

## Pages of History of RUPE "Belarusian Autoworks" (BELAZ)

RUPE "Belarusian Autoworks" (BELAZ), the sixtieth anniversary of which last year was celebrated not only by the workers of the enterprise, but also by numerous consumers of its products. Annals of BELAZ are rich with creative aspirations and labor feats that brought world-wide glory to the leader of the Belarusian mechanical engineering.

The history of the enterprise sights since 1948 when according to the Law on the Five Years' Plan for Restoration of National Economy of Belorussian Soviet Socialist Republic for 1946-1950 near railway station Zhodino in 50 kilometers from Minsk the construction of machine-building factory for production of the peat equipment was launched. In May, 1950 the first types of equipment of the factory was produced: containers for transportation of peat, agitators for peat drying, etc.

In March, 1951 the factory of peat machine-building was transformed into the factory for soil-reclamation and road vehicles "DORMASH" which produced snowplows, flusher and auger vehicles, brush cutters and other equipment.

On April 17, 1958 the enterprise has received new name - "Belarusian Autoworks" (BELAZ). The first dump truck that left BELAZ assembly line by November 7, 1958, was MAZ-525, developed by designers of the Minsk Autoworks.



**The first dump truck MAZ-525  
with payload capacity of 25 tons**

It is natural, that the majority of the technical solutions applied at design stage were similar to the solutions that are applied to the trucks intended for movement on public roads.

However in 1960 engineering department was formed on BELAZ and this department had to solve a challenging task. Recently considered a sample of new equipment dump truck MAZ-525 ceased to satisfy increasing requirements of end-users. Powerful mining companies and coal open-cast mines, large-scale hydraulic engineering sites and enterprises of the construction industry were in demand for more efficient dump trucks as much as possible adapted first of all to operating conditions in open-cast mines.

Improving existing model of a dump truck or creating absolutely new vehicle? The creative staff of the factory chose the second way. The new period in BELAZ history started. BELAZ specialists studied operating conditions and demanded technical characteristics of dump trucks, drew pencil sketches of the future vehicle, checked on test-beds the correctness of technical solutions. Meanwhile the factory remained a usual factory that had to supply its products to the country.

For the period of less than one year BELAZ engineers created essentially new mining dump truck with payload capacity of 27 tons - BELAZ-540. The first sample was produced in October, 1961.



**Mining dump truck BELAZ-540  
with payload capacity of 27 tons**

In design of this vehicle were applied lots of technical solutions new to mechanical engineering that provided subsequently highly effective operation of dump trucks in the conditions of open-cast mines. Among these solutions: pneumohydraulic suspension, applied for the first time in practice of domestic automotive industry, providing high smoothness of movement both in loaded, and in empty condition, hydromechanical transmission which also in practice of our mechanical engineering has been used for the first time for serially produced vehicles. It is also worth to mention the original configuration: the cab arrangement near to the engine allowed to get the minimum base and the minimum outline dimensions and by that to raise maneuverability of the vehicle, to increase its stability; bucket type body allowed to lower the centre of gravity and also to raise stability of the vehicle. Original solutions of steering and hoist systems, guards and other units became traditional at creation of dump trucks of the next classes of payload capacity.

And in 1965 without stops in production process the enterprise carried out transition to serial production of 27-ton dump truck BELAZ-540 which became the ancestor of the whole family of heavy trucks. Since 1967 the enterprise launched production of 40-ton dump truck BELAZ-548A designed taking into account the greatest possible unification of the basic units and parts of two vehicles.

Creative activity of factory staff was highly appreciated. For successful work on creation of design and organization of production of new vehicles in 1966 BELAZ was awarded with the Order of the Labor Red Flag.

Originality and constructional perfection of these dump trucks was admitted not only in our country, but also abroad.

Thus in 1965 at International Exhibition in Leipzig BELAZ-540 was awarded with gold medal. This dump truck received the same award in 1966 at exhibition in Plovdiv.

The success of the "younger brother" one year later was repeated by 40-ton dump truck BELAZ-548A created with the same basic technical solutions. This dump truck was awarded with anniversary 1000th gold medal at exhibition in Leipzig.



**Mining dump truck BELAZ-548A  
with payload capacity of 40 tons**

In 1968 for creation of family of the unified heavy-load vehicles for open-cast mining of minerals and construction industry and for development of their serial production 11 BELAZ workers were awarded with the State Prize of USSR.

