OPPORTUNITIES

Huge importance of the project lies in the fact that plant's specialists have success-

fully mastered new competences that allow enhancing production capabilities of the enterprise.

Such operations as body manufacture, welding of the frame and side frames from large assemblies were fully performed by the plant. All the engineering solutions used have been developed by the OEVRZ' design office. It should be noted that in addition to modernization proper, the plant takes care of service of the repaired plant throughout its life cycle.

"Successful and high-quality fulfillment of the first order for overhaul reconditioning of the tramway has opened a new page in the history of OEVRZ, — underlined Director General of OEVRZ JSC Oleg Pavlov. — The plant has initially specialized in overhaul of electric train's cars and passenger cars of the locomotive traction. Over the recent years, the enterprise has mastered a host of new competences — production and overhaul of metro cars, tramway repair. The enterprise is successfully implementing the concept for product range diversification, which allows to procure the required volume of orders for the plant and maintain a high level of qualification of workers and employees amidst unstable economic situation in the country and globally".

THE CAR IS FITTED WITH COMFORTABLE SEATS AND A PLATFORM FOR LOW-MOBILITY PASSENGERS


ЭГ2Тв

The future is now

TRANSMASHHOLDING IS DEVELOPING A MULTI-PURPOSE BASE PLATFORM FOR NEW-GENERATION DOMESTIC ELECTRIC TRAINS. TRAINS BASED ON IT MAY BE USED FOR URBAN, SUBURBAN AND REGIONAL SERVICE.

THE FIRST MEMBER OF THE NEW FAMILY IS EG2TV ELECTRIC TRAIN CREATED IN 2014.

Operational characteristics and economic efficiency of the train place it on a par with the best specimen available on the market. However, the main difference of EG2Tv is that it is targeted at home-grown technologies. This electric train is a result of work of Russian engineers and most of its assemblies and parts are made by enterprises of this country.

EG2Tv will be manufactured at Tver Carriage Works. The first prototype of the electric train has already been manufactured; currently, it is undergoing acceptance tests. Certification tests are scheduled for

March 2015; after their completion, a certificate authorizing serial production will be obtained.

DOMESTIC PROJECT

During their work on the project, engineers have made the most of the rich experience accumulated during more than 100 years of rolling stock operation in this country.

The main focus was on maximum localization of production of the train and its component parts in Russia. Already when the first prototype was made, utilization ratio of Russian component parts was some 80%. Further on, this figure will increase. Minimum dependency on imported parts is particularly relevant in the current economic situation when there is a constant risk of issues related to deliveries from abroad.

Not only is EG2Tv not inferior to its foreign counterparts, but it leaves them behind in a number of indicators. Thanks to its targeting at Russian vendors, Tver electric train will be at least time and half cheaper than its foreign counterpart.

EG2Tv has become the first development as part of the new base electric train platform that may be used in the future to create various modifications of trains for urban, suburban and regional service.

For example, EG2Tv (urban type) is ideal for passenger service on the Smaller Ring of the Moscow railway.

INDIVIDUAL DESIGN

This electric train perfectly combines modern design, excellent functionality and high safety standards. Design of EG2Tv has been developed by Spanish company Integral Design and Development, the projects of which are well-reputed at many European railways. Still, the train is not limited to one exterior and interior option — it may be individual to reflect the carrier's corporate style.

The electric train's concept provides for a possibility to create modifications for traveling speeds of up to 120 and 160 km/h, and in the longer run, for high-speed service — up to 250 km/h.

work. EG2Tv makes use of advanced modular configuration principles, which enables adaptation of the car's space to passengers' needs in advance. Thanks to application of the air suspension technology, the electric train features enhanced riding comfort and passengers are exposed to lower noise and vibration.

Passenger compartments are fitted with comfortable cantilever-design seats, elaborate system of handrails, LED lamps and information displays. The arrangement of seats and entrance doors enables passengers' free movement in the passenger compartment. Microclimate control and air decontamination systems will make passengers' experience even more pleasant. If so desired by the customer, cars may have wireless Internet and electrical sockets.

A special focus has been made on assurance of comfort of the passengers with musculoskeletal system disturbances. Wide doors and through inter-car walkways ensure the best experience of people with disabilities when boarding and moving along the train. Head cars are fitted with seats and toilet rooms for people with disabilities.

The driver's working place has been designed using the most advanced solutions. The cab is fitted with the microclimate control system and ergonomic seat.

The driver's workspace conforms to all applicable health and safety requirements.

AC, DC and two-system options may be created.

The electric train of a baseline configuration may accommodate more than 1,500 persons. The train's principal makeup is 5 cars, however, in the long run, it may comprise 4–14 cars. The number and arrangement of seats may be easily adjusted based on customer's wishes.

