



Garrett's Suffolk Punch was a valiant but doomed attempt to modernise the traditional steam engine – it arrived on the cusp of the turning tide against steam power and only eight were ever built while the Fordson model F combustion engine tractor released the same year went on to record 700,000 sales

HORSES BEAT STEAM BUT

TRACTORS TAKE OVER

Steam proved not to be the promised child for agricultural advancement and was facing a tough battle for survival against internal combustion tractor engines. And while horses had survived the steam challenge – Ford, Ferguson and Case now had their measure

Steam engines had already reached the peak of their popularity in 1914, by the beginning of World War I. Apart from engines operated mainly by contractors for threshing, steam failed to make a big impact on farming.

There was some success with steam powered cable ploughing and cultivation systems, and steam traction engines were in occasional use for hauling wool, timber and other bulky products, but it is significant that the number of working horses on farms continued to rise while steam had passed its popularity peak.

Horses and other draft animals were still powering

most of the work on farms with numbers still rising until 1918 when they peaked at about 2.5 million, but then, in the early 1920s numbers here and in other countries began to fall as change was at hand.

Even before the war started there was increasing evidence that steam was facing a tough battle for survival against tractor power.

It was a classic example of long established manufacturing companies challenged by new technology, with many of the big names in the agricultural steam engine industry being forced out of business while only a few managed to find other products to fill their factories.

Surprisingly, few companies that were prominent in the glory years of agricultural steam power were able to move successfully into tractor production. The obvious exception was the J I Case company which seems to have adopted exactly the right strategy at every stage, making a smooth transition from being the world's biggest agricultural steam engine company to become one of the leading tractor makers.

Another possibility in the increasingly one-sided battle between steam power and tractors was to modernise the steam engine, adopting improved technology to allow

it to compete more effectively against the tractor.

This approach met some success in the early days of the motor industry – the world land speed record was held for a while by a steam car – and this was the approach chosen by the Garrett company in England when they announced their Suffolk Punch steam tractor in 1917.

The Garrett tractor was a complete break from traditional design. It was smaller and lighter, the driver was transferred from the rear to the front and provided with a proper seat and truck type steering, and it was designed like a tractor for pulling a plough or a cultivator.



The twin cylinders of this International Harvester steam tractor are beside the steering wheel, just behind the boiler, with the fuel tank and a condensor in what would be the engine compartment of an oil-burner

The boiler was turned round with the firebox at the front, transferring most of the weight over the driving wheels at the rear, and with 30kW (40hp) maximum output it performed well in ploughing tests.

It was unfortunate that Garrett's expensive Suffolk Punch arrived in the same year as Henry Ford's low priced Fordson Model F tractor. Only eight of the Garrett steam tractors were built, while Ford factories produced well over 700,000 Fordsons.

Steam tractors were also built in America. A design team at International Harvester took the idea much further than the Garrett engineers. Steam for the Suffolk Punch was raised with coal, but the IH tractors burned paraffin to provide controllable heat to produce the steam pressure without shovelling coal. IH tested several experimental steam tractors during the early 1920s before the project was abandoned.

Meanwhile oil-burner tractors – those with an internal combustion engine – were making enormous progress, both in numbers and in technical design. The 1914-18 war created a big surge in the demand for tractor power to increase food production when large numbers of men and horses were being taken from farms to the battlefields of Europe.

The only country left, with the resources to build tractors in large numbers, was the United States where production soared from an estimated 4000 built in 1910 to more than 200,000 leaving the factories in 1920.

It was not just the numbers that were increasing, there were also important design improvements and the period of just over 30 years from the start of World War I to the end of the 1939-45 war was particularly productive for the design teams.

Arguably the most important development in this period was the introduction of the Fordson Model F tractor in 1917. Henry Ford pioneered mass production and his engineers designed the Fordson to be assembled in large numbers and at low cost so that it could be sold as cheaply as possible.

With his car and truck factories already making big profits and with no outside shareholders to consider, Ford could sell his tractors at a loss if necessary and he cut the price repeatedly. His policy put many of his competitors out of business, and it also made large numbers of horses redundant as tractor power became affordable for many thousands of farmers for the first time.

Ford's main rival as the tractor industry's greatest pioneer is Harry Ferguson.

His Ferguson System using a hydraulically operated three-point linkage with draft control revolutionised tractor and implement operation and, with the addition of some technical updates including electronic control, it remains standard

equipment on about 99 per cent of farm tractors worldwide.

To demonstrate his new hitch, Harry Ferguson built the Ferguson Black tractor, it was completed in 1933.