Thus, the first eight years of existence of BELAZ design department proved that this young team is capable to put forward and quickly realize ideas that correspond, and at times outrun the level of development of science and practice in the world.

It was once again confirmed in 1968. This is the year of birth of the first pre-production model of dump truck BELAZ-549 that was a base dump truck of a class of payload capacity of 75-80 tons.



**Mining dump truck BELAZ-549  
with payload capacity of 80 tons**

This vehicle was different from the predecessors not only in payload capacity. First of all, the approach to development was different. Instead of hydromechanical transmission for the first time electromechanical transmission was applied and it caused the necessity of creation of variety of essentially new assemblies, units and systems. The new dump truck was also different from 27 and 40-ton dumpers by independent suspension of all wheels and new two-seat cab. In the process of its creation other new technical solutions were also used.

In 1969 on the basis of dump truck BELAZ-549 the prototype of the auto-train BELAZ-549B-5275 with rear unloading and payload capacity of 120 tons was produced, and in 1973 BELAZ manufactured auto-train BELAZ-7420-9590 for coal transportation with bottom unloading and payload capacity of 120 tons.

Auto-trains were also created on the basis of other dump trucks that BELAZ produced at that time. However the life itself has proved that the biaxial dump trucks created under the classical scheme are finally cheaper, more economical and more universal in operation in comparison with auto-trains. Therefore the factory stepped on a way of increase in payload capacity of dump trucks. In particular, in 1977 pre-production models of dump truck BELAZ-7519 - base dump truck of a class of payload capacity of 110-120 tons - were produced. Due to successful design solutions and high consumer properties dump trucks of this payload capacity for a long period of time remained for BELAZ the most important products.



**Mining dump truck BELAZ-7519  
with payload capacity of 110 tons**

However development of the big mineral deposits in Yakutia and Kuznetsk Basin (Kuzbas) demanded for creation of even more productive, powerful and effective mining dump trucks. Therefore in 1983 BELAZ launched serial production of dump truck BELAZ-75211 - base dump truck of a class of payload capacity of 170-220 tons. For its development a well-known, tested and time-

proved scheme was used: classical configuration and electromechanical transmission. A number of modifications of this truck that differed basically in type of the diesel engine unit were for a long period of time successfully operated in Russian mines.



**Mining dump truck BELAZ-75211  
with payload capacity of 170 tons**

As one can see, design engineers of BELAZ kept their efforts up-to-date, created the very kind of equipment that was demanded by national economy at time when it was required. The new progressive solutions applied in design of the first vehicles allowed to further improve units and systems of dump trucks of all classes of payload capacity, to introduce new accessories and materials, to perform step-by-step modernization of dump trucks with creation of new versions on the basis of use of diesel engines, transmissions and tires produced by various companies. Factory experts always paid special attention to suitability of equipment to operating conditions, creation in each class of dump trucks modification with northern and tropical options, for transportation of easy cargoes, etc.

After disintegration of the USSR and sharp curtailment of production in Russia which was and remains basic consumer for BELAZ the factory did not stop production of any dump truck models covering a range of payload capacity from 30 to 220 tons. Moreover, the factory expanded product range and included in the production program other special heavy transport equipment: dump trucks with enhanced cross-country capacity and hydromechanical transmission, road-construction vehicles and vehicles for mine servicing works, such as loaders, bulldozers, recovery tractors and watering vehicles; equipment for underground works, vehicles for metallurgical enterprises, etc.

Family of dump trucks which are produced by BELAZ in 1994 was filled by the vehicle of new generation - 55-ton dump truck BELAZ-7555 - which not only organically incorporated all

advantages of traditional BELAZ equipment (excellent traction-dynamic characteristics, high smoothness of movement and maneuverability, simplicity and convenience of steering and maintenance, low costs for one ton of transported cargo), but also got new qualities favorably distinguishing it from predecessors. Among them, first of all, is the increased stability at movement in open-cast mines with the load, reached at the expense of new original elements in design of the guiding device of suspension and increased spring track; secondly, the minimum labor input for maintenance provided with more convenient arrangement of assemblies and units, cutting-down of number of lubrication points and application new "maintenance-free" materials.



**Mining dump truck BELAZ-7555B  
with payload capacity of 55 tons**

New dump trucks were produced in the several modifications that differed by engine units (diesel engines of the Russian and foreign companies), tires (diagonal and radial design), presence of system of multiple-disk oil-cooled brakes, etc.

Tests of new dump truck in severe road conditions have proved technical solutions and high operational properties of the new vehicle.