CARE FOR PEOPLE

Design of the new electric train ensures utmost comfort of passengers and allows the driver focus on his/her

THIS ELECTRIC TRAIN PERFECTLY COMBINES MODERN DESIGN, EXCELLENT FUNCTIONALITY AND HIGH SAFETY STANDARDS. THE TRAIN IS NOT LIMITED TO ONE EXTERIOR AND INTERIOR OPTION — IT MAY BE INDIVIDUAL TO REFLECT THE CARRIER'S CORPORATE STYLE

FOCUS ON SAFETY

Much attention has been given to drivers' and passengers' safety when the electric train has been designed.

EG2Tv is equipped with the integrated control, troubleshooting and safety system. It enables electric train control by one driver and conducts real-time monitoring of the train's technical condition.

Modular units (crash modules) of the passive safety system used in head and intermediate cars are an innovative engineering solution that has not been used before in construction of home electric trains.

In case of a crash, they absorb the energy released thus reducing the risk

THE DRIVER'S WORKING PLACE HAS BEEN DESIGNED USING THE MOST ADVANCED SOLUTIONS. THE CAB IS FITTED WITH THE MICRO-CLIMATE CONTROL SYSTEM AND ERGONOMIC SEAT. THE DRIVER'S WORKSPACE CONFORMS TO ALL APPLICABLE HEALTH AND SAFETY REQUIREMENTS

to the health of passengers and engine crew.

A special focus in the design of EG2Tv has been made on reliable braking action. Its design combines electric resistance and regenerative braking and advanced disk brakes. Motion and brakes are controlled with the "traction — braking" electronic controller, with which the driver may infinitely regulate traction and braking force. To ensure safe movement in case of an exhausted brake and feeding conduit of the electric train, a parking brake is automatically activated; it can hold the electric train with a maximum aslope load of up to 30%.

EG2Tv is also fitted with the most advanced fire response complex — alarms and fire fighting systems. Besides, all cars have video surveillance and train communication with the driver.

EVERY LITTLE THING MATTERS

Comfort and safety of EG2Tv electric train are backed up by its cost-effectiveness. For example, application of an asynchronous traction drive and disk brake has enabled a significant decrease in labor intensity of maintenance and increase in the repair interval. To reduce wheel wear and ensure stable wheel adhesion to rails, bogies are additionally fitted with wheel work face cleaning units.

COMFORT AND SAFETY OF EG2TV ELECTRIC TRAIN ARE BACKED UP BY ITS COST-EFFECTIVENESS. THE ELECTRIC TRAIN MAY OPERATE AT A SPEED OF UP TO 160 KM

All structural elements of electric train's systems have been designed with the maximum use of the modular principle. Thanks to it, all the systems and mechanisms that need maintenance and repair are easily accessible and replaceable.

Train's cost-effectiveness is ensured by energy-saving lighting, automatic climatic control in the passenger compartment, mobility of passengers' boarding and alighting.

Engineering solution of the EG2Tv design has been well-thought-through. For example, oil-free piston compressors are used to generate compressed air, which significantly reduces their maintenance costs.

In general, the use of leading-edge technologies has enabled an increase in the electric train's service life from 28 to 40 years.

Service the year around

Switchover to operation of new-generation locomotives brings about a need for a totally differeфnt approach to their maintenance management. EP20 two-system passenger electric locomotives have been in operation at the Moscow railway for more than two years now. These machines are serviced at a purpose-built service center of NEVZ LLC.

EP20 electric locomotive service center (SC) is located at Moscow-Sortirovochnaya Ryazanskaya depot. As of now, 48 EP20 locomotives have been allocated to this depot and they ply in 11 directions from Moscow: Voronezh, Kislovodsk, Adler, Anapa, Kazan, Novorossiysk, Nazran, Rostov, Minsk, Nizhny Novgorod, Vainikkala (Finland). Russian Railways (RZD) intends to purchase a total of 200 electric locomotives of this series by 2020.

MODERNIZATION

To ensure high-quality service maintenance of EP20 electric locomotives and decrease in repair time, technical retooling of Moscow-Sortirovochnaya Ryazanskaya depot is planned.

As of now, the depot is fitted to repair electric locomotives of older series: EP10, CHS2K, CHS7. A need for multiple travels of a locomotive to conduct various service operations of EP20 electric locomotives has given rise to modernization. Recently, a contract for elaboration of technical documents for depot's equipment has been signed. Start of technical retooling activities is scheduled for 2016.

SC will take the bulk of locomotive maintenance and repair equipment on lease at the depot.

Processing, bench and checking equipment will be additionally purchased as part of the NEVZ' investment program.

The electric locomotive needs to be in operation as much as possible. This is possible thanks to decreased maintenance, scheduled and unscheduled repair time. Currently, a proposal for an increase in the run between current repairs from 100 to 150 thousand km is being considered; with it, the project's performance will dramatically increase and turn into yet another benefit of the locomotive.