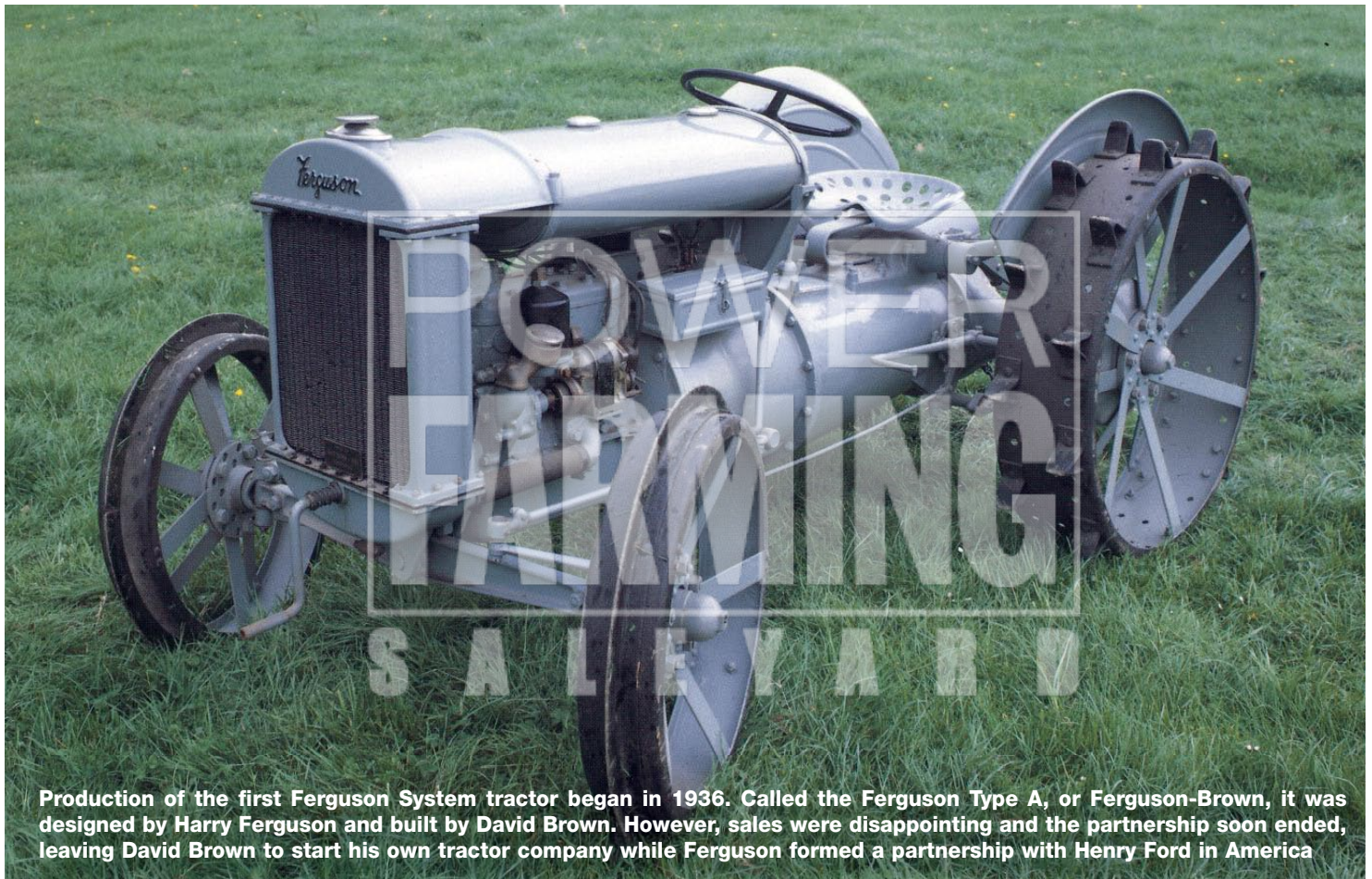
The first production tractor with the Ferguson System was



The low price of the Fordson Model F made tractor power affordable to many farmers for the first time from 1917



To demonstrate his new hitch, Harry Ferguson built the Ferguson Black tractor it was completed in 1933 and became the fore-runner of all modern day tractors with its three-point linkage and hydraulics, weight transference and automatic depth control



Production of the first Ferguson System tractor began in 1936. Called the Ferguson Type A, or Ferguson-Brown, it was designed by Harry Ferguson and built by David Brown. However, sales were disappointing and the partnership soon ended, leaving David Brown to start his own tractor company while Ferguson formed a partnership with Henry Ford in America

the 1936 Ferguson Model A which was built in Britain by David Brown while Harry Ferguson controlled the design and marketing, but sales were disappointing. Ferguson decided that offering his three-point linkage to Henry Ford might be a

better way to establish the Ferguson System on the world market, so he took one of his Model A tractors to America for a demonstration on Henry Ford's farm. This was in 1938, and Ferguson's timing was perfect. The Ford company was selling

a tractor based on the 21-year old Fordson Model F with a just a few design changes, and it was becoming outdated. Henry Ford wanted a completely new tractor to replace the Fordson design and he was quick to appreciate the advantages of the

