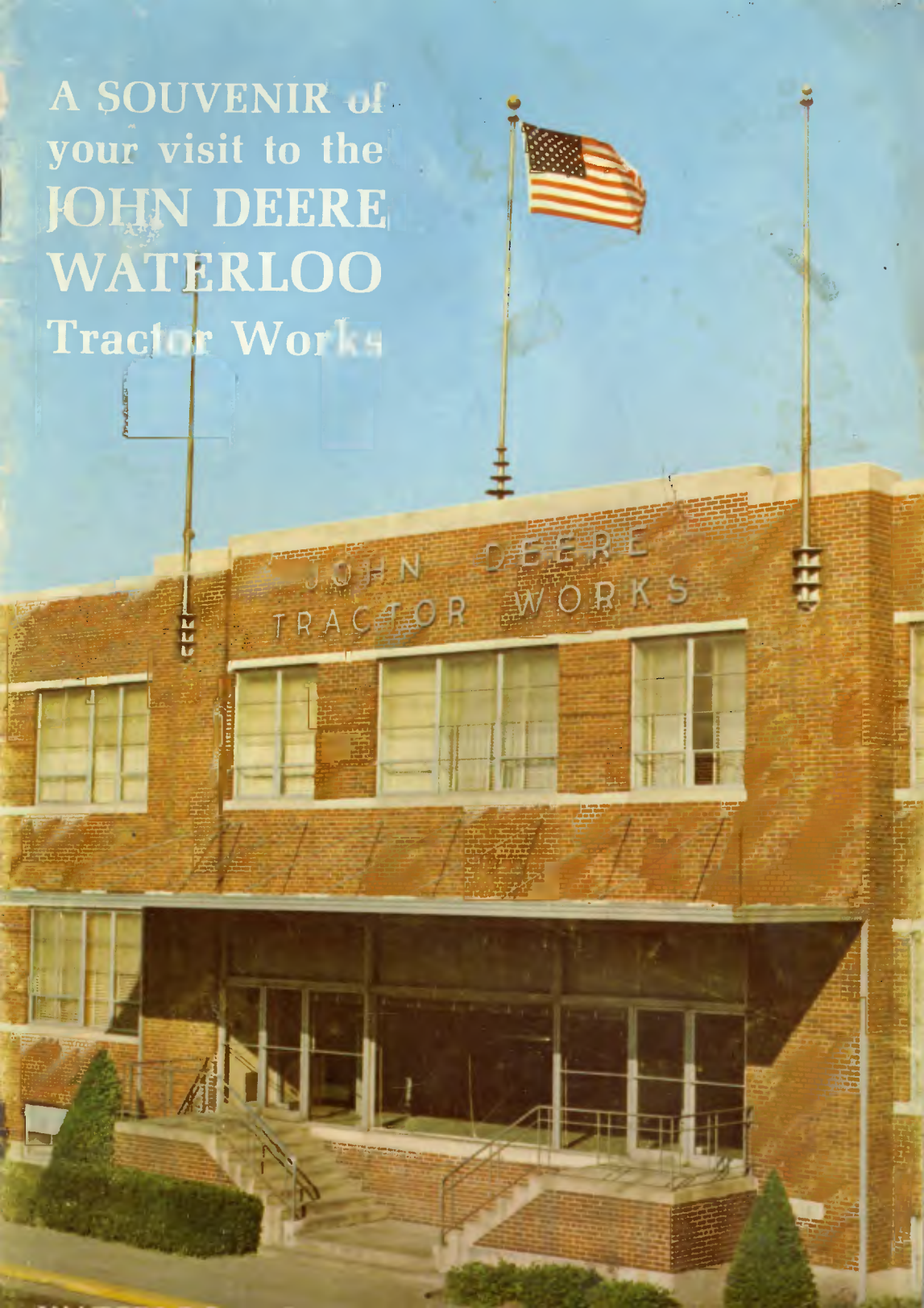
January 1980

Brochure: John Deere Waterloo Works

Nebraska Tractor Test Lab
University of Nebraska-Lincoln, tractortestlab@unl.edu

A SOUVENIR of your visit to the JOHN DEERE WATERLOO Tractor Works



Thanks for coming to see us

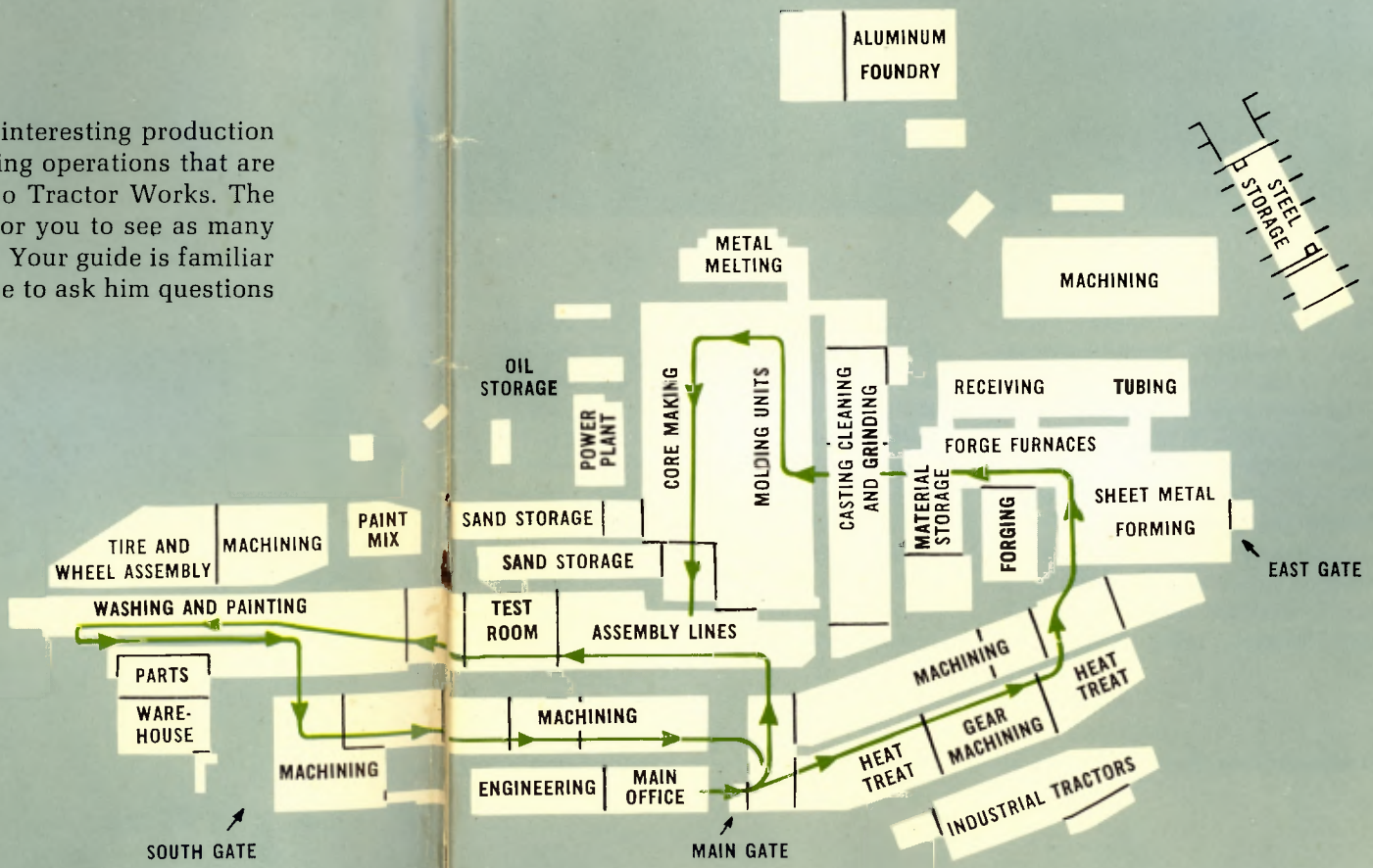
Today marks what we hope will be a memorable experience for you–a visit through the John Deere Waterloo Tractor Works. Your visit is a most welcome one–and should help point up the lengths to which we go to produce a truly quality product.