NEW APPROACH TO MAINTENANCE MANAGEMENT

The main difference between the service center and a regular repair depot is close co-operation with the EP20 locomotive manufacturing plant. Required information and component parts arrive at SC much faster. Besides, a different maintenance management approach is used. In a "legacy" repair depot, the key indicator is a number of repairs conducted. Here, it is much more profitable to keep the locomotive in operation with payment made for the run. Another factor is arrangement of a compact structure that ensures clearly high quality of operations.

Further on, it is planned to set up divisions focusing on service maintenance of other more promising locomotives (first of all, 2ES5) on the pattern of the Moscow service center.

Quite recently, a toll-free hotline started its operation at SC. Experienced specialists are available twenty-four-hour to advise drivers in case of abnormal situations.

At earlier stages of operation of new locomotives, in case of an abnormal situation, the electric locomotive used to stand idle at a span or station for a long time; drivers tried to restore it using their own resources. If they failed, they had to call for a reserve electric locomotive. Thanks to the hotline, time for correct decision-making dramatically decreases and it only takes 5–10 minutes to make a decision that could take a few hours before.

To ensure prompt locomotive maintenance outside of the service center, a mobile team has been set up;

figures

HUMAN RESOURCES

The staff of the EP20 service center comprises

56 EMPLOYEES

MANAGERS **8** PERSONS

SPECIALISTS **23** PERSONS

WORKERS **26** PERSONS

it visits three Moscow railway terminals — Leningradsky, Kursky, Byelorussian.

The service center has its own twenty-four-hour control center. Its functions are diverse and include planning of electric locomotive delivery for trains depending on the run. The locomotive's condition and schedules repairs are subject to twenty-four-hour monitoring.

TEAM

Today, the service center employs 56 persons. Despite the challenging economic situation in the country, work has not stopped at the NEVZ' branch and the management has retained the entire team. Going forward, as the locomotive fleet increases, it is planned to extend the staff to 200 persons.

More than 60% of team members have higher education. 9% of team members are experienced in railway transport operation. Fitters also have higher and secondary technical education. The center also employs Alstom specialists who closely co-operate with service engineers.

Average wages of workers at the service center are some 10% higher than at the depot. Director of the service center Aleksander Rodionov:

figures — HUMAN RESOURCES

4.3 average labor grade at the EP20 service center

3 4 5 GRADE — 5 — 10 — 11 PERSONS

Aleksander Rodionov, director of the service center

"People regularly contact us asking for employment.

Good and stable salary is strong motivation. Besides, working with an innovative electric locomotive is much more pleasant that with worse for wear locomotives that gradually go unserviceable".

Advanced engineering solutions used in the creation of EP20 have determined a special approach to its service. This requires new skills and expertise. Much attention is paid to training. All employees have taken special training at the manufacturing plant. Product engineers from the NEVZ' training center came here to give classes. Such advanced training activities are conducted on a regular basis. Drivers' training by service center specialists has also been arranged. For example, this year, training has been conducted in Kazan and St. Petersburg.

EDUCATION OF ROLLING STOCK REPAIRMEN:

11 PERSONS higher education

6 PERSONS intermediate vocational education

3 PERSONS elementary vocational education

4 PERSONS general education

EDUCATION OF TECHNICIANS AND ENGINEERS:

27 PERSONS higher education

4 PERSONS intermediate vocational education

AT EP20 SC, A TOTAL OF **38 PERSONS** HAVE HIGHER EDUCATION,

WHICH MAKES **65.5%** OF THE TOTAL STRENGTH

VL8 (N8): hero electric locomo

Speech by NEVZ' design manager B. Suslov at the meeting dedicated to manufacture of the first 16-wheel N8 locomotive. 1953

IN 1950S AND 1960S, VL8 ELECTRIC LOCOMOTIVES WERE THE MAIN RAILWAY LOCOMOTIVES OF THE USSR. IN TODAY'S RUSSIA, THESE MACHINES HAVE BECOME MUSEUM PIECES, BUT THEY ARE STILL IN OPERATION IN SOME CORNERS OF THE CIS.

In 1950s, this country was on the upswing, which required a dramatic increase in railways' capacity. VL22 electric locomotives could not handle this volume of transportation. This could only be done by way of switchover of long-distance lines to electric operation and, correspondingly, design of new high duty electric locomotives. Operation of trains with increased weight requires freight locomotives with eight and more mounted driver wheels.

In 1952, Novocherkassk Electric Locomotive Plant (NEVZ) set upon design of the new locomotive under the guidance of design manager B.V. Suslov. As early as next March, N8–001, the first pilot sixteen-wheel freight electric locomotive, was manufactured — Novocherkassk sixteen-wheel locomotive.

