



**KRYVOKON**

**Olexander G.,**

Candidate of Philosophy  
Associate Professor of automobile and  
tractor construction  
National Technical University  
“Kharkiv Polytechnic Institute”  
(a city of Kharkov)

**AN IMPORTANCE OF MODERNIZATION OF THE STATE KHARKIV  
LOCOMOTIVE PLANT NAMED AFTER COMINTERN  
IN THE BEGINNING OF THE XX CENTURY  
IN THE CONTEXT OF TRACTOR CONSTRUCTION IN UKRAINE**

*The article is sanctified to the analysis of modernization features of the State Kharkiv Locomotive Plant named after Comintern in the beginning of the XX century in the context of development of the domestic tractor construction. The processes of equipment updating and alteration on the new type of production are described. A conclusion about an importance of the modernization for development of tractor construction as an industry of economy of Ukraine is observed.*

*Стаття присвячена аналізу особливостей модернізації Державного Харківського паровозобудівного заводу ім. Комінтерну початку ХХ ст. в контексті розвитку вітчизняного тракторобудування. Описано процес оновлення обладнання та перебудови виробництва на новий вид продукції. Зроблено висновок стосовно особливого значення даної модернізації для розвитку тракторобудування як галузі народного господарства України.*

*Статья посвящена анализу особенностей модернизации Государственного Харьковского паровозостроительного завода им. Коминтерна начала ХХ в. в контексте развития отечественного тракторостроения. Описан процесс обновления оборудования и перестройки производства на новый вид продукции. Сделан вывод относительно особенного значения данной модернизации для развития тракторостроения как отрасли народного хозяйства Украины.*

**Statement of the problem.** At present functioning of the Ukrainian economy prerequisite improvement serves industrial upgrading. Under the modernization all understand “modernizing all progressive changes in society that moves” [16]. According to another definition, modernization is “the social and historical process in which traditional society is progressive, industrialized” [4]. When it comes to

modernizing the economy, and therefore the company, the first thing they mean a “state of sustainable and effective development, based on the implementation in the production of scientific and technological progress, aimed at updating material and technical resources of all sectors of the national economy and their enterprises with a view to manufacture products with innovative content and competitive in foreign and domestic markets” [13].

It should be noted that at the time the modernization and restructuring of the economy in accordance with the requirements of scientific and technological progress has caused a rapid increase in production engineering plants of the USSR, as well as increased purchases of new machinery and equipment abroad. Today, the domestic economy is also carried out modernization of existing enterprises by equipping new machinery, tools, machineries and technologies etc. However, in practice, companies’ investment programs laid indicators that provide return on equipment in a very short time, which provides a high level of intensity of production. For example, laid the data of the machine must be carried out in three shifts. But because of unevenness production, low load plants, planning mistakes and other deficiencies identified indicators are not achieved, making our economy as a whole is not effective.

It’s a pity, that the development of modern ways of modernization and implementation of investment projects, particularly in engineering, is not considered the experience of previous stages of the development of this industry. In our view, it would avoid many mistakes and correct subsequent actions, “not stepping on the same rake”. Therefore, the works that devoted to observing the features of the first years of the domestic tractor construction are urgent at the theoretical and practical levels.

The study of the history of becoming tractor construction involved such well-known specialists as E. Aleksandrov, L. Besov, A. Bystrychenko, A. Drobotenko, A. Epstein, V. Yevtenko, V. Epifanov, S. Kulchytsky, G. Luparenko, L. Pogorily et al. [1. 2. 3. 11. 12. 14. 15].

**The main purpose** of this article is to analyze the characteristics of the modernization of the State Kharkiv Locomotive Plant named after Comintern

(hereinafter – SKLP) based on newly discovered materials from Kharkiv regional archives. Our study is based on archival materials for the first time introduced to the scientific community. This analysis will find new information on the problems that arose in the early stages of modernization of industrial production in our country and also help us consider the most significant achievements of previous generations.