John Deere Waterloo-Built Tractors farm the fields of the free world and handle many industrial applications as well. In both cases, the end result is to create an ever-higher standard of living for mankind. It is our responsibility to provide dependable products that will serve long and well in the pursuit of this goal.

This book is presented to you as a souvenir of your visit... to help preserve the memories and to give you a clearer understanding of what you saw. We hope that this tour has been both educational and enjoyable. We hope, too, that one day you will return to visit us again–the welcome mat is always out.

Harley A. Tholen Manager

It would take a number of days to see the interesting production machines and the thousands of manufacturing operations that are carried on daily at the John Deere Waterloo Tractor Works. The map of a typical tour indicates our desire for you to see as many of these sights as possible during your visit. Your guide is familiar with the plant layout and operation; feel free to ask him questions at any time.



It's a Giant Tractor Factory

The Waterloo Tractor Works covers 125 acres, of which 82 acres (3,500,000 square feet) are under roof.

Average employment is 6,400 people of whom approximately 1,300 have 20 years or more of service.

12,000 individual operations are required to build a "4020" Tractor; inspections number into the hundreds.

928 million gallons of water are used per year. It is cooled, cleaned, oxygenated before being returned to the river.

63¾ million cubic feet of gas, 70 million kilowatts of electricity, 3¾ million cubic feet of compressed air, and 95 thousand tons of coal are used yearly.

The factory power house is capable of serving a city of 35 to 45,000 people.

Complete medical facilities with two doctors in constant attendance are retained for accident or sickness.

Tractor "firsts" from Waterloo include the first power lift, the first tractor with four sources of power (drawbar, belt pulley, power takeoff, and hydraulic system), Roll-O-Matic knee-action front wheels, the first turbulence-producing combustion chamber, first power steering for row-crop tractors, the first hydraulic power brakes, the first scientifically designed posture seat, the first two-wheel-drive tractor to exceed 100 drawbar horsepower, and others, many of which are found only on John Deere Tractors.

The foundry is one of the world's largest gray iron facilities. Daily capacity is about 1,000 tons to serve 500 different castings running at one time.

Other than tires, batteries, lights, and a few other parts, the tractor is completely designed, manufactured, and assembled at Waterloo. This includes engines, transmissions, final drives, hydraulics, and sheet metal.

In 1959, the factory underwent a multi-million-dollar retooling program for the New Generation Tractors.

History of the John Deere Waterloo Tractor Works

1892

The story of how the John Deere Waterloo Tractor Works came into being goes back more than 70 years, when Benjamin Harrison was president of the United States and Admiral Robert E. Perry made the first of his polar expeditions . . .

. . . well over a half a century ago, when Rudolph Diesel took out his first patent on the type of engine which bears his name and is in wide use today; back to the time when hissing, panting, whistling steam engines were used to power threshers and a few other stationary machines . . . when farming meant long hard days of tiring muscle work and far less production per man and acre than with today's modern methods of power farming . . .

. . . back to the year, 1892, when some of the folks around a little farming community in northeastern Iowa were considerably amused by what a man named John Froelich was saying.

John Froelich

They admitted that he had invented two or three mighty handy gadgets, and that he was a good businessman—what with running a grain elevator, and picking up extra income with a well-digging outfit and with the straw-burning smoke- and spark-spitting steam traction engine and threshing rig which he took on "runs" in Iowa and South Dakota each harvest season.

A Man of Vision

But, after all, John wouldn't see 40 again; he was old enough to know better than to go around saying that mechanical power had a great future—that someday traction engines would do the work of horses even on medium-sized farms. As for his talk about inventing a smaller traction engine, one that would run on gasoline—could it be that John had been out in the sun too much?

Well . . . John Froelich didn't have a touch of the sun. He envisioned and built the first gasoline tractor that propelled itself backward as well as forward.

John Froelich was born on November 24, 1849 in Girard, Iowa, but he was living in nearby Froelich (named for his father) when he began wondering if he couldn't build a more useful traction engine than the steam engines then in use.

He knew about steam engines from experience. They were heavy and bulky, hard to maneuver. They were always threatening to set fire to the grain and stubble in which they worked —and on flat prairie, with a wind blowing, that was no joke. Froelich believed that he could build a gasoline traction engine—or tractor—that would remove all these drawbacks to mechanical power.

The First Tractor

Likely you'd smile if you could see his first attempt. It was a sort of hybrid—a vertical, one-cylinder (14-inch stroke and bore) engine mounted on the running gear of a steam traction engine.

The two halves didn't fit together too well. In fact, in most respects, they didn't fit at all, and Froelich and his helper, William Mann, had to design many new parts. It took time to figure everything out. But the day came when the hybrid was assembled and ready for trial.

Froelich tugged at the massive flywheel. The machine wouldn't start. No matter how hard Froelich and Mann yanked on that flywheel, the machine wouldn't start . . . and somewhere among the spectators, there was a snickered, "I told you so!"

Then Mann had an idea.

He twisted the bullet from a rifle cartridge, wedged the cartridge in the priming cap, hit it with a hammer.

That Did It!

With a cough and a roar, the one-lunger came to life. The flywheel began to spin . . . horses reared and tried to pull loose from a nearby hitching rail . . . "I knew old John'd do it!" shouted the onlooker who, a moment before, had started to scoff.

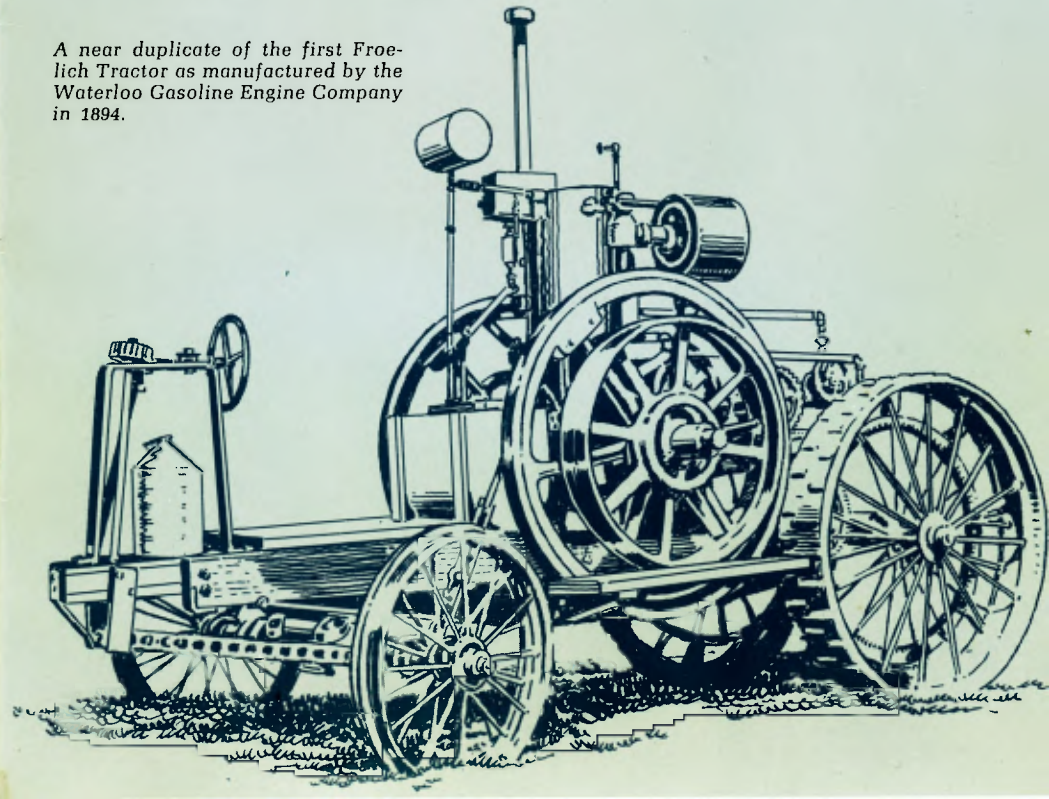
Froelich, on the driving platform gingerly eased his invention into gear. It lurched forward. He tried the reverse. The machine clanked backward.