N8 electric locomotives that were designated as VL8 (Vladimir Lenin) in January 1963 were manufactured until 1967. Until 1961, they were country's most powerful locomotives able to haul trains with a weight of 3,500 tons at a speed of 40–42 km/h. They were delivered to the railways of the Urals (South Ural) and Siberia (Tomsk, East Siberian) and further on — to Moscow, Transcaucasian and Azerbaijanian railways until late 1990s. VL8 electric locomotives were concurrently produced by NEVZ (until 1964) and Tbilisi Electric Locomotive Plant (TEVZ, since January 1958).

Production electric locomotives retained design of the mechanical part, electric machines and devices of the pilot batch electric locomotives built in 1955. Starting from 1957, bodies and bogies of VL8 electric locomotives were made by Lugansk Diesel Locomotive Plant. It is worthy of note that VL8–009 (N8–009) electric locomotive manufactured in March 1956 was a milestone for NEVZ — thousandth locomotive made at the plant.

VL8 was designed based on a brand new force diagram and it embodied advanced scientific, design and engineering solutions. Brand new bogies of casting design were developed for this electric locomotive; journal boxes were fitted with antifriction bearings and spring suspension was balanced at either side of the bogie. For the first time, the electric locomotive's body was made without vestibule platforms and had an advanced semi-streamlined shape. VL8 sections had permanent mechanical and electric interconnections and could be separated only during repairs.

NB-406A new traction motors were designed for the electric locomotive. They had an unsaturated magnetic frame, which helped them implement full power in a wider range of rotation speeds.

Specifications of NB-406A traction motor

Mode	Power, kW	Current, A	Rotation frequency, rpm
Hourly	525	380	735
Continuous	470	340	765

NV 001 electric locomotive in the NEVZ' assembly shop

notive of the mid XX century

Auxiliary machines were also designed and manufactured at a higher technical level: NB-430A motor — for the fan engine and control current generator, NB-431A motor — for 1-KT compressor drive and NB-423A converter required for regenerative braking. DK-405K control current generator and PU-3A distribution board with the generator voltage regulator remained virtually the same as at VL22M electric locomotives.

VL8 had a regular resistant start circuit — with series, series-parallel and parallel TED connections and four stages of excitation weakening. This electric locomotive for the first used the new P3 double-skid collector bow.

Electric locomotive 001 was tested in 1953–1954 at Suramsky mountain crossing (Transcaucasian railway) and at Kropachevo — Zlatoust — Chelyabinsk section (South Ural railway) and demonstrated strong superiority over VL22M. 1955 saw manufacture of a pilot batch of seven electric locomotives. Design of production electric locomotives was only slightly different from that of pilot ones.

A total of 1,715 electric locomotives were made with 431 built by NEVZ.

Increase in passenger traffic in 1970s resulted in frequent use of VL8 electric locomotives for passenger service.

This entailed a host of changes — sockets and cables of intercar heating connections appeared.

Now, VL8 electric locomotives are operated at the railways of Ukraine, Armenia, Georgia and Azerbaijan. In Russia, VL8 are left in Caucasian traction section only and they are out of service.

Anna Semenyuk
Photo from the NEVZ' History Museum

Memories of E.SH. YURKOVERTSKY, Chief Technical Retooling and Technology Specialist:

— I joined NEVZ in 1960. I was delegated as an engineer to an electric locomotive test station. I started to work under the authority of experienced driver and test engineer V.I. Pivnenko, DC electric locomotive group. Back then, there was no DC rolling ring and we conducted running tests of N8 electric locomotives at the plant — a rail track electrified with 3kW DC ran from the bogie to the assembly shop. I remember that all the tests were conducted in strict accordance with the regulations. This electric locomotive proved its good operation characteristics. Powerful, reliable, the first truly NOVOCHERKASSK locomotive — from design drawings to implementation in metal.

Principal specifications of BL8 electric locomotive

Current type:	direct
Collector bow voltage, kW:	3
Axle configuration:	2(2o+2o)
Electric braking:	regenerative
Power, kW:	
in hourly mode	4,200
in continuous mode	3,660
Traction effort, kN:	
in hourly mode	319.7
in continuous mode	297.5
estimate up-hill	456.0
Speed, km/h:	
design speed	100
in hourly mode	42.6
in continuous mode	44.3
estimate up-hill	43.3
Regulating system:	resistance-power operated
Number of stages of field weakening:	4
Maximum field weakening, %:	64
Reduction ratio, mm:	3.905
Wheel diameter, mm:	1,200
Truck rigid wheel base, mm:	3,200
Common wheel base, mm:	24,200
Rail load of mounted wheels, tons:	22.5
Locomotive's axial length automatic coupling, mm:	27,520
Height, mm:	5,080
Weight (without sand), tons:	180
Sand bin capacity, m^3:	3.92

NEVZ' specialists during N8 electric locomotive tests

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