

NEUSS PLANT LAYOUT

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NEUSS



C A S E

Neuss Factory

Production at the Neuss factory dates back to the early 1900's, with a very long and successful history in the manufacture of agricultural equipment.

It is now the world-wide production centre for all Case International tractors between 85 and 145 horsepower. Situated close to the town centre with its own rail link, the plant stands on the banks of the Rhein, and is within easy reach of all major routes throughout Germany. The site occupies 144,000 m² with 83,000 m² of factory space.



Currently the factory employs a work-force of over 1800 people and produces in excess of 13,000 tractors per year, plus 37,000 engines destined for the assembly line at Neuss, the Doncaster plant in England and the 580K loader backhoe plant at Vierzon in France.

Neuss Factory Production

Major engine castings for Maxxum, the 56 Series and 55 Series tractors are produced at the Neuss foundry.

Throughout every stage of engine manufacture, Case utilises the latest CNC machining centres, the parts are then rigorously tested to ensure that the final product meets the highest standards of performance and efficiency demanded by our customers.

Complete transmissions for Maxxum and the C Family machines are supplied from St. Dizier, France. They are assembled with the completed engine and front axle units then transported via overhead conveyor to the paint shop. Basic cab units are supplied from Croix and completed on a separate assembly line, then all the components are brought together for final assembly. At the end of the line prior to shipment, each tractor is roller tested and carefully checked before being given the final OK.

Quality is the key

Our aim is to build the finest machines available to the farmer.

To achieve this we put quality first. By listening to our customers, identifying precisely their requirements, then meeting those requirements through innovative design and advanced production techniques, we strive to manufacture tractors that will give the end user years of productive work.



2 Core Shop 2

At Core Shop 2 the cores for the D Series engines, crankcases and cylinder heads are made.



3 Core Assembly

Here, and next to the core machine the individual components from Core Shop 2 are joined to form the completed cores.

4 Reconditioning of Moulding Sand

Here the used moulding sand is reconditioned in three stages. During the first stage the sand is demagnetized to remove larger lumps and absolute waste, then it is sifted and carbon added.

Finally, using a conveyor belt, the reconditioned sand is transported to a storage bin, where it is available for use again in the production of new moulds.

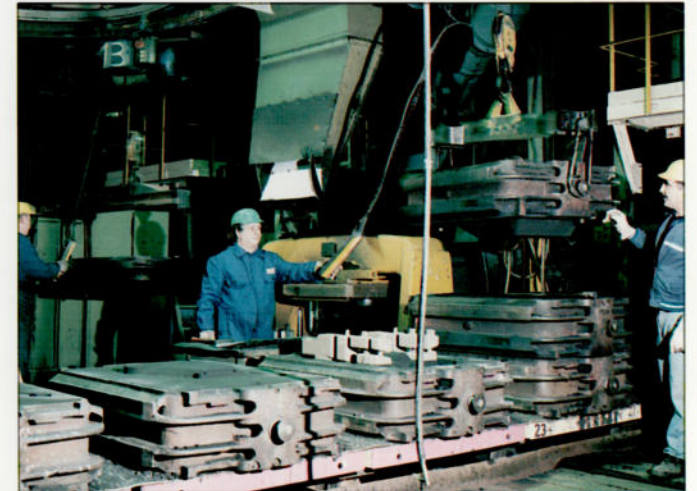
5 Forming Line 2 7 Forming Line 1

At the forming station a metal frame is placed around the pattern, and sand is then poured from a bin above onto the pattern, and by using a hydraulic ram the sand is compressed to form an impression of the exterior bottom half of the casting – this process is repeated to form the top half of the casting. The core is placed in the bottom half of the exterior mould, then by careful location the top half is placed precisely in position. The new mould is moved on to the pouring point.

1 Core Shop 1

A core is essentially the impression of the interior of a casting and is made from a quartz-sand mixture, sodium silicate (bonding agent) plus a chemical additive. This special mould mixture is compressed under high pressure to form the core, paint is applied to protect critical areas from the molten iron. After the casting process is completed the used core sand is disposed off in compliance with the local regulations covering special waste.