Out on the road he went and to a farm where a neighbor was threshing grain. The hybrid was substituted for the steam engine. It did the job.

A few weeks later Froelich and his crew started for the broad fields of South Dakota with the gasoline tractor and a new threshing machine.

1894

A near duplicate of the first Froelich Tractor as manufactured by the Waterloo Gasoline Engine Company in 1894.



That fall, they threshed 72,000 bushels of small grain.

Success seemed assured.

But success was still twenty years away. First were to come failure . . . discouragement . . . heartbreak.

As a result of successful demonstrations, a company headed by Mr. Froelich was organized to manufacture gasoline tractors. A frame building was erected in Waterloo, Iowa. The company was named the Waterloo Gasoline Traction Engine Company.

But efforts to build a practical tractor failed. True, two were sold — but they were returned.

The company decided to manufacture stationary gasoline engines in order to have some income while tractor experiments continued.

Reorganization

In 1895, the Waterloo Gasoline Engine Company was incorporated—but John Froelich, whose interest was in tractors, not stationary engines, chose to withdraw. Later, he moved to St. Paul, Minnesota, where he died May 23, 1933.

Increasing Success

The Waterloo Gasoline Engine Company continued the building of stationary engines with increasing success, and also—in 1896—offered an improved tractor. It was a good job, for those days. But the world wasn't ready for gasoline tractors. Only one was sold.

In 1897, another tractor was designed. Again, only one was sold. Demand for stationary engines, however, was so good that a new factory and foundry were built.

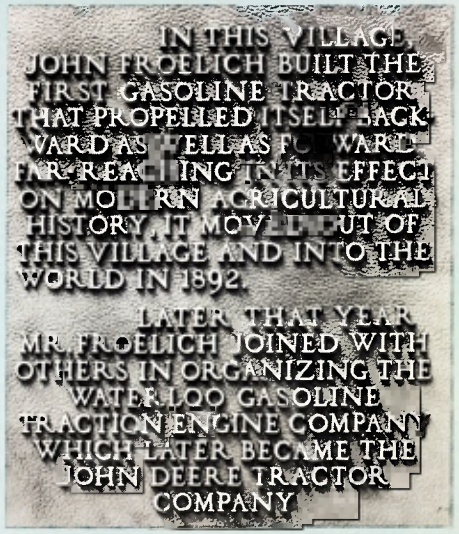
The Waterloo Gasoline Engine Company also began manufacturing two-cylinder automobiles. Space limits and the mounting demand for stationary engines made it necessary to discontinue that project after only six automobiles had been sold.

But tractor experiments continued. None was successful until, in 1913, the company offered the Model "LA," a two-cylinder opposed engine on a four-wheel chassis. Twenty tractors were sold! The tide was turning.

The Waterloo Boy

Early the next year the company brought out the Model "R" single-speed tractor (the first Waterloo Boy Tractor). Farmers liked it. Within a year, sales reached 118.

Design was modified, largely on a basis of users' suggestions, and by the end of 1918, the company had sold 8,076 Model "R" Waterloo Boys.



While much of the world has forgotten John Froelich's contribution to American agriculture, the village of Froelich, Iowa (named after his father) remembers him. This plaque appears on the monument which the community dedicated to his memory in 1939.

The Model "N" Waterloo Boy with two forward speeds was introduced. It, too, was successful. The tide had turned.

With the opening of World War 1, farm prices had begun to rise and the opposition to tractors was melting in the heat of popular demand for dependable mechanical farm power. In fact, there was such sudden acceptance of the tractor idea that the Waterloo Gasoline Engine Company was faced—in a matter of months—by scores of competitors.

John Deere had been watching the development of farm power . . . the growing need for tractors. There was talk of starting a John Deere tractor factory.

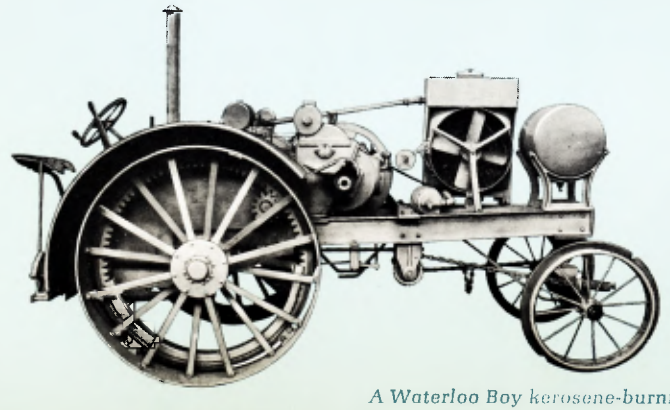
John Deere Takes Over

But John Deere had also been watching the progress of the Waterloo Gasoline Engine Company and the mounting quality of its product. Here was an organization with many years of experience, a company with a firsthand knowledge of what farmers wanted, of what it took to build a good tractor. The purchase of the Waterloo Gasoline Engine Company was the logical step. This took place in 1918 and brought the plant facilities and employees of the Waterloo Gasoline Engine Company into the John Deere organization.

John Deere and Waterloo Gasoline Engine Company engineers and technicians promptly pooled their thinking and knowledge. Improvements in the Waterloo Boy were a natural result. By 1921, this tractor had established itself as a leader. Although it was sold as a two-plow tractor, farmers said that it handled three bottoms without trouble. It operated on low-cost kerosene.

For five years following the merger, the tractors continued to be known by the name "Waterloo Boy." Then in 1923, a powerful new machine was placed on the market under the identity of John Deere Model "D." Few (if any) tractors of whatever make or model have been so popular.

Truly, the Model "D" marked the beginning of a new era in American agriculture. Succeeding years have brought a steady procession of John Deere tractor improvements, of specialized models, of steady, continuous growth and development in both tractors and the John Deere Waterloo Tractor Works, bringing it to its position of leadership in the design and manufacture of modern farm and industrial tractors.



A Waterloo Boy kerosene-burning two-bottom tractor manufactured by the Waterloo Gasoline Engine Company during World War 1.

From dreams to dimensions, ideas come alive on paper in the drafting room.

Few tractors will work in mud like this.

At 30 below, starting and operation are checked.

Seasons go by fast in accelerated field tests.

Experimental engine gets a dynamometer check.

It all begins with an idea

From a farmer in Iowa, a wheat grower in Montana, a Florida grove owner, a college agronomist, a John Deere field-test engineer—from many sources the world over come ideas, comments, criticisms, and suggestions that form the basis of today's ultra-modern John Deere Tractors. Out of such synchronization of tractor needs and tractor design have come such advancements as the posture seat, variable-speed engine, front-mounted fuel tank, rack-and-pinion wheel-tread adjustment, and many others.

To develop tractors that will do more work and bring greater satisfaction to farmers everywhere, the Engineering Department at the Waterloo Tractor Works is broken down into experimental, development, materials, design, engine design, and research units. Guided by senior engineers who have years of experience in tractor design, these units coordinate their efforts to produce the products that lead the industry—John Deere Tractors.

John Deere Tractors are not "greenhouse" products — every tractor component is vigorously tested under actual field conditions as well as in the laboratory. Experimental farms in the south permit year-round field work. The testing program is constant and also twofold . . . new products are tested in all phases of development; current products are tested to improve quality and durability.

In addition to mechanical engineering, great attention is paid to human engineering. What is the best position for the steering wheel? How should instruments be grouped for fast reading? Where should mounting steps and handholds be placed? How can daily servicing be simplified? View improved? Human engineering encompasses all phases of comfort, convenience, and tractor handleability which make operation easier.