**Theoretical analysis of the problem.** The SKLP modernization had great importance in the context of domestic tractor construction in the early twentieth century. For the first time in Ukraine (and in the USSR) it allowed to put the current production of crawler tractor “Komunar” in 1923–1929.

Thus, in 1897 during the construction of the plant the most advanced imported equipment at the time was purchased, installed and put into operation. By 1914, it is replenished as reconstruction and rebuilding on the release of new products. In 1914 during the First World War, and intervention and civil war, this equipment has not been updated. Moreover, machinery saw service physically and morally obsolete. To illustrate the intensive aging of machines is sufficient to indicate that they have the gear from total transmission shaft through the belt transmission. And while in foreign factories machines were supplied with individual electric drive from the early twentieth century.

Before starting production crawler tractors in operating 1924–1925 at SKLP the machines require significant repairs from medium to capital [5]. On September, 1 1923 SKLP technical service reported to plant management a memorandum “Condition of work in preparation for the tractor construction at SKLP” [5]:

- repaired and inspected 40 machines;
- lasts repair, inspection and cleaning of 55 machines;
- the total number of required machines is 600;
- scheduled to take 50 machines from the former carriage workshop, 200 –

from the works “Gerlach and Pulst”, 146 – from Taganrog plant, 190 – from the factory “Naval”.

The degree of wear of the machines majority was so significant that in the first three years of tractors production was impossible to ensure interchangeability of parts

and welding units produced tractors [6]. The machines systematically went down, tearing perform production tasks. Accordingly, the tractor works was forced to conduct a monthly schedule dozen overhauls of machines. One thing that saved the production was that there were many backup tools. Even experienced machine operators were forced to move and work at one machine to another. That negatively impacted on the performance level. The capital repair of machine tools and operative repair the broken machines were one of the main tasks of the senior mechanic of tractor shop [7. 8].

In particular, about the volumes of repairs said information of the first quarter of the 1927–1928 [7]. There were 365 machines in the tractor shop at that time. In fact, 279–280 machines worked for the program within a month. About 75 machine tools were in reserve, 11–12 – monthly repaired because of unexpected serious damage. Every month tractors' output usually did not exceed 9–10 tractors. According to the monthly diagrams of use of working hours by tractor shop, repair work reached 18,73% of the total working time.

It should be noted that the number of machines in a tractor shop has been steadily growing in comparison with previous years. Thus, in the IV quarter of 1924/1925 operating year, when actually began production of tractors, an average of 235–236 machines worked in the shop. Each month had to repair about 100 machines, including 12 – thorough.

If one considers the last 3 years, with the start of production of tractors and the first quarter of 1927/1928 operating year, it turns out that 3500 was conducted to ongoing repairs and thoroughly renovated almost all available tools, including an additional set (reserve). Almost all of the machines that were in the tractor shop until 1927/1928 were released in 1913, which were aged 10–15 years. And parts of the machine-tools were in the plant since 1897, about 30 years. The vast majority of machine tools did not have individual electric. The movement of the working bodies was applied by shop's belt drive gear shafts (near the ceiling).

Thus, the machines were physically worn out and outdated. Applications for new equipment related mainly machinery in the tractor shop that really could not

provide a substantial increase in output. Earlier machines were used mostly universal. This equipment has been convenient for the production of various outfits in a small number of each species.

Among the equipment was ordered as universal equipment and specialized. All machines must have individual electric.

Therefore, numerous orders of imported equipment were made for both main tractor shop and purveying workshops to the development of the tractor construction at the plant [9].

Separate revenues of technics and components began in 1924–1925. But serious systematic supplies of imports were made only in 1928 after a 2.5-year hiatus. Import to the plant arrived through the Department of Equipment and Commercial Service. Three groups have been the subjects of import:

1. Equipment as machine tools and separate machines and as individual drive motors for machine tools.
2. Tools and equipment except electrical measuring devices.
3. Universal electrical measuring devices.

According to the orders to obtaining import the tractor works received formalized license from higher authorities. The first of them was published in April 30, 1929, the second – in July 19, 1929, the third – in November 21, 1929. For example, the latter allowed obtaining machinery for 679.000 rubles.

During the first and second quarter of 1929/30, from October 1, 1929, the “Metalimport” outfitted posing for obtaining separate machines or their parties. It lasted until March 1930. Just then the USSR People’s Commissariat of Commerce formed a Committee under the chairmanship Yu. Figatner to organize all union imports.

All unrealized licenses until March 1930 were also revoked. Plants and trusts was proposed again apply for the import with the justification inability to obtain similar Soviet products. The Commission chaired by Yu. Figatner quickly reviewed the application and established the reasonableness of each. New outfits output only after the approval proposals or parts of them by this Commission.

All previously submitted applications to the Commission from the State Kharkiv Locomotive Plant named after Comintern through the Supply Office of “Machine Associations” have been satisfied. The Commission took into account not only the formal content of the application, but the prospects of a particular company. No doubt, the Commission considered that imports for SKLP needed not only for the development of tractor construction, but also for the future.

It is interesting that factory workers clearly understand that they can afford imports. For example, imported equipment didn't request to the development of engine-building and diesel-engine at all. Machines for tractor shop were ordered on the basis of production of 350 tractors a year under licenses by April 30, 1929 and July 19, 1929. And under the license of November 21, 1929 machine tools already were ordered in production of 600 tractors in 1929/30 with further growth annual output to 1,000 tractors a year.

The equipment for the procurement departments under license from April 17, 1929 was ordered by calculating the production of 600 tractors a year. There was a view that besides the output of 350 complete sets for new main production still 250 sets were intended for the production of spare parts and works external cooperation.

According to factory data at October 1, 1930 orders were output to foreign companies for equipment for the total amount of 1 528 519 USD (all prices – USSR franco-cordon), including German firms to 1 340 584 rubles (87,705%) and American – 187 935, i.e. the rest of 12,295%. Order in Germany was in 7,13 times more than in the USA in monetary terms. Condition of import orders for tractor shop is presented in Table 1.

*Table 1*

**Condition of orders for tractor shop**

№	Index	Germany		the USA		Total pieces	Germany to USA
		pieces	%	pieces	%		
1	Ordered machine tools	183	91,96	16	8,04	199	11,44
2	Received on the plant machine tools at October 1, 1930	146	90,68	15	9,32	161	9,73
3	Installed machines to October 1, 1930	127	89,44	15	10,56	142	8,47
4	Started using machines to October 1, 1930	117	89,31	14	10,69	131	8,36

From the specified in Table 1, 5 German and 2 American machine tools, that is 2,73% and 12,5% of order, were purchased from the demonstration warehouse “Orga-Metal” in Moscow. The rest of machines were ordered directly in Germany and the NAUS (so in those days the present United States of America abbreviated called, that meant The North American United States).

Besides specified in Table 1, at October 30, 1930 additionally granted outfits on the American equipment through the "Metalimport" (Moscow): five machines and dynamometer, but the order has not been done (to October 1, 1930).

Increasing output of tractors was constrained due to insufficient power of purchasing plants. It was ordered the most different necessary equipment, including:

1. 7 hammers, including 2 air falling, 2 steam stampings and 3 single-stanchion steams for forging were ordered in Germany for a blacksmith shop. 5 hammers, not including 2 steam stampings, 2 machines and 4 presses were obtained. 2 machines and 1 hammer have been installed by the reporting period. Two others were established (with the term of ending work in November 1930). From the 4 edged hammers one was set, one was almost ready for commissioning and 2 would be ready in October and November 1930.

2. Powerful mechanical shears, press and 2 radial drilling machines were ordered and received for boiler shop. 2 objects of these had worked, one prepared for starting and the last one was scheduled to start in October 1930.

3. Two machines were ordered and returned for cooper workshop of locomotive shop. One of them worked and the other was scheduled to start in October 1930.

4. Two propeller sandblasting machines “Prosam”, a press for breaking up pig iron and 5 devices to cover foundry forms with graphitic ink were received for iron foundry shop. Ordered but not yet received 2 machines for the preparation of a mixture of earth. One of them would worked in the unit with the already obtained and installed in 1928 vibrating machine (now the equipment called “shaker apparatus”), the other will be used for the processing of old molding earth. Both machines hadn’t worked for long, because they have broken propellers. But the factory engineers have

developed an enhanced propeller design, and their manufacture was completed before October 30, 1930. Press for breaking up the iron also needed minor processing and was ready to launch with the planned start of new cupolas with mechanical loading. It turned out that the Soviet ink is the cause of clogging of nozzles apparatus for coating molds. Factory specialists were working on installing new nozzles with self-cleaning.

5. Blasting purifying apparatus and vibrating machine and 2 machines for catering ground mixture have been ordered for the steel shop. The first two units have been received, 2 others were shipped and arrived soon. Equipment has been installed and put into operation after the works' reconstruction by the project of the State Design Institute of Machine-Building Plant with simultaneous the development of new casting processes. Shop's production capacity was expanded from 7000 to 12 000 tons of casting per year with its help.

6. A two-stage rotary compressor with an individual electric was ordered, received and installed for power plant.

7. One autogenous cutting machine that cut patterns on the workpiece with metal sheets was ordered for welding shop, but at that time had not yet returned.

Even before the work of the commission Yu. Figatner the instruments and appliances were ordered on the 17500 rubles by 2 licenses, besides machine tools and other equipment, 12 000 obtained to October 30, 1930, i.e. 68,57% or more than 2/3.

Measuring tools received mainly. But including plant received universal measuring microscope the "Zeiss". It was worth 4000 rubles and provided precision measurements to a micron.

Prior to working the Commission, factory application of this group have been carefully analyzed, but in the end the commission did not pass. Foreign firms got orders mainly in Germany.

Among the products: measuring and cutting tools for the tractor shop at 65 200 rubles; measuring tool for the assembly of diesel engines for 2000 rubles; measuring tool for general works requirements for 13 000 rubles; special safety equipment for 3300 rubles; oil meter "Siemens" firm for 300 rubles; spare parts to previously purchased equipment for 9600 rubles. 3 licenses for a total of 15 580 rubles received

to support the production. These were electrical transformer substation and gauges to it. 55 % of the total cost received according to the given orders. 2 applications of the orders in that group for a total of 11 730 rubles successfully passed through the Commission of Yu. Figatner. Above all there were 12 high-power automatic switches [7. 8].

Thus, the State Kharkiv Locomotive Plant named after Comintern using imported equipment had significantly reconstructed production, increased manufacturing capabilities as the exhaust tractor shop and procurement departments. General craft gear shafts, which were on the shop's ceiling, managed to get rid from a huge number of drive pulley to each machine tool. It is radically improved the working conditions and increased safety.

Due to individual drive of machine tools they managed to locate in the optimal technological flow, sharply reducing the time lost from loading and unloading and internal departmental transport operations. Significantly was lowered overall noise on working belt drives, improved lighting by eliminating eclipses, and reduced concentration of dust in the air. Individual drive machine tools increased the efficiency of their use by optimizing the time of inclusion. Power losses and power consumption were reduced.

It should also be noted that new technological processes had developed. They couldn't be implemented on older hardware. It is most clearly illustrated by the cutting bevel gears. Previously, each tooth "whittled" individually. It was extremely time consuming. Gear machines of the "Glisson" came from America for imports that allowed cutting bevel gears by special worm modular cutters by running. Such a shift in gear manufacturing technology meant "pointing" of one of the most bottlenecks in the production of tractors. Without a similar machining and machine equipment factory could not build the future mass output of tanks.

Technical re-equipment of production of imported machine tools and other equipment, as well as various instruments and tools has created new opportunities for the production of tractors and other equipment: tanks and tractors at the State Kharkiv Locomotive Plant named after Comintern.