Ferguson System. It was during the demonstration that Ford and Ferguson agreed to join forces to build a new Ferguson System tractor, and the result was the highly successful Ford 9N launched in 1939. The first tractor to bear the John Deere marque was the



Ford, like Ferguson, was a farmer's son and quickly appreciated the benefits of the three-point hitch – Ferguson System. Henry Ford and Harry Ferguson joined forces to design the Ford 9N tractor. Available from 1939 It was popular, establishing the advantages of the three-point hitch that is found on 99 per cent of all tractors today



John Deere purchased the Model N but continued to sell it under the Waterloo Boy name. The first tractor to bear the John Deere marque was the Model D of 1923

Model D of 1923. It replaced the 1917 Waterloo Boy Model N, powered by a two-cylinder engine of 19.4kW (26hp), this was a rugged, reliable and popular design, with fewer working parts and easy to fix in a farm workshop. The twin-cylinder "Johnny Popper" was thus to remain a hallmark of John Deere tractor design for almost 40 years.

The first John Deere tractors in Australia were imported by farmers in the mid-1920s. No formal distribution system existed here until the late 1930s, when Deere tapped into the Caterpillar network.

Inflatable rubber tyres were another of the big technical development from the 1930s.

Previous attempts to use solid rubber tyres or truck type high pressure tyres on farm tractors had been a failure, and steel wheels used in the paddock and on the road limited the top speed of most tractors to between about 5 and 8 kph (3 and 5 mph).

It was the Allis-Chalmers company in America that decided to try low pressure tyres that allowed the casing to mould itself to the soil surface and grip the ground. To test the idea they fitted a set of used tyres from a small aircraft on one of their 33hp Model U tractors in 1932.

The idea worked well at 15 psi pressure, offering efficient traction on the soil while the smoother ride allowed speeds up to 24kph (15mph).



International Harvester introduced the forerunner of the modern power take-off (pto) on their 12kW (16hp) Junior tractor

Firestone and Goodyear were soon making special tractor tyres and by 1937 almost half of all new wheeled tractors sold in the United States were on rubber tyres.

An important development that still features on almost every modern tractor is the power take-off or pto. Various devices for using the tractor's engine to drive equipment such as power harrows or binders for harvesting had been available since 1900 when the Scott tractor from Scotland was shown with a powered cultivator and seed drill attachment.

But it was the International Harvester Junior 8-16 tractor in 1917 that introduced the type of pto shaft that we still use today and also established the rotation speed and direction



International's Farmall series rowcrop models were an important breakthrough in tractor design

that became the industry standard.

International Harvester achieved another major break-

through in 1924 when they introduced the first of their Farmall tractors designed specifically for rowcrop work.



It was 1930 and four-wheel drive had arrived for the first time when Massey-Harris announced their General Purpose tractor with power from the 25hp Hercules engine delivered through four equal diameter wheels. Equal to the traction efficiency of a crawler, but there was little interest in four-wheel drive at that time

The special design features of the Farmall included generous underside clearance for mid-mounted equipment and to avoid damaging crop plants, and the tricycle wheel layout allowed good manoeuvrability for headland turns. There was plenty of wheel track adjustment to suit different row spacing and the tractor was also light to minimise soil compaction.

Farmall production started with the 13hp (18hp) Regular model and within six years the sales total had reached 100,000 tractors. Meanwhile most of International Harvester's main

competitors had introduced their own versions to establish rowcrop models as a major sector of the tractor market.

There were also some new developments that arrived in the 1920s and 1930s, but unfortunately the market was not ready for them.

Four-wheel drive for example, simply arrived too early with Massey-Harris introducing the General Purpose model in 1930 with power from the 19kW (25hp) Hercules engine delivered through four equal diameter wheels. Previously farmers who needed extra traction efficiency chose a

crawler tractor, and Massey-Harris became the first major manufacturer to offer four-wheel drive. Sales were disappointing, due partly to poor handling but also because of the extra cost of four-wheel drive.

The first diesel tractors suffered a similar fate. The pioneers were the Benz company in Germany followed by Cassani of Italy – predecessor of the SAME company – with Garrett in England and Caterpillar in the United States close behind. The early diesel engines were expensive, not always easy to start, and low fuel prices meant there was

little interest in choosing diesel as a more economical type of engine. It was not until improved diesels arrived 20 to 25 years later that this type of engine dominated tractor sales. □

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Steam engines have been relegated to curiosity pieces at carnivals where they are often used for threshing demonstrations – here a Ransomes traction engine is on show at a steam rally

In the next exciting 120 year series



In our next installment. Why the mid-1940s was the start of the golden age for farm equipment, with farmers anxious to invest in new machinery to improve output. One of the biggest growth areas was for harvesters as more grain growers switched from binders, with demand also swelled by the launch of self-propelled harvesters to replace older tractor-powered combines. Tractor sales also expanded rapidly with the introduction of a new generation of diesel engines. □