The pictures show some of the many functions of engineering: the drafting room where ideas take shape on paper, the mud-bath test of rear-axle bearings and seals, cold-room operations at sub-zero temperatures, actual field work at a test location, engine dynamometer test, drawbar tests by pulling dynamometer tractors around the test track, and the "rattle board" which tests the strength of frames, axles, welds, and bolts. Such complete testing helps maintain traditionally high quality.

Round the clock and calendar tractors pull dynamometer loads (left) as others (below) go bumping over the concrete "rattle board." There is no substitute for quality in tests like these.

John Deere castings are works of art

As completed molds move along a conveyor, metal is poured into each one. Besides this method, automatic pouring machines are used.

With a capacity of 1000 tons of molten metal per day, the foundry ranks as one of the largest in the world. Four of eight giant, silo-like cupolas are always in use while the remaining four are being repaired with silica refractory material.

A normal day's production of gray iron requires 20 carloads of pig-iron, scrap, and steel as raw materials, a half-carload of lime rock to purify the metal, and four carloads of coke to maintain a rigidly controlled temperature of 2800 degrees. In the laboratory, samples of the metal are checked continuously for quality.

Approximately 1,500 different castings are produced. Many are extremely intricate; the largest single casting (the "5010" transmission-differential case) weighs 1320 pounds. Overhead carriers and ladle trucks hustle molten metal to the various pouring stations.

Activity along the cupola line. Metal can be seen pouring into a receiving ladle from which it will be poured into transport ladles for delivery to pouring stations. In the background, a cupola is being repaired with silica refractory material.

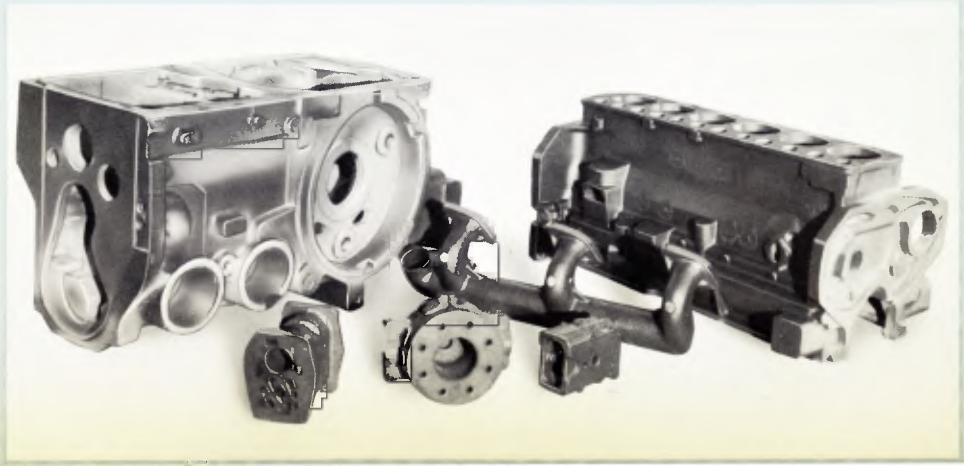
Coremaking is a fascinating part of the foundry operation. These cores duplicate the interior of hollow molds and are formed to very rigid specifications. Batteries of semi-automatic machines as well as hand molds are used in the making of cores. Core material—sand, resin, and core oil—are properly mixed, compressed into shape, and dried. Power sand slingers and jolt squeeze molding units eliminate the laborious shoveling and hand ramming methods once used. Cores are placed in the bottom of a mold (the drag) and the top half (cope) is locked in place. The mold is then ready for pouring.

After cooling, the castings are removed from the molds and the core sand is removed and the casting completely cleaned. The finished casting is now ready for the machining operations which will prepare the casting for assembly into a tractor.

Freshly molded and cleaned, these castings symbolize the wide variety of intricate shapes and sizes produced daily in the foundry.

Here a workman prepares a mold for two rear-axle housings. Coming up—the oil pan for a crankcase.

These cores, top to bottom, will form the interiors of the "4020" intake manifold, hydraulic control valve, and exhaust manifold.

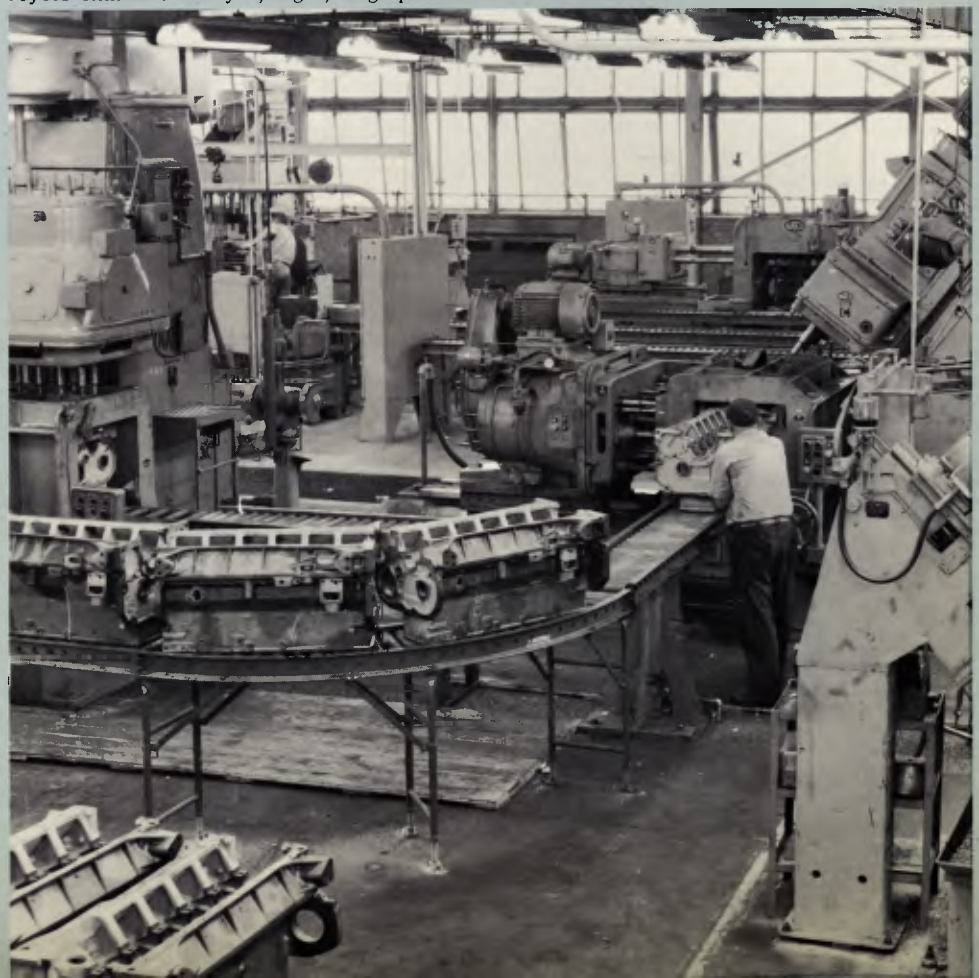


Modern precision machinery holds measurements to hairline tolerances

From the cutting machine, a piston pin goes through a ground finish to the mirror-like polish provided by centerless grinders.

When Tom McCahill, noted automotive writer, visited the Waterloo Tractor Works, he commented that many parts "are held to tolerances so close that they equal the specifications required for guided missile work." When you consider that in a tractor hundreds of parts work at fantastic speeds in perfect coordination for years on end despite punishing loads, heat, and stress, the requirement for such tight tolerances becomes apparent.

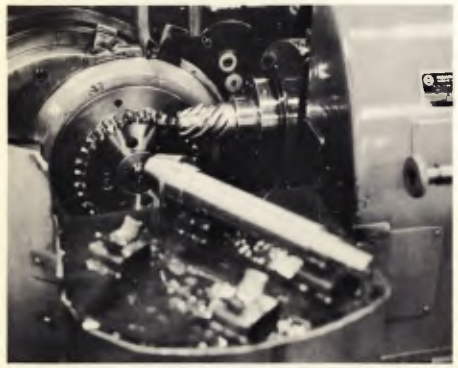
All main-bearing oil lines are drilled simultaneously in this huge machine. Modern conveyors eliminate heavy lifting of large parts.



During your tour, you'll see machines cutting, shaping, milling, boring, broaching, and doing many other of the thousands of operations required to build a John Deere Tractor. These machines are of the latest modern design, requiring a minimum of physical effort to operate.

Transmission cases are milled on the top and both sides in one operation and later all openings are drilled simultaneously in a jig to insure greater accuracy in matching component parts and to insure proper gear and shaft alignment. Crankshafts are ground and polished to a depth of finish finer than plate glass. Accurate gear-cutting machines work to extremely close tolerances to insure that gears run smoothly and quietly at all speeds and loads. Small parts, such as those used in the hydraulic pump and valves are discarded if tolerances are off as much as .0001-inch (one ten-thousandth of an inch)!

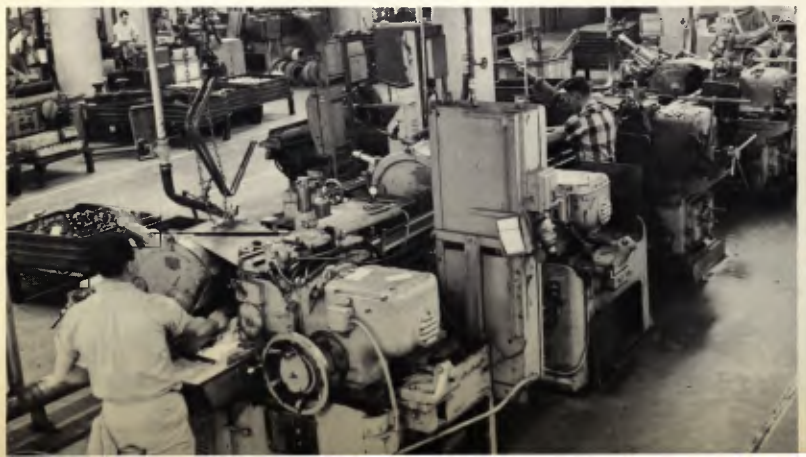
To do this job on a big-capacity mass production basis and yet retain quality and accuracy every step of the way requires modern machinery, skilled workmen, and eagle-eyed inspectors. The fact that John Deere New Generation Tractors have gained such an enviable reputation among farmers for dependable, long-lived performance testifies to the degree of success obtained toward this end at the Waterloo plant. Quality is a built-in feature.



Teeth are cut in the transmission bevel-pinion gear as another piece of stock awaits its turn. Cutter lubrication prolongs tool life.

The bearing surfaces of a "4020" crankshaft are ground in this machine. Later, the crank will be statically and dynamically balanced.

This battery of centerless grinders produces a fine finish and a close tolerance on the hydraulic sensing torsion bar for the rockshaft. The inset (right) shows the "before" and "after" of this operation. So precise is this operation that tolerances have to be measured electronically.



From Waterloo comes this modern line of extra-value, high-performance tractors

"3020" Row-Crop

"4020" Row-Crop

And here they are—modern tractors for every conceivable type of farming operation, plus three sizes of tractors designed specifically for industrial operations. Each is the value leader in its field, enabling owners and operators to turn out more work faster and better and with greater comfort and convenience than with any other make of tractor on the market. 64 h.p. on the "3020" and JD 500 Tractors, 88 h.p. on the "4020" and JD 600 Series, and 121 h.p. on "5010" agricultural and industrial models. Modern, functional, practical.

JD 500 Wheel

"3020" Standard

"4020" Standard

"5010" Diesel

JD 600 Wheel

"3020" and "4020" Hi-Crops

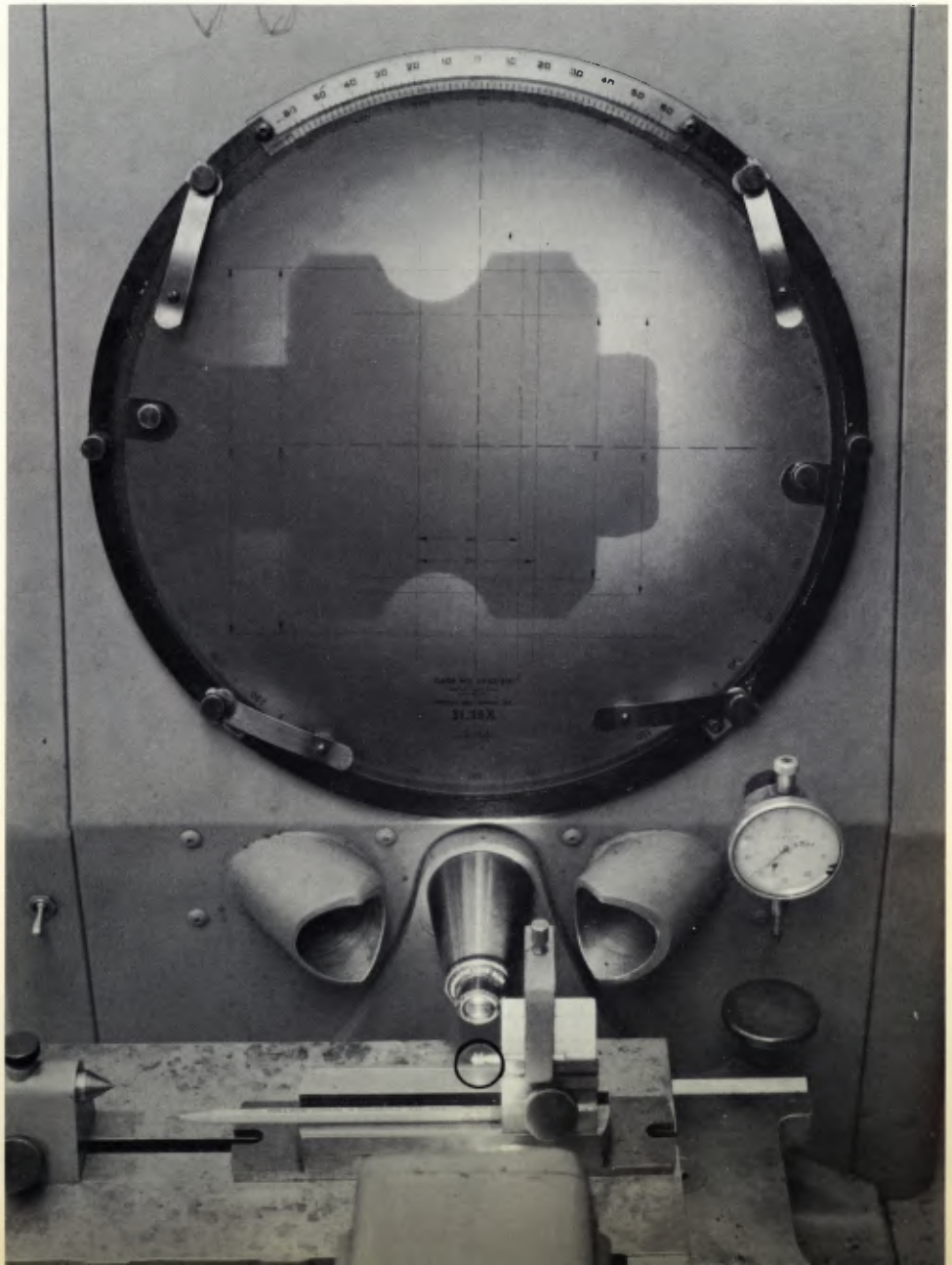
"3020" Grove and Orchard

"3020" Row-Crop Utility

"5010-I"

Countless inspections along the way insure John Deere quality

This Optical Comparator enlarges the image of a small part for comparison with dimensions on the screen. Special microscopes are also used to examine samples of steel and other raw materials before they are put to use. There's no room for guesswork at the Waterloo Tractor Works.



A highly specialized "detective force" patrols the John Deere Waterloo Tractor Works. More than 200 inspectors are constantly at work . . . analyzing samples of raw material . . . gauging smoothness of super-finished surfaces with profilometers . . . checking the accuracy of cylinder sleeve bores . . . testing the hardness of gear teeth . . . examining everything from nuts and bolts to completed tractors to insure just one thing—delivery of top-quality John Deere Tractors.

Every single item in the manufacture of a John Deere Tractor must meet rigid quality specifications. Inspector approval must be granted before an item can move from one department to another. Completed engines and transmissions are performance-checked before being okayed for the assembly line. Each tractor undergoes 600 inspections from the end of the assembly line through loading for shipment.

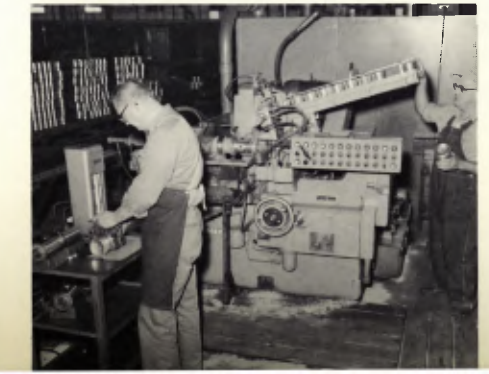
Many parts are machined to such microscopic tolerances that they can be checked only by light, or electronically, or by an air gauge. Accuracy of inspection is checked by the Quality Audit Department. At random, this department selects component parts and even completed tractors which have been released for shipment and completely disassemble entire units to provide a double check to make sure that quality is upheld throughout every operation, including inspection. At the Waterloo Tractor Works the echo of John Deere's words rings loud and clear: "I will never put my name on any implement that doesn't have in it the best that is in me."

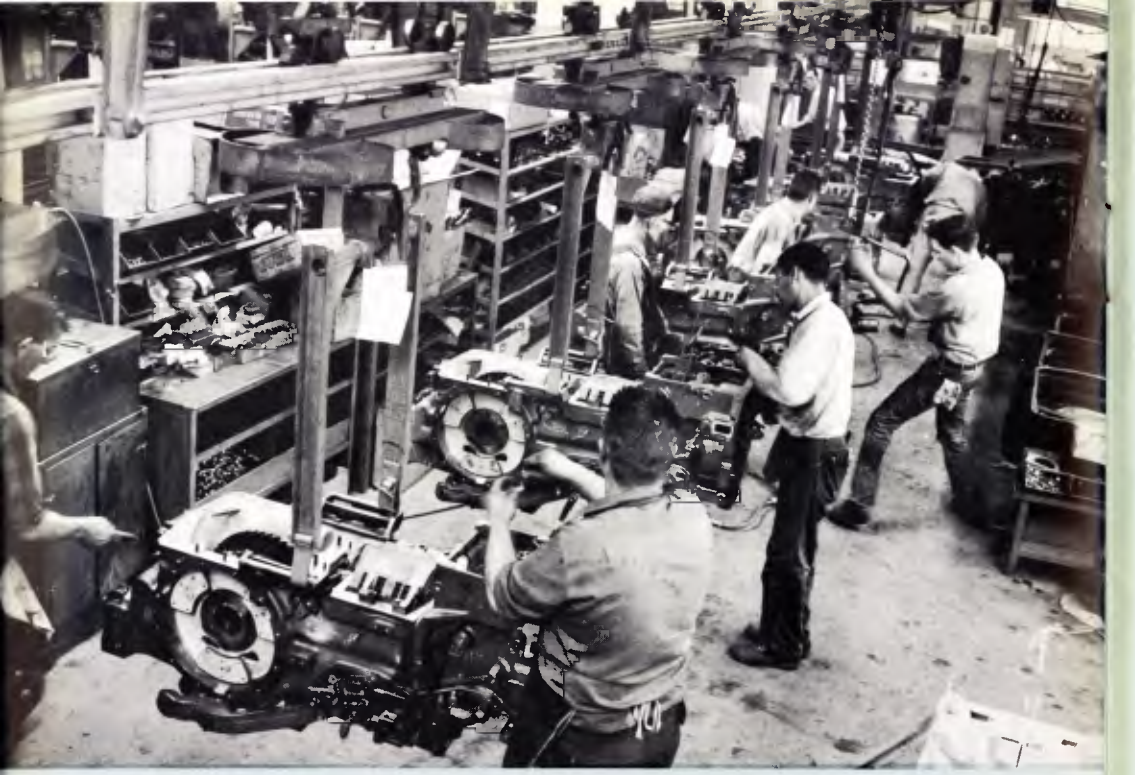
Checking the smoothness and diameter of a remote-cylinder piston rod after grinding, this workman uses an electronic instrument.

Pulled off the line at random, this transmission case is inspected for location and size of openings on a completely flat surface.

Using an electronic profilometer, this inspector measures the smoothness of crankshaft bearing surfaces within two millionths-inch.

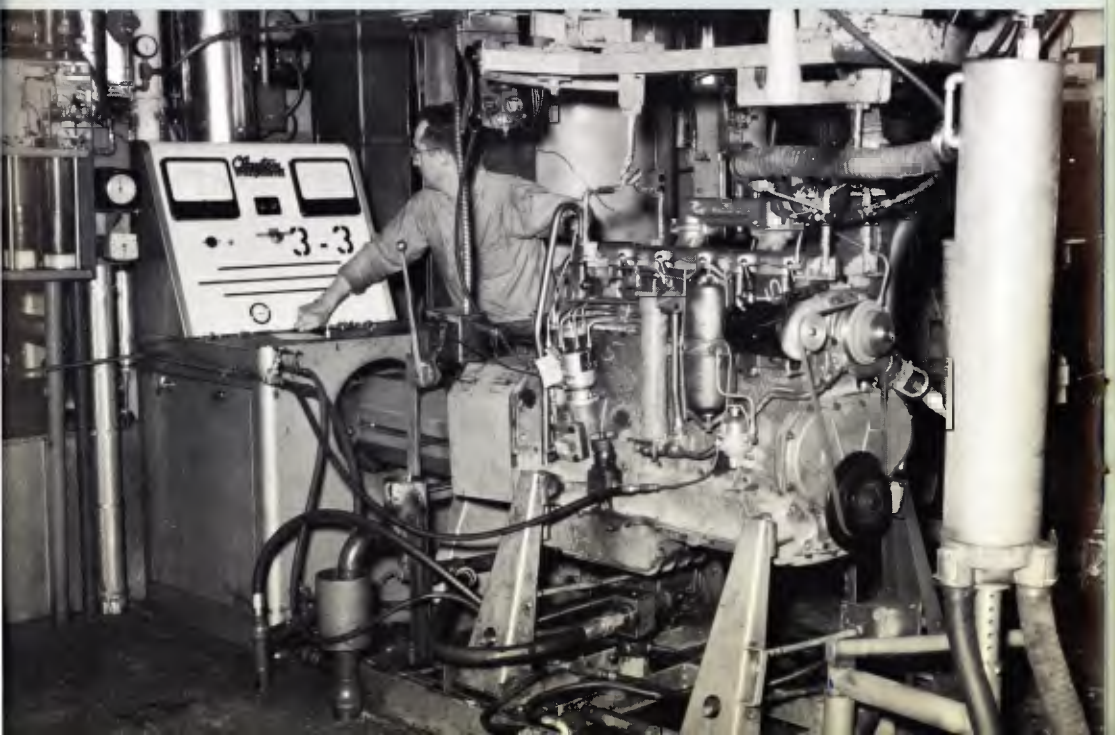
Following a trip through a centerless grinder, cam ground pistons are measured at left with an air gauge to check proper size and taper.