In addition to the supporting cores, Core Shop 1 also produces cores for the flywheel housing, hydraulic housing, the Family I engine – crankcase, and the Family I – cylinder head. By using a special conveyor system the newly produced cores are moved directly to the forming line in the foundry, where the individual components are combined to produce the complete core.



6 Pre-melting and Holding Furnace

The raw material is melted in pre-melting furnaces which have a capacity of 8-10 tonnes. By adding certain additives the desired composition and grade of the melt is achieved. When a temperature of 1450°C is reached the molten material is moved in special containers to the holding furnace, this furnace holds approximately 80 tonnes – spectral analysis of the content of each furnace is constantly taken ensuring the optimum quality of melt. After pouring the molten metal the full moulds are conveyed via a 300 metre cooling line ready for removal of the castings from the mould.

8 Pre-cleaning Shop for Castings

Once the castings have been removed from the moulds they are subjected to an initial pre-cleaning process, then transported to the cleaning shop.

9 Cleaning Shop

Here the castings are thoroughly cleaned, then coated with a protective paint primer.

10 Steel Storage and Cutting Area

In this area all parts for steel fabrications are cut into sections and forwarded to the individual departments for welding, drilling and assembly.

The two wheel drive front axles are formed using enormous moulding presses which bend the parts at operating pressures of between 800 and 1250 tonnes.

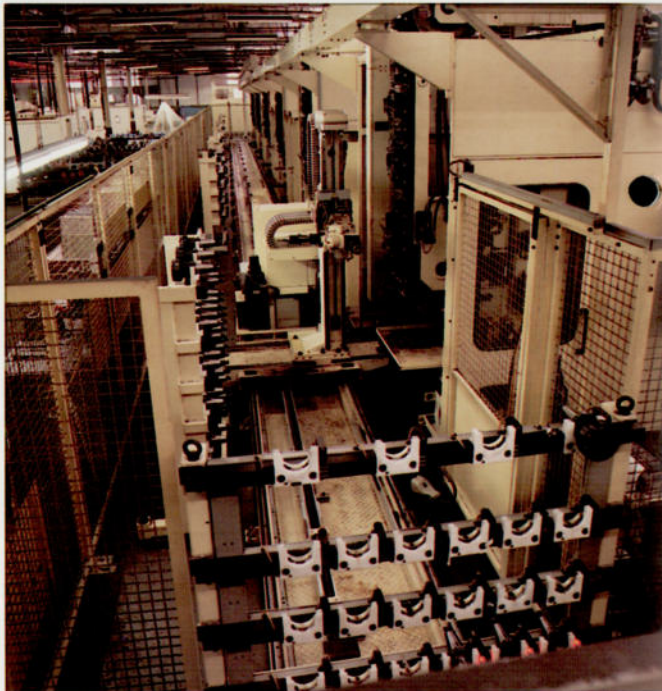
11 Manufacture of Small Parts

Within the first section of the small-parts production area gear blanks and other component parts required for the tractor production are machined and processed.

12 Quality Control

Here the finished parts are checked for quality, critical components like balancer pins, pulleys, and hydraulic pistons are subjected to a 100 percent quality control.

On other components, audit checks are performed on a set number of parts per batch.



13 CNC-Machining System

The numerically controlled interlinked machining system machines front axle bolsters for all current tractor versions as well as chassis members for the MAXXUM tractor series. A programmed robot picks up the part to be machined and transports it to one of the machining units as soon as its previous task is completed, it is now ready to drill, mill and cut threads to the required tolerances.

Sensors installed in each individual machine unit recognise the arriving parts and

the computer switches to the correct machining routine required. As soon as a tool shows signs of wear, the machining process is stopped while a second robot automatically replaces the worn tool with the correct new one.

Separate smaller CNC-machines handle the machining of about 100 different parts, components and tools are exchanged manually on a revolving chuck fixture. Each part is fed into the machining routine from one side, while on the other side another part can be loaded, ready for machining as soon as the first part is finished.



14 Control Point for Machining Tools

The tools are carbide or cerametic-tipped and if required they are exchanged or turned over. Each tool is set under a microscope to a tolerance of 1/1000 mm and when the tool is correctly set and ready for use, the centralised computer system is advised via a terminal.

Twist drills are reconditioned and checked in the tool room. A stock of at least three of each tool must be kept available and ready for use at all times.

15 Hardening Shop

At the hardening shop the gears are heat-treated for about 12 to 14 hours.

A gas-carburization process is used to harden the gears in the following way:

- Carburizing (under heat mix of carbon and gas is used).
- Hardening, Washing, Tempering and finally Sand-blasting.

16 Gear Laboratory

Quality control checks of gear manufacture are carried out at the start of every shift, at each tooling change, as well as at random. The gears are checked for concentricity, tooth profile and pitch, etc. Finished gears are spot-checked in quantities of around 5% of each batch, but critical gears – those required for balancers or crank-shafts are subjected to a 100% quality control check.

17 Gear Cutting Shop

Semi-automatic machine tools shape and cut the teeth in the prepared blanks.

18 Starter Ring Gear Manufacture

Here the starter ring gears are checked, turned, milled, heat-treated, and cleaned, then taken to the engine assembly plant.

19 Transfer Line

The transfer lines used to manufacture the crankcases and cylinder heads for the D Series engines.

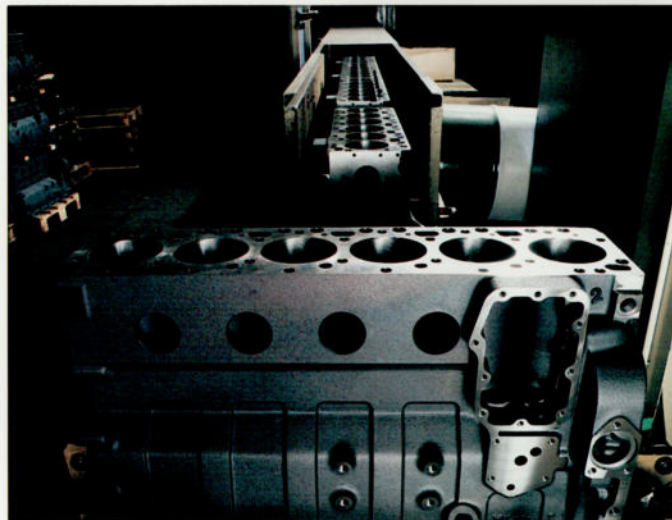
20 Transfer Line

At the first processing line (CNC-equipment) newly cast crankcase blanks for the Case Family I engines are fed into the system. It takes around 2 minutes of operating time for the crankcase to complete its passage through each of the individual stations of this 240 metre long processing line.

At the second processing line (CNC-equipment) the cylinder heads complete their run through the system in about 1.5 minutes machining time.

It is possible to view some of the processes of manufacture through small inspection windows along the line.

From here the finished parts are forwarded to the engine assembly plant.



21 Engine Component Preparation

The engine assembly line is fed its components from the engine component store located directly adjacent to the assembly shop.

22 Engine Assembly Plant

At Neuss, both the D Series and the Family I engines are built.

These D Series are used in tractors, trucks, construction equipment and other industrial applications. However, the Family I engines are built for use within the company only and they are exclusively installed in company built machines.

23 Crankshaft Production

The crankshaft blanks are sourced externally and in this area they are individually machined and finished.

Each individual crankshaft is thoroughly tested for its quality, during processing the crankshafts are subjected to an important DEEP-NITROC hardening process.

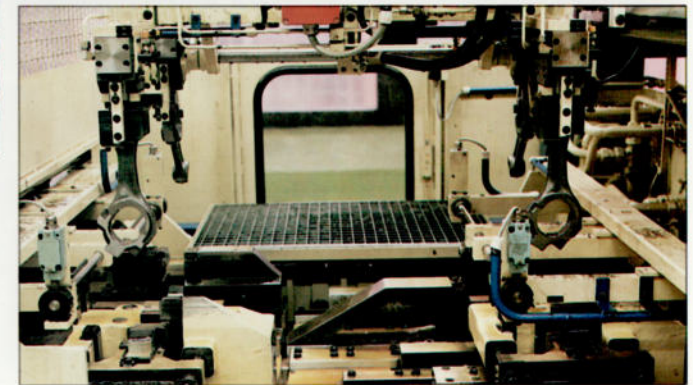
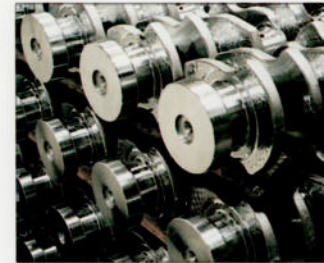
This special gas-nitriding technique produces only a small hardened area to an exact specified depth. This leaves the core of the crankshaft flexible to improve reliability.

Compared to the conventional method of crankshaft production, this process doubles the strength of the component and offers the benefit of an additional positive side-effect. Anti-corrosion properties achieved during manufacture prevent any serious corroding of the crankshaft.

On the upper floor of the same building the connecting rods and the camshafts are manufactured, from the ready-made blanks right through to the finished product ready for assembly.



Production of connecting rods is split between the traditional method for D Series engines on semi-automatic equipment, and the production of those for Family I engines which are machined and processed on a fully automatic CNC system.



24 Engine Testing

The completed engines are first washed and then conveyed to individual testing booths.

Every engine built is tested for a period of 6 minutes, the numerically controlled test equipment compiles all data relating to torque increase, engine speed, fuel consumption, heat balance, noise emission, thermal characteristics & turbulence in the water ducts etc. The data compiled during testing is stored by the central computer, where it is retained for a minimum period of 10 years. After passing through the test area, engines are sprayed and ready for assembly.

25 Assembly of Hydraulic Systems

Components used in the hydraulic system are manufactured at the Neuss plant, then assembled and tested on a short line adjacent to the engine test area.



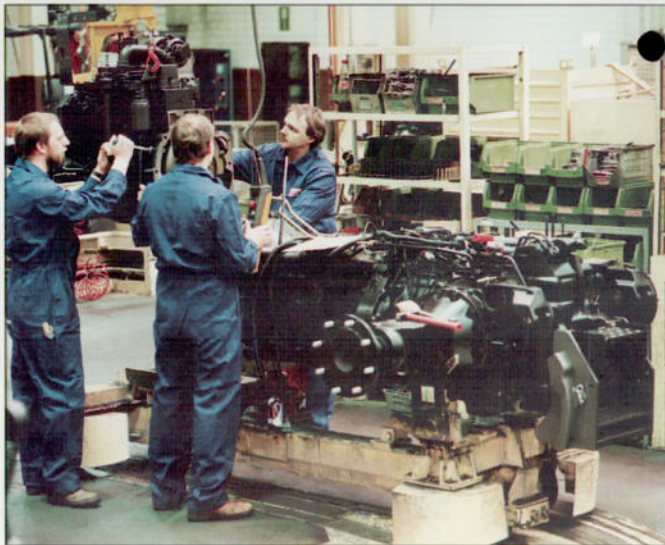
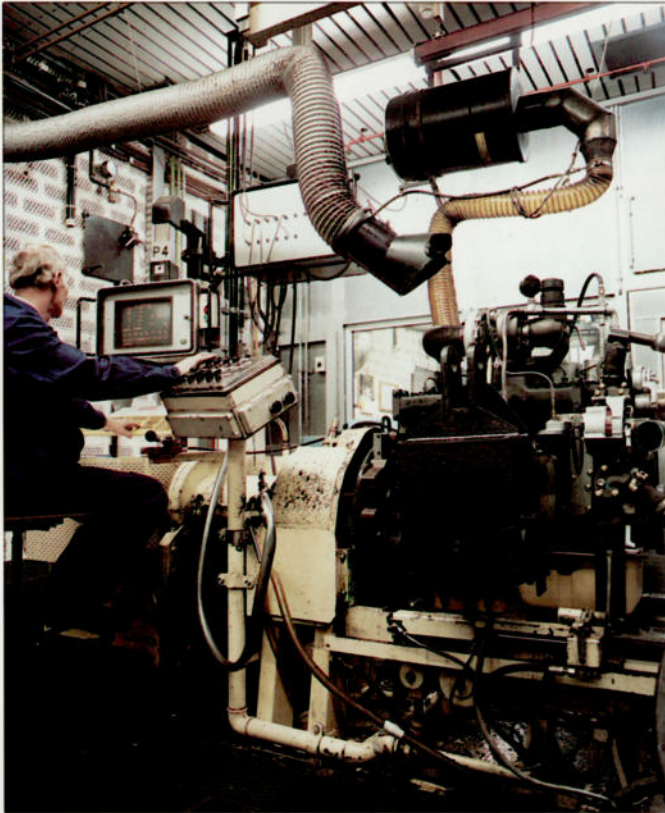
26 Tractor Skid Assembly Area

Individual components like front bolster, front axle and hydraulic housings arrive already assembled.

