ALLIS-CHALMERS: TECHNOLOGY AND THE FARM
1925–1940

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Under the direction of General Otto H. Falk, Allis-Chalmers entered the farm equipment field to further diversify the company’s products and to make the company name known beyond the area of heavy machinery. This venture was to change the technology of the American farm, particularly during the decade of the 1930’s. Broadly speaking, technology is the way people do things. This being the case, patterns of agricultural life and production had changed but little over the centuries until very recent times. It is true that steam power had come to many farms in the last quarter of the nineteenth century, but steam merely supplemented the traditional horsepower—it did not replace it. From 1914 to 1920 about 20,000,000 horses and 5,000,000 mules were used on American farms.1 However, the horse had been brought to its highest efficiency while the tractor was being markedly improved with each passing year.

The first Allis-Chalmers tractor went into production late in 1914. By modern standards it was a most cumbersome piece of equipment. An unwieldy tricycle type with one speed forward and one reverse, it weighed 4,000 pounds and sold for $1,950. Largely an experimental tractor, it never achieved a wide sale to the American farmer.2 During World War I and the early 1920’s, tractor manufacturers constantly improved their products as engineers simplified design, reduced the weight, and provided greater ease in operation. As farmers became increasingly aware of the advantages of the tractor, the number of horses began to decrease. By 1928 the number of horses had fallen to 15,000,000; one quarter less than eight years before.3

One of the most important events in the history of the Tractor Division of the Allis-Chalmers Manufacturing Company was the appointment of Harry G. Merritt as manager on January 1, 1926.4 His job, as he saw it, was to produce a quality tractor at a price

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that the depression-ridden farmers of the 20's were willing to pay. As he and Allis-Chalmers engineers set about redesigning the standard 20-35 tractor, non-essential apparatus was stripped from the old model and essential parts were replaced by lighter ones. Concentrating on the tractor's general appearance, they gave it what Merritt called tractor "sex appeal." The finished product was a trim, snappy looking tractor that was more efficient, half a ton lighter, and priced at $700 less than its predecessors.5

Under Merritt's direction, change and improvement were constant in the Tractor Division. Engineers were sometimes reluctant to suggest ideas for improvement as Merritt would invariably ask them to proceed immediately. This policy produced greater sales and, consequently, more money for research and development.6 The willingness of Allis-Chalmers to take a smaller profit had a good deal to do with its success in producing a cheaper tractor and its rapid emergence as the third largest manufacturer of farm equipment.7

Administrative change was equally rapid. The appointment of W. A. Roberts as General Sales Manager made it possible for Merritt to concentrate on his primary interest, that of tractor engineering.8 Allis-Chalmers purchased the well-known La Crosse Plow Company so that it could join the ranks of the "full line" companies and compete on more even terms with other major producers.9 When it was found that its distribution system was inadequate, Allis-Chalmers purchased the Advance-Rumley Corporation of La Porte, Indiana, which had 24 branch houses and about 2,500 dealers, along with Advance-Rumley's well-known harvesters and threshing equipment.10 Through expansion Allis-Chalmers put itself in a position to engage in imaginative engineering which would revolutionize American agriculture.

Allis-Chalmers, in common with all other tractor producers, faced the cold fact that the tractor had not been universally adopted for farm use and was not in a position to really replace the horse on

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7 Fortune, May 1939, p. 150. According to this article, a report of the Federal Trade Commission indicated that in the period of the 1930's, the average Allis-Chalmers profit on new farm machines and implements in some years was less than 4 per cent, compared to an average of 6.7 per cent for International Harvester, and a whopping 18.1 per cent for Deere and Company.
8 Power Review, September, 1941, pp. 27 f. W. A. Roberts succeeded Harry Merritt as Manager of the Tractor Division in 1941, and in 1951 became president of the company.
the farm as the automobile and the truck had replaced him on the highway. This was due to the limitations and inefficiency of the type of wheel equipment used. The lugs on the steel wheels damaged meadows, orchards, and barnyards; and signs stating "Tractors with Lugs Prohibited" were appearing on most well-surfaced roads.11

The sheer inefficiency of the lug-type wheel is indicated in the old tractor ratings of 10–18 and 20–35. The first figure represented the useful power delivered at the drawbar and the latter the rated power of the motor. Tests proved that the tractive efficiency, the ratio between the power delivered at the drawbar and the power produced by the motor under field conditions, varied from a low of 40 per cent to a high of about 65 per cent. Very simply, it took power to push the lugs in and power to pull them out. The end result was that even on level ground the tractor was compelled to constantly climb a rather steep grade. As the speed of the tractor was increased, more of the total horsepower was required merely to move the tractor. At higher speeds it tended to approach the total output of the engine, leaving little power for useful work. The consequence of this was that conventional tractor work had to be done slowly, inefficiently and with a high rate of fuel consumption.12