In 1996 the enterprise launched production of one more perspective model - dump truck BELAZ-75131 with payload capacity of 130 tons - that was designed taking into account more than 15 years of operating experience of its predecessor - 120-ton dump truck. Among its advantages are the following: perspective AC/DC transmission; new design of the rear axle, allowing to reduce labor input for maintenance of brake gears to minimum; new body providing rational loading; new comfortable cab; reliable, powerful and effective Cummins engine.



**Mining dump truck BELAZ-75131  
with payload capacity of 130 tons**

Still one dump truck deserves special attention. In September, 2005 the pre-production model of the biggest dump truck in the history of domestic automotive industry - BELAZ-75600 with payload capacity of 320 tons - was produced at BELAZ. The classic wheel formula 4x2 in combination with new guiding device of suspension and AC transmission provide high smoothness of new dump truck movement and good traction-dynamic characteristics.



**Mining dump truck BELAZ-75600  
with payload capacity of 320 tons**

Complete units and assemblies of leading world manufacturers are used in the design. Diesel engine with an electronic control system, transmission with microprocessor control device, centralized lubricating system, system of combined automatic-

controlled extinguishing, system of rear and side video view, a two-seater cabin with safety system "ROPS" provide high level of operator safety and comfortableness, as well as low level of maintenance and repair laboriousness. BELAZ-75600 has successfully been tested on Bachatsky coal open-pit mine of Kuznetsk Basin and now the enterprise makes already the fourth dump truck of this series.

In total for all history of the enterprise BELAZ has developed more than 600 versions of mining dump trucks of payload capacity from 27 to 320 tons, has produced more than 130 thousand units of mining dump trucks which have been sent to more than 60 countries of the world.

At the same time the enterprise continues systematic work on expansion of product range. Only during the past 2008 RUPE «BELAZ» which includes also, besides headquarters plant, Mogilev Autoworks, has developed and made pilot batches of:

- 320-ton mining dump trucks BELAZ-75600;
- 90-ton mining dump trucks BELAZ-75570;



**Mining dump truck BELAZ-75570  
with payload capacity of 90 tons**

- 45-ton mining dump trucks BELAZ-7545;

Production tests of 160-ton dump truck BELAZ-75170 are also finished, pilot models of 50-ton underground dump truck BELAZ-75810 and 9-tonnes of underground load-haul-unit MOAZ-4055 are finished.



**Load-haul-unit MOAZ-4055  
with payload capacity of 9 tons**

Besides, the product range of the enterprise is expanded over last two years thanks to development and production startup of:

- New modifications of 30-ton dump trucks with engines of Tutaev and Minsk motor factories co-production, as well as Cummins engines.

- New modifications of 130 and 220-ton dump trucks with MTU engines;

- New modifications of 130-ton dump trucks with AC/DC and AC/AC transmissions;

- New models of recovery tractors on the basis of 55, 130 and 220-ton mining dump trucks;



**Recovery tractor BELAZ-7455B**

- New modification of a 150-ton heavy truck for needs of metallurgical enterprises;

- Hopper cars of 67 and 70.5 ton payload capacity for transportation of mineral fertilizers.



**Hopper car 19-9774  
with payload capacity of 70.5 tons**

The system of quality management for development, production and maintenance of mining dump trucks, special vehicles and road-construction equipment corresponds to the requirements of Belarusian standard STB ISO 9001-2001 and to International standard DIN EN ISO 9001:2000.

BELAZ today is a dynamically developing enterprise. Thus, in 2008 output production in the comparable prices was increased in comparison with 2007 by 11.2 %. Relative density of new kinds of production was around 43.1 %. The project of renovation of production facilities for 2008-2012 provides the organization of serial production of some new products (mining dump trucks BELAZ with payload capacity of 90-110 tons with hydromechanical transmission, mining dump trucks BELAZ with payload capacity of 320-360 tons; as well as equipment with trade mark MOAZ: load-haul-unit with payload capacity of 9 tons, articulated dump truck for underground works with payload capacity of 50 tons, dump truck with enhanced cross-country capacity and payload capacity of 25 tons, 3-axle dump truck with enhanced cross-country capacity and payload capacity of 27 tons, hopper car for transportation of mineral fertilizers with payload capacity of 70.5 tons, etc.) and corresponding development of other facilities.

Everything that is reached by BELAZ for more than fifty years of its history is a result of realization of the main policy of the enterprise: complete satisfaction of requests of consumers of mining equipment that is produced with trade mark BELAZ for more than half of a century.