As these new Power Shift Transmissions move along, each workman adds a part or performs an operation. Next stop, testing under load; then assembly into a tractor.

A six-cylinder Diesel engine is run in at one of many dynamometer test stands. Instruments show engine rpm, horsepower, and measure fuel consumption.



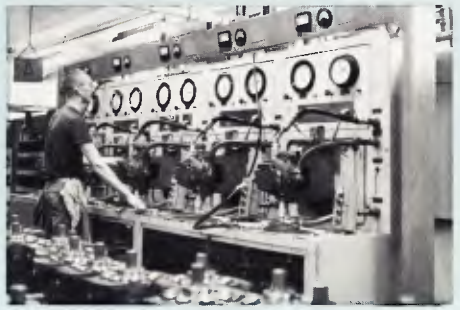
Sub-assembly provides unit "packages" for the assembly line

Tractors are assembled on the main floor of a six-story building. On the upper floors, workmen are busy assembling component parts—engines, transmissions, hydraulic pumps, power-steering motors, instrument panels, and many others.

This building is pressurized inside to keep dirt from entering the building and getting into the tractor. A constantly moving conveyor line as well as the ever-familiar lift trucks move the subassemblies to the point on the final assembly line where they are needed.

Equally important to careful subassembly and inspection is the "run-in" period. The various assemblies are actually run in special test machines to determine how efficiently they operate before they are installed in a tractor. Transmissions are operated in all gears to insure smoothness, easy shifting, and to check the amount of horsepower transmitted. Engines are run in (opposite page) under varying speeds and loads. This leaves nothing to question as to power developed, fuel consumption characteristics, and general over-all performance. Remote cylinders must extend and retract smoothly . . . the hydraulic pump must deliver a specified amount of oil at a given pressure . . . . power-steering valves must score an "A" in speed and smoothness of operation. These assemblies are truly ready to go to work when installed in a tractor . . . their performance has already been proved.

A 155-pound 7-main-bearing crankshaft is inserted into the block of a new "4020" engine. Mighty sturdy backbone.



A battery of freshly assembled hydraulic pumps is tested for capacity before receiving the final "A-okay."

Steering spindles to which the front end will be attached are inserted into these power-steering hydraulic motors.

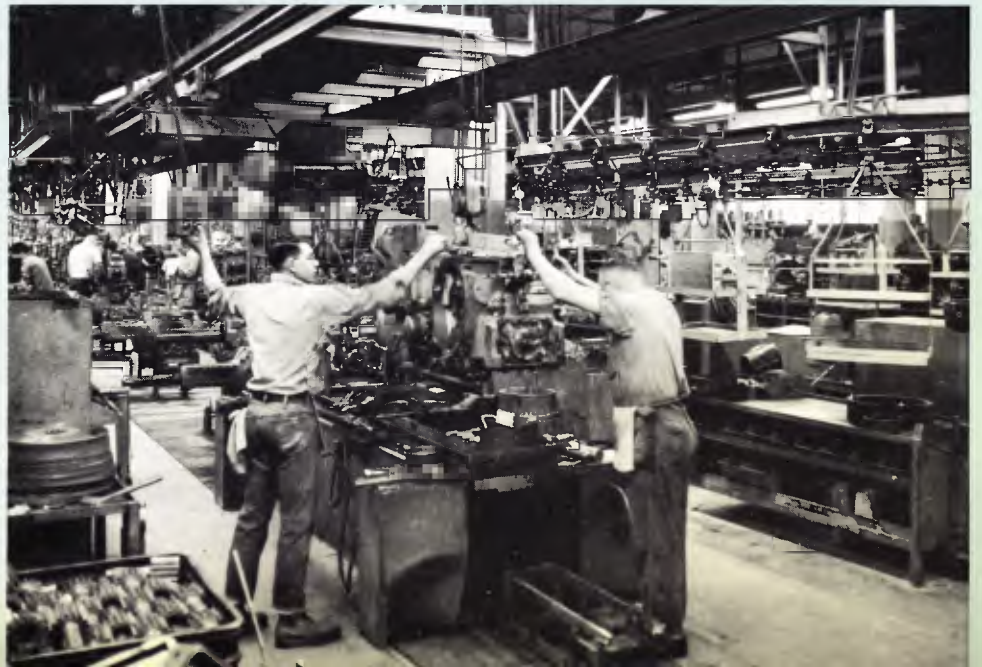
Wet-type cylinder sleeves, which will insure proper cylinder operating temperatures, are installed by these men.

The assembly line where new John Deere Tractors start their busy lives

Assembled and run-in, this engine is lowered through the ceiling right on time to be put in place on the chassis of a tractor. Gas, Diesel, and LP-Gas engines are provided on most models.

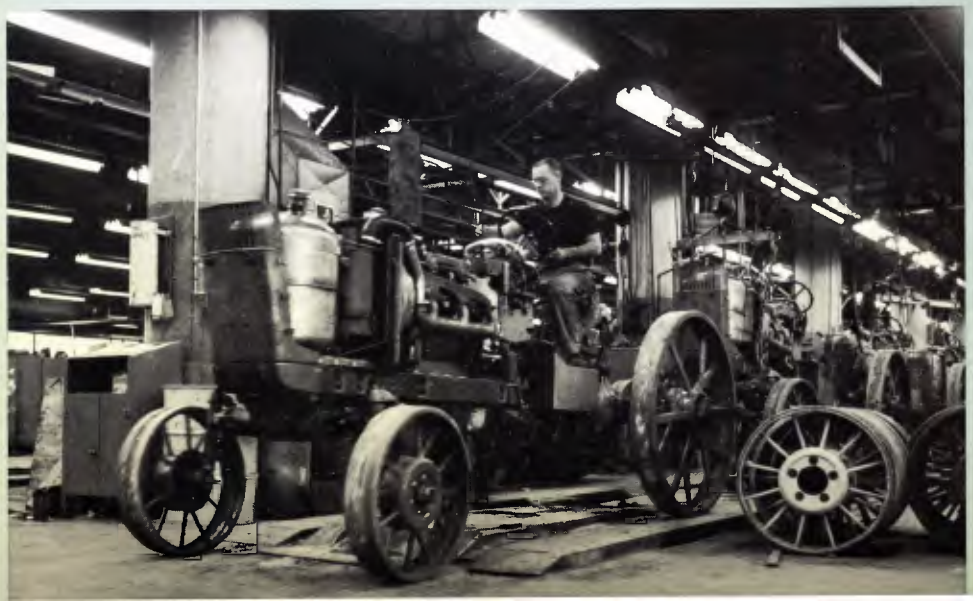
The assembly line, where tractors take shape before your eyes, is certainly one of the most fascinating points of your tour. Although tractors seem to roll off the end of the line every few minutes, each tractor spends about two hours on the line from the time assembly starts until the tractor moves off under its own power. The line is constantly moving. Engines, transmissions, and front ends are lowered through openings in the ceiling. Hydraulic systems, seat mounting, steering wheel, instrument panel, fuel tank, radiator —all are added as the tractor moves along the line. Finally, fuel is added, steel transport wheels are mounted for movement throughout the factory. The tractor is started, moves off the line, and heads for the paint line and some 600 final inspections. A busy life has started for another John Deere New Generation Tractor.

Here's the start of it. To this transmission assembly will be added the two rear axles. The tractor then starts moving down the line to completion.



New "4020" Tractors "shape up" with grille, fuel tank, radiator, engine, instrument panel, seat mounting, batteries, and a temporary muffler in place.

Fully operational, a tractor moves off the assembly line under its own power. It will remain on these steel wheels through the paint line, then rubber tires will be mounted.



Final assembly and shipping... jump-off point to the world

Prior to this station the right side of the tractor was painted by another operator. The left side is being completed.