Engineers had flirted with the idea of putting rubber tires on tractors. Experiments were conducted with both hard rubber tires and high pressure pneumatic tires, similar to those used on trucks. But when attempts were made to plow with this equipment it was found that the tractor could perform only under the most favorable ground conditions, and it was absolutely useless on wet ground. However, the tractor engineering staff finally arrived at the solution to the problem. They conceived of the idea of a low pressure tire with a flexible casing that would allow the tread to spread out and distribute the load, thus giving the needed traction.13 The development of the "air-tire" was a significant break-through for the entire industry. As the Farm Implement News put it on October 13, 1932, "Just about the time this industry seems to have dropped into a rut and reached a static point with no outstanding developments in sight, something arises to change its course. Rubber may be the pivot of the next turn."14

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11 Sales Bulletin, October–November–December, 1931, p. 67; J. W. Shields, Pneumatic Tires for Agricultural Tractors, undated ms. Shields was a field engineer for the Firestone Tire and Rubber Company.


13 W.E. July, 1947, p. 4; R. A. Crosby to author, June 15, 1961; According to Fortune, May, 1939, p. 150, Deere and Company offered solid rubber tires for tractors in 1926 and high pressure pneumatic tires beginning in 1928. However, it is generally accepted that Allis-Chalmers introduced the first low pressure, or air-tire.

A program of testing was set up; Allis-Chalmers tractors equipped with air-tires were put on selected farms so that the tests could be conducted under a wide variety of work and conditions. The reports were uniformly enthusiastic. Rubber actually seemed tougher than steel; the tractors rode more comfortably and the air-tires were easier on the tools used. They provided greater fuel economy, presented greater tractive surface, and most important, permitted greater speed of travel in the fields. The farm tractor equipped with air-tires was no longer limited to a narrow field of operation but had become a general utility machine to be used wherever power was required.\(^{15}\) Harry G. Merritt in 1933 summarized the agricultural advance made possible by the air-tire in these words:

We regard this new development as marking the dawn of a new era in American agriculture and the most important advancement in Tractor engineering in years. It eases a bit more of the farmer’s yoke, making his work easier, shortening his hours and reducing his costs of production.\(^{16}\)

While one group of Allis-Chalmers engineers was developing the air-tire and thus solving one problem—how to make the tractor an all-purpose machine, another group of engineers was tackling another knotty problem—how to design and produce a practical combine of small size for use particularly on the small Mid-Western farm. A combine is basically a threshing machine with a harvesting attachment which heads, threshes, and cleans the grain as it moves over the field. Crude combines had been devised as early as the mid-nineteenth century and with later refinements they came to be used effectively on the great wheat farms of the Far West and Northwest. These huge machines were drawn by 40 to 50 horses and cut a swath 30 to 40 feet wide. As the conventional combine crept eastward to the Kansas wheat fields its size was reduced to 20 to 30 feet. But it was successful primarily with wheat which could simply be headed and the heads rammed through a small throat into the threshing cylinder. It proved totally unable to harvest such crops as sweet clover, alfalfa and bush beans which inevitably clogged the small threshing cylinder. Eventually, the size was cut to 10 to 12 feet for the Mississippi Valley. Although these 10 and 12 foot combines were a vast improvement over the binder-thresher method of putting up grain, they still cost $1,250 to $1,500 and required a three-plow tractor and the services of two or three men to operate them.

\(^{15}\) Farm Implement News, June 23, 1932, quoted in A Decade of Allis-Chalmers Pioneering, undated mss., pp. 22 f; Also see William A. McGarry, “The Farm Tractor Takes Wings,” The Magazine of Wall Street, December 7, 1935, p. 198. The original Model “C” tractor equipped with the original Firestone airplane tires used in the first experiments is now on permanent exhibit at the Museum of the State Historical Society of Wisconsin.

\(^{16}\) Unmarked tractor mss., p. 2.
Allis-Chalmers set out to develop a totally new harvester that could, as one man put it, harvest everything from bird seed to beans. Other specifications were that it had to be light enough to be pulled by a two-plow tractor and operate from its power take-off, and it must sell at a price low enough that a farmer could afford to buy it. To provide a basis for development of such a machine the company in 1930 purchased the rights to a small five-foot combine manufactured in California. While they found it cumbersome and inefficient, it was a basis for experimentation and development. When Advance-Rumley was purchased in 1930, their long experience in threshers was utilized in the continued designing and testing of the proposed combine.  