27 Tractor Skid Assembly Line

The basic structure of a tractor is called the skid. Transmissions are manufactured at our St. Dizier plant in France, and on the skid assembly line the transmission is completed by adding the engine, the front bolster, the front axle, the engine, the side rails (MAXXUM), plus the hydraulic system and part of the electric system.

By using an overhead conveyor system, the completed skids are transferred to the main assembly line.



28 Sheet Metal Finishing

The sheet metal parts for the tractors are fabricated in Croix/France and sent unformed to the Neuss factory, where they are bent to the required shape, then welded and finished, washed, degreased and ferrophosphorated.

An anti-corrosive primer is applied and baked at 80°C for 2 minutes. These parts are subsequently sprayed with a two-component paint, consisting of acrylic and hardener.

After hardening at 90°C for 30 minutes, they are transported to the next area for pre-assembly where lamps, rubber parts, front grille components are added, machine decals fitted. The parts are then passed on an overhead conveyor belt to the final assembly line for mounting.

29 Cab Assembly Line

On the upper floor of the building housing the main tractor assembly line, the cab shells are manufactured at our Croix factory in France are fitted and trimmed on a short line.

After testing they are transported by a travelling hoist to the ground floor cab docking area on the main assembly line.



30 Tractor Assembly

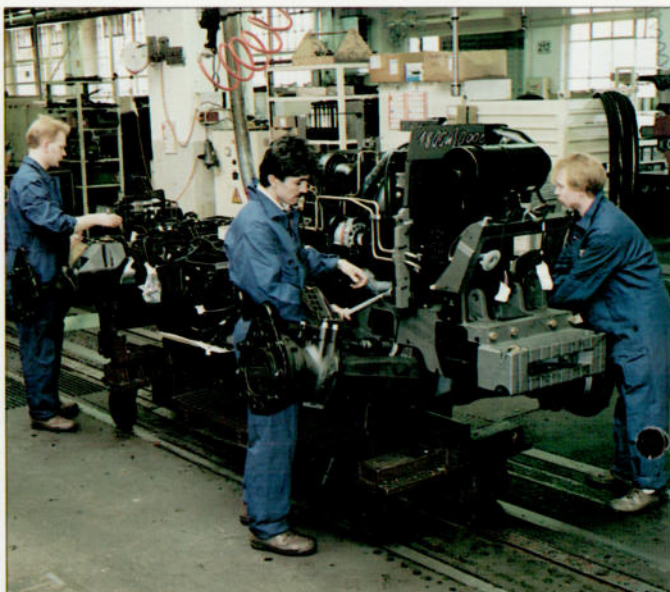
The Neuss factory produces tractors from 85 hp to 145 horsepower, production on the final assembly line has been specifically designed so that it is possible to respond to specific requirements of individual customers, including any special equipment.

From the skid assembly area, the tractor skid units arrive at the final assembly line by an overhead hoist, where completion of the finished tractor starts. After mounting the external oil pipes, the engine is started and the units basic operation is tested.

Then the skid continues to a specialised cleaning area where it is thoroughly washed to remove unwanted oil & grease. The whole unit is then sprayed manually with a two part black acrylic paint and a hardener. These two components are mixed in an electrostatic spray gun, the paint is then electrically charged and is attracted to the surface of the skid unit to create an even finish. After spraying each painted unit is baked in an oven, at a temperature of 80°C for 45 minutes.

The skid moves along the line receiving electrical, fuel tank, and sheet metal parts until it reaches the cab docking area.

The finished cabs are transported from the floor above by a computer controlled lift conveyor, after fitting, each unit continues its journey towards the end of the line.



31 Roller Testing

At the end of the line before leaving the factory each tractor receives a roller test – brakes, electrical equipment, hydraulics, steering, gearbox plus other vital functions are carefully checked, after passing the test the tractors are transported by rail to a nearby distribution area, from where they are transported throughout the World.