In this case plant management – director G. Nakonechnuy and chief engineer V. Tsvetkov issued a decree № 206 of May 10, 1930 about the appointment of the Commission composed of the most experienced and respected engineers to identify the new actual capacity of the tractor shop [10].

Commission was instructed to formally evaluate the performance change when implementing new models of imported machines and equipment. And to establish a list of necessary urgent measures to balance the increase in productivity on the shop as a whole to ensure the uninterrupted and timely collection complete sets, tools and tractors. Commission was requested to undertake a difficult and responsible work within a week of October 5, 1930. Among the committee members were deputy director A. Bondariv, deputy chief engineer M. Andrianiv, deputy head of the Department of the tractors while the head of tractor shop I. Kocheriv, department heads K. Livshyts and A. Chepa and a representative of the engineering group V. Fomin.

There were very important reasons to create such a commission:

➤ From the plant constantly required increasing the production of tractors. In 1927–1929 the demand for tractors has risen sharply due to the greatly increased orders of the War Department, the needs of the building, so the ever increasing volumes of timber districts and other;

➤ In 1930 the Stalingrad Tractor Works (STW) was built and designed for production of 50 000 wheeled tractors per year. Kharkov Tractor Works was built in 1930. At first it was intended for release crawler tractors “Caterpillar” with power 30 HP, but during construction it was re-oriented to output wheeled tractors – the same as in the STW. Thus an urgent need for tracked tractors was formed;

➤ In Leningrad works “Bolshevik” (Obukhov) ceased to production of crawler tractors type «Holt».

In spite of completely unreal deadlines of assigned work, the Commission has been able to:

- develop a common approach to in-depth analysis on each machine or other items of equipment;

- establish a “narrow” places of production, constraining the growth of shop capacity;
- give an expert evaluation of the real capacity of the tractor shop with the technical limits of machine tools and equipment;
- outline the main lines of jointing “bottlenecks” by bringing in additional equipment and labor, organization of work on the “bottlenecks” in 2 and 3 changes for the revision of technological processes.

Based on the commission recommendations the experts conducted in-depth analysis on every working place in the tractor shop in normal, not in the emergency mode [10].

It was found that the shop could produce 134 tractors a month (average for 30 days) with rational organization of production.

In conducting the planned technical and organizational measures, including involvement highly skilled workforce to work in certain areas in 3 shifts, shop capacity could be increased in 2 stages to 149 and 174 tractors a month, roughly corresponded of production to 1800 and 2100 tractors per year.

Necessary expenses and planned particular technical solutions and possible terms of implementation provided by timely funding were identified. It is important that a detailed analysis showed the effect of the installation of various positions of imported equipment as far as it has retrieved and efficient.

Thus, the increase in production at the State Kharkiv Locomotive Plant named after Comintern and improvement of indexes of its equipment are the undisputed achievement of industrialization and modernization. That lent the activity of great plant at the time in a promising direction.

**Conclusions.** Launched industrialization in recent years of Tsarist Russia was picked up and fundamentally forced in the 20–30s of last century. The purpose accelerated industrialization is the strengthening of state autonomy and independence of the young the Soviet country as a condition of its survival. This process has a significant influence on the economy, led to the weighted step to increase industrial

capacity, and caused the active development of such an important industry for Ukraine as a tractor construction.

Due to the above-described upgrading of the State Kharkiv Locomotive Plant named after Comintern first in domestic tractor construction was made a deep analysis of each machine tool based on a common approach, which, incidentally, is actual now. All of it enables to believe that a period of modernization of the SKLP named after Comintern in 1927–1930 was critical for the formation and development of the domestic tractor construction. That is why in our view the description of the history of tractor construction in the Ukraine be sure to take into account this stage as such that contributed to the launch of tractor construction as a branch of the economy in Ukraine.

Formed situation in the industry of modern Ukraine inadvertently leads to the need for a comparison of state policy in the historically not far periods of the late nineteenth and early twentieth century, when there was intense industrialization of Ukraine as an example of successful reformation engineering industries.