The basic idea that was to make this machine different from and better than its predecessors was having a threshing cylinder the same width as the cutter bar. This permitted the grain to be fed into the cylinder in a thin stream rather than trying to ram a large quantity of grain into the narrow cylinder throat. Behind the threshing cylinder there was a wide rack which allowed the stream of straw to move toward the back of the machine making it easier to shake the grain out of the straw. It was no longer necessary to hammer the straw to pieces. The farmer who was feeding livestock could now save the entire yield of straw as well as the grain. This new concept of threshing also kept the weeds and green stuff out of the grain thus revolutionizing the harvesting of crops on the smaller farms of the United States.

The first demonstration of the "Corn Belt Combine," as this machine was originally named, was described in the Indiana Farmer's Guide:

A new development in high-speed grain harvesting was demonstrated a few weeks ago on a farm in La Porte County, Indiana, when a baby combine, travelling 5 miles an hour cut and threshed wheat and oats at one operation with such ease and speed as to amaze the more than 200 spectators gathered from all parts of the country. This new type machine, the product of the factory of the Allis-Chalmers Company, marks a distinctive milestone in the advancement of American agriculture, quite as much as did the advent of the reaper, more than a hundred years ago.

When the "Corn Belt Combine" was put to the test in 1935, it was found that it exceeded all expectations. By 1936 it had successfully harvested 84 different small seed and bean crops, including even rice and sunflower seed. Eventually it was to harvest over 100 different crops, and the name was logically changed to the All-Crop

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18 A Decade of Allis-Chalmers Pioneering, pp. 42 f; R. A. Crosby to author.
Harvester. In 1935, 550 machines were sold. Adverse harvesting conditions throughout the country stimulated sales because it was found that the All-Crop could harvest grain when no other conventional combine could. In 1936 the sales of All-Crop Harvesters jumped ten times, to 5,500. In 1937 the number was 10,500 and in 1938, 16,500 more replaced the binders and threshing machines. In fact, the All-Crop Harvester came to be known as the “successor to the binder,” for as Allis-Chalmers production increased to meet demand, total binder production in the United States declined from 66,000 in 1936 to 15,000 in 1939.\(^{20}\)

But the real merit of the new machine and its revolutionary nature received outstanding recognition when the Allis-Chalmers All-Crop Harvester was awarded the Royal Silver Medal at the Royal British Agricultural Exposition held at Bristol, England. It was held that this machine represented the most notable advancement of the year in agricultural machinery. This was the first time in twelve years that this coveted award had been won by an American manufacturer.\(^{21}\)

The All-Crop Harvester made the small Mid-Western farmer competitive with the large Western grain grower. By combining his grain the large farmer could put his grain in the bin for about 9¢ a bushel. By comparison, the small farmer found that the cost of binding, shocking and threshing cost him at least 20¢ a bushel. By combining the operations with an All-Crop Harvester he found that he could put his grain in the bin for 10¢ less a bushel than before and could pay for his machine with his new profits in less than two years.\(^{22}\)

Allis-Chalmers research in a third area met a long-standing need. As early as 1871, Horace Greeley envisioned a small, inexpensive form of power on the farm in these words:

What our farmers need is not a steam plow as a specialty, but a locomotive that can travel with facility, not only on common wagon roads, but across even freshly plowed fields, without embarrassment, and prove as docile to its manager’s touch as an average span of horses.

Such a locomotive should not cost more than five hundred dollars, nor weigh more than a ton.


\(^{21}\) Sales Bulletin, October, 1936, p. 9.

\(^{22}\) A Decade of Allis-Chalmers Pioneering, p. 47; R. A. Crosby to author. By 1936 the Tractor Division was the largest single division of the company, selling more than 300 different products from four large plants. The West Allis Works manufactured wheel-type tractors, and the engines for the tractors and equipment built in other plants. The La Porte, Indiana, factory built the All-Crop Harvester together with an impressive line of threshers, big combines, clover and alfalfa hullers. The La Crosse Works at La Crosse, Wisconsin, manufactured the extensive line of Allis-Chalmers farm implements, including cultivators, plows, bedders, harrows, mowers, and other power machinery tools.
It should be so contrived that it can be hitched in a minute to a plow, a harrow, a wagon or cart, a saw or grