

SOVIET AUTOMATION 1945-1953.

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During the late Stalinist period (1948–1953), the Soviet Union launched the massive "**Great Construction Projects of Communism**" (Velikiye stroiki kommunizma) and the "**Great Plan for the Transformation of Nature**".

These projects to build communism required an unprecedented level of mechanization, leading to the rapid development of automated industrial processes, mechanized forestation, and rural electrification.

-I- INDUSTRY

1. The Automated Piston Factory (1950)

Subject: Fully automated manufacture of aluminum alloy automotive pistons.

Timeline: Concept developed 1947–1949; operational in **November 1950** at the Uljanovsk / Moscow Stalin Auto Plant (ZIS) system.

Automation Scope:

Widely recognized as one of the world's first fully automatic, end-to-end production lines.

Raw metal was automatically melted, cast into molds, heat-treated, machined on 14 linked automatic machine tools, quality-checked via pneumatic gauges, weight-balanced, and wrapped for shipment.

Reduced human labor from dozens of machinists per shift to just 3–4 supervisory technicians monitoring control panels.

2. Machine Tool Industry & Transfer Lines (1946–1960)

Subject: Mass implementation of multi-station automatic transfer lines (*avtomaticheskie linii*) across heavy industry.

Timeline: Codified during the 5th (1951–1955) and 6th (1956–1960) Five-Year Plans.

Subjects:

Automated transfer lines for machining engine blocks, gearboxes, and tractor axles installed at the Gorky Automobile Plant (GAZ) and Stalingrad Tractor Plant.

2. Ferrous Metallurgy & Blast Furnace Control (1948–1958)

Subject: Blast furnace pressure regulation, automatic blast temperature adjustment, and automated rolling mills.

Timeline & Subjects:

Magnitogorsk Iron and Steel Works (1948–1952): Introduced automated blast furnace top-pressure regulators and automatic moisture/temperature control of the hot blast, significantly boosting iron yield.

Zaporizhstal Steel Plant (1951–1953): Deployed automated continuous hot and cold sheet rolling mills with automated speed matching between mill stands.

4. Automated Cement & Concrete Production in Megaprojects (1948–1953)

During the construction of giant canals and hydro-dams, mixing concrete manually or via small batch mixers was impossible due to the sheer volume of material needed (millions of cubic meters per project).

Volga-Don Canal Construction (1948–1952):

Automated Batching Plants (Avtomatizirovannye betonnye zavody): The Soviet state deployed fully automated, continuous-operation concrete plants directly along the construction sites. Aggregate, sand, water, and cement were fed into bins where pneumatic and electrical sensors automatically weighed ingredients, adjusted for moisture content, and loaded mixing drums without human intervention.

Continuous Conveyor & Pumping Systems: Concrete was pumped into lock molds and dam foundations using automated concrete pumps and cable-crane systems controlled from a single central console.

Tsimlyansk Hydro-Node & Kuibyshev (Zhiguli) Dam (1950–1953):

Implemented centralized, push-button concrete plants (Avtomat-Zavod) capable of producing over **10,000 to 15,000 cubic meters of concrete per day**.

Temperature Automation: Automated steam heating systems were introduced for concrete mixing during winter to prevent freezing during pour cycles—a crucial innovation for year-round dam construction in Russia.

Gigant Cement Plant (Moscow Region) & Belgorod Cement Works

(1955–1958): Implemented automated temperature control loop systems on giant rotary kilns and automatic slurry feeder metering, reducing fuel waste and standardizing cement grade output.

5. Nuclear Power Generation and Reactor Control (1954–1957)

Subject: Automated safety monitoring, control rod regulation, and turbine synchronization in atomic energy.

Timeline & Subjects:

Obninsk Nuclear Power Plant (June 27, 1954): The world's first grid-connected nuclear power station (AM-1) featured fully centralized automated and remote control rod regulation system (using feedback signals to automatically maintain core criticality and prevent thermal runaway).

Siberian Atomic Power Station (1958): Integrated automated emergency shutdown protocols (AZ systems) and continuous automated coolant monitoring.

6. Hydroelectric Power Plant Automation (1947–1956)

Subject: Tele-control, automated turbine governor regulation, and remote dispatch in massive Volga and Dnieper river hydro-dams.

Timeline & Subjects:

Dnipro Hydroelectric Station (DniiproGES) Restoration (1947–1950):

Rebuilt post-war with automated hydro-generator control systems.

Kakhovka Hydroelectric Station (1955–1956): Became the Soviet flagship for complete remote automation (tele-mechanization). The station's turbines could be regulated automatically from a central dispatch grid hundreds of kilometers away without local operator intervention on the floor.

Kuibyshev (Zhiguli) Hydroelectric Station (1955–1957): Integrated automated load-balancing and water flow regulation systems.

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AGRICULTURE

1. Automated Tree Planting & Forest Belt Mechanization (1948–1953)

Launched by the Stalinist decree of **October 20, 1948**, the **Great Plan for the Transformation of Nature** aimed to plant over 5.7 million hectares of forest shelterbelts across the Eurasian steppe to prevent wind erosion and droughts. Hand-planting on this scale was unfeasible, leading to specialized forestry automation and mechanization:

Tree-Planting Machinery (Lesoposadochnye mashiny):

SLN-1 and LPP-1 Tree Planters (1949–1951): Towed behind heavy crawler tractors (such as the S-80), these machines automatically opened a furrow, placed saplings at fixed interval depths, pressed the soil around the roots, and applied water or fertilizer simultaneously.