In this brightly lighted booth, final touch-up is made on the tractors as they move along a track. Special high-gloss paint is used.

are washed down with a special solution to prepare the surface for painting. The familiar John Deere green is added, the paint is oven dried, and rubber tires replace the steel wheels. Hoods, side grilles, the seat, muffler, and lights are added. In addition, all accessories ordered for the individual tractor — 3-point hitch, precleaners, weights, warning lamps, cabs, muffler caps, etc.—are installed. The John Deere name is on the side—the tractor is ready to go places!

And go places, these tractors do! Throughout the United States and Canada—indeed, in most areas of the free world, John Deere Waterloo-built tractors are a familiar part of the landscape. By truck, train, and ship, these new tractors hurry to their assignments —to build an interstate highway, raise and harvest a corn crop, to till the vastness of a wheat field, prepare the way for a housing development, to build levees for a ricefield, harvest a timber crop . . . to bring a higher standard of living in lands where the language differs, but the needs and desires are the same. The success with which these tractors have handled these tasks is testified by the growth of the factory and the company which produces them.

Powerful 12-volt lamps (a spot and a floodlight) are installed in each fender of this new "4020" Diesel Row-Crop Tractor.

Muffler, hood (above), and side shields are installed on this "5010" Tractor. Hood design permits easy removal for servicing.

Two railroad tracks inside the factory permit tractors to be fastened down for shipment despite the weather.

John Deere Tractors are backed by complete parts facilities...

One man (foreground) feeds small parts into this machine as another collects the finished packages to carton for shipment.

The John Deere organization backs what it sells with complete parts service. At Waterloo, as in the other Deere factories, it is just a matter of chance whether any given part will end up being assembled into a product or packaged as a replacement part. In all respects, including quality, parts are identical to the originals provided in the tractor. Recognizing the importance of a good parts follow-through, a seven-story building at Waterloo is devoted solely to this facet of the business. Here parts are packaged with modern equipment, stored, and shipped to various John Deere Branches and Parts Depots. Thus, during critical rush seasons, John Deere tractor owners are never very far away in time and distance from genuine John Deere parts.

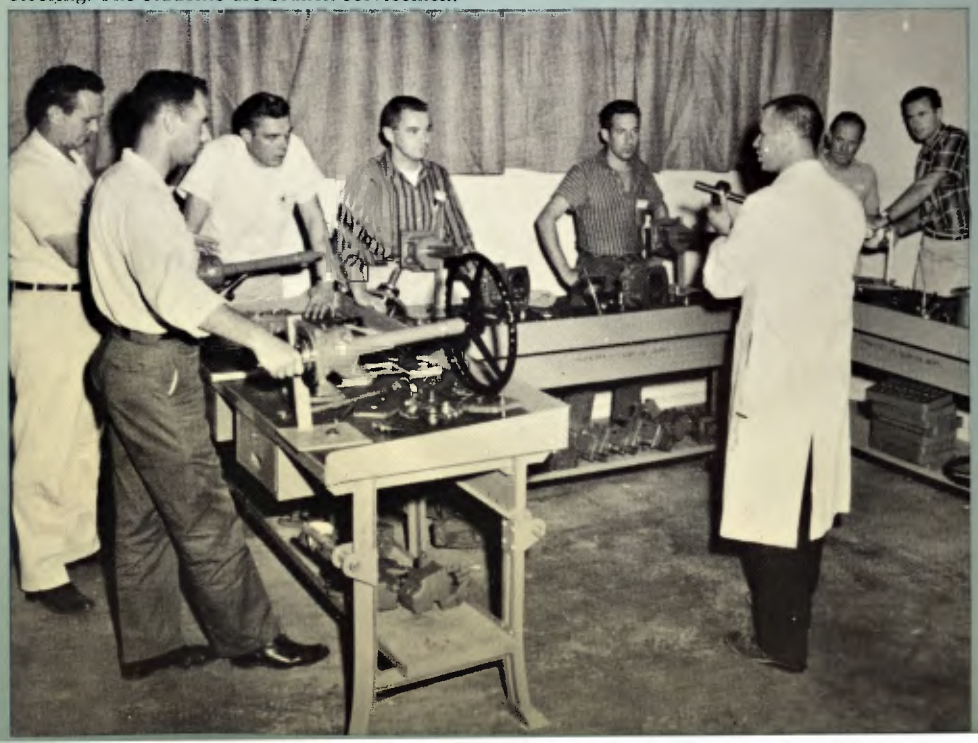
Modern equipment and proper warehousing procedures enable orders for tractor parts to be processed quickly.

...and with factory-trained service specialists

Service publications include Service Manuals for dealers' shops, Parts Catalogs, and Operator's Manuals. All originate at Waterloo.

Many times during the year, the Waterloo Tractor Works is engaged in the business of "teaching school." Any announcement of a new product requires that branch and dealer service personnel be trained in the methods of servicing. Techniques of servicing and changes of current products calls for more time in these service schools. The factory works with tool manufacturers to design special equipment which enables John Deere servicemen to identify and remedy troubles with a minimum of time and cost to the owner. The factory is also responsible for publishing complete information for the operation and servicing of the tractors. These service publications are another assurance of greater performance satisfaction with John Deere Tractors.

This factory specialist is teaching servicemen the techniques of servicing John Deere power steering. The students are branch servicemen.



From one Anvil

22 great John Deere Factories

In 1837, when John Deere gave to the world his steel plow, his "factory" was a little blacksmith shop. Today, 22 manufacturing installations comprise the John Deere family of factories. In addition to those shown here, there are three plants in Germany, two in France, one in Spain. Each factory specializes in its particular products, tractors or implements, and are joined together by the common goal of ever-higher product quality.

Dubuque Tractor Works • Dubuque, Iowa

Waterloo Tractor Works • Waterloo, Iowa

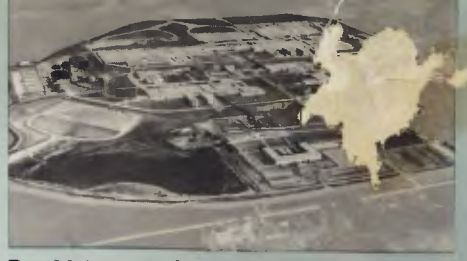
Plow Works • Moline, Illinois

Industrial Equipment Works • Moline, Illinois

Planter Works • Moline, Illinois

Spreader Works • East Moline, Illinois

Harvester Works • East Moline, Illinois



Des Moines Works • Des Moines, Iowa

Ottumwa Works • Ottumwa, Iowa

Horicon Works • Horicon, Wisconsin

Killefer Works • Los Angeles, California

Malleable Works • East Moline, Illinois

Vermilion Works • Hoopeston, Illinois

Welland Works • Welland, Ontario, Canada

Rosario, Argentina

Monterrey, Nuevo Leon, Mexico

Through John Deere dealers the Waterloo Tractor Works serves the world

The Waterloo Tractor Works is represented on both sides of the oceans by franchised John Deere dealers. These are independent dealers who order, stock, sell, and service John Deere Tractors. Each falls within a branch house territory and receives personal counsel on all phases of the business. John Deere people at Waterloo are extremely proud of John Deere dealers in the field. They have a fine understanding of conditions in their locale, are friendly, and, like the products they sell, are highly reliable. The John Deere dealer organization is a tremendous asset—and we at Waterloo are proud to have such an organization represent us to our customers in the field.

The Research and Engineering Center

The John Deere Research and Engineering Center, located just a few miles from this plant, is the first of its kind to be established solely for the development of tractors. Here on an 850-acre tract of land, engineers are provided with ample field and laboratory facilities to develop new ideas in tractor design.

This is the birthplace of the New Generation of Power, introduced in 1960. In addition, the center provides testing facilities, including two test tracks for durability checks of current tractors. Other field locations (in the south) are controlled by the management of this Research Center. Thus, winter weather does not interfere with any development work requiring field operations.

While the Research and Engineering Center is not a part of your tour, the work performed at this center plays a vital part in the John Deere Tractors you have seen built today and in those you'll be seeing coming off the lines in the future.

JOHN DEERE DESIGN, DEPENDABILITY, AND DEALERS MAKE THE DIFFERENCE

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