## REFERENCES

1. *Александров С. С.* Быстроходные гусеничные и армейские колесные машины : краткая история развития / С. С. Александров, В. В. Єпіфанов. – Х. : НТУ «ХПИ», 2001. – 376 с.
2. *Бесов Л. М.* Наука і техніка в історії суспільства : навч. посіб. / Л. М. Бесов. – Х. : Золоті сторінки, 2011. – 464 с.
3. *Быстриченко А. В.* История двигателестроения на ХПЗ- завод имени Малышева 1911–2011 / А. В. Быстриченко, А. П. Дроботенко. – Х. : Прапор, 2011. – 480 с.
4. *Модернізація* [Електронний ресурс] // Вікіпедія – Вільна енциклопедія. – Режим доступу : <http://uk.wikipedia.org/w/index.php?title=Модернізація&oldid=13795955>.
5. *Державний архів Харківської області (ДАХО)*, ф. Р. 1354, оп. 3, спр. 853 [Тракторостроение за период с 07.04.1923 по 31.12.1923 год], документи № 116-117, 207 арк.
6. *ДАХО*, ф. Р. 1354, оп. 3, спр. 253 [Материалы по тракторостроению от 08.01.1925 года закончено 09.12.1925 года], документи № 42-43, 119 арк.
7. *ДАХО*, ф. Р. 1354, оп. 3, спр. 687 [Месячные отчеты по тракторостроению за 1927 год. с 27.10.1927 по 07.12.1927 год], документи № 1, 2-10а, 22-23, 31, 31 арк.

8. *ДАХО*, ф. Р.1354, оп. 3, спр. 300 [Сведения о состоянии тракторостроения на заводе имени Коминтерна. О состоянии импортных заказов в 1928–1929 годах и 1930–1931 годах. О состоянии на 01.10.1930 г.], документи № 176-179, 225 арк.

9. *ДАХО*, ф. Р. 1354, оп. 3, спр. 1057 [Материалы по вопросу тракторостроения. Протоколы заседания комиссии по тракторостроению. Стенограммы совещаний у директора, рапорта и постановления с 18.09.1929 – по 24.12.1929 года], документи № 110, 176-179, 218 арк.

10. *ДАХО*, ф. Р. 1354, оп. 3, спр. 1375 [Месячные производственные программы тракторного цеха завода. С 02.01.1930 года по 26.08.1930 года], документи № 22-26, 33,36, 39-40, 45, 47, 55, 62-63, 68, 80-81, 98-99, 119, 145, 160, 187, 219-224, 225, 225 арк.

11. *Кульчицький С. В.* Україна між двома війнами (1921–1939 рр.) / С. В. Кульчицький за аг ред. В. А. Смолія. – К. : Альтернатива, 1999. – 335 с.

12. *Лупаренко Г. В.* Історія становлення тракторобудування на території України в першій третині ХХ століття : автореф. дис. на здоб. наук. ступеня канд. іст. наук : спец. 14.01.07 / Г. В. Лупаренко ; Київський ун-т економіки й технології транспорту. – К., 2007. – 18 с.

13. *Петрович Й. М.* Модернізація промислових підприємств як передумова їх ефективного розвитку [Електронний ресурс] / Й. М. Петрович. – Режим доступу: [http://ena.lp.edu.ua:8080/bitstream/ntb/16326/1/138\\_Petrovich\\_249\\_250\\_Modern\\_Problems.pdf](http://ena.lp.edu.ua:8080/bitstream/ntb/16326/1/138_Petrovich_249_250_Modern_Problems.pdf)

14. *Погорілий Л. В.* Мобільна сільськогосподарська енергетика / Л. В. Погорілий, В. Г. Євтенко. – К. : Фенікс, 2005. – 181 с.

15. *ХПЗ* – Завод імені Малышева, 1895–1995. Краткая история развития. – Х. : Прапор, 1995. – 704 с.

16. *Штомпка П.* Социология социальных изменений / П. Штомпка. – М., 1996. – 171 с.