Advanced multi-row planting rigs could plant up to **10,000–15,000 tree seedlings per day per machine**.

Automated Acorn Sowing (Lysenko's "Nest Method"):

Specialized seed drills were modified to automatically drop acorns in specific "clusters" (гнездовый способ) along pre-measured grid lines.

Forestry Machinery Stations (LMS):

In **1949**, the state created dedicated **Lesozashchitnye Stantsii (LMS)**—counterparts to Machine Tractor Stations (MTS)—equipped with automated ditch-diggers, mechanical sapling diggers, and automated sprayers to protect saplings from pests.

2. Farm Electrification and Rural Automation (1946–1953)

In the immediate postwar period, rural electrification was framed as bringing the factory floor to the collective farm (kolkhoz).

Local Hydroelectric Stations (Malye GES):

Before the state power grid expanded to rural regions in the late 1950s, thousands of small, automated or semi-automated mini-hydroelectric plants were constructed on small rural rivers between **1946 and 1952**. These stations often operated with automatic water-flow governors and basic automated shut-off relays.

Automated Grain Drying and Processing (1949–1953):

Grain Cleaning & Drying Complexes (Ochistitel'no-sushil'nyye agregaty): Tying into farm electrification, state farms began installing centralized, electric-powered grain cleaning and drying towers. Temperature sensors automatically adjusted air blowers to prevent grain scorching.

Mechanized Livestock Feeding and Milking (1950–1953):

Electric Milking Stations (Elektrodoyka): Centralized electric vacuum milking systems (such as the Impuls series) were installed on model collective farms, piping milk directly into automated cooling vats.

Electric Feed Preparation (Kormotsekh): Farms introduced automated conveyor loops that chopped, steamed, mixed, and distributed livestock fodder via electric drive-lines controlled from a central panel.

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TRANSPORTATION INFRASTRUCTURE, COMMERCIAL DISTRIBUTION, AND LOGISTICS NETWORK MANAGEMENT

1. Transportation Automation

Automated Railway Hump Yards (1949–1955):

The Soviet railway ministry (*MPS*) introduced automated marshalling yards (*Avtomatizirovannye sortirovochnye gorki*) at major freight hubs such as Bekasovo and Leningrad-Sortirovochny.

Systems used pneumatic rail-retarders controlled by track sensors to automatically calculate wagon weight and speed, applying pneumatic brakes to assemble long freight trains without manual coupling crews.

Automatic Train Operation (ATO) Development (1953–1957):

Early experimental automatic train driving systems (*Avtopilot*) were designed for the Moscow Metro (Koltsevaya Line) and mainline electric locomotives. Relays and inductive track loops automatically adjusted train speed according to signal block occupancy, maintaining safe distances between trains without direct driver throttle input.

Centralized Traffic Control (CTC) in Shipping & Rail (1948–1953):

Massive canal construction (Volga-Don, Moscow Canal) relied on centralized tele-mechanical control stations (*Dispetcherskaya avtomatizatsiya*), allowing a single operator to open lock gates, control water levels, and direct vessel traffic across dozens of kilometers via automated signals.

2. Trade, Commerce, and Warehousing Automation

Mechanized and Automated Warehouses (1950–1956):

Central wholesale bases (*Torgbazy*) introduced automated overhead crane systems, continuous belt sorters, and pneumatic tube networks to move paperwork, orders, and small packaged goods through storage facilities without manual transport.

Punch-Card Accounting in State Trade (1948–1955):

Wholesale trade management (*Gossnab* and *Gostorg*) introduced centralized machine-calculating stations (*Mashino-schetnye stantsii*) equipped with mechanical punch-card tabulators (such as the SAM series) to automate inventory tracking, balance product distribution, and manage supply logistics nationwide.

Automated Vending and Unmanned Retail (1955–1959):

the Ministry of Trade created dedicated state enterprises (*Torgmash*) to build fully automated retail kiosks.

Machines automatically dispensed carbonated water (*Gazirovka*), milk, notebooks, and bus tickets via coin-operated electromechanical mechanisms, aiming to reduce retail labor costs.

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PLANNING

During the 1950s, Soviet economic planning at **Gosplan** (State Planning Committee), **TsSU** (Central Statistical Administration), and **Gossnab** (State

Committee for Material and Technical Supply) relied heavily on electromechanical punch-card processing.

Known as **Machine-Calculating Stations** (Mashino-schetnye stantsii or **MSS**), these centralized computing hubs processed millions of physical 80-column punch cards to aggregate census data, balance material and financial balances, and track industrial-agricultural and other output.

1. Hardware Architecture & Key Equipment

Soviet MSS installations were built around standardized sets of electromechanical machines, predominantly manufactured by the **Moscow Calculating-Analytic Machines Plant (CAM / Zavod Schetno-Analiticheskikh Mashin)**.

2. Operational Workflow in Economic Planning

The central task of Soviet planners in the 1950s was calculating **Material and Financial Balances** - matching the total production and financing of goods (e.g., steel, coal, grain) with total industrial –Agricultural and other demand across thousands of enterprises.

3. After 1953, during the digital era

Instead of a single centralized "economic internet," the USSR developed thousands of isolated, unintegrated digital computer centers across individual ministries—automating local accounting while leaving the central economic plan dependent on manual administrative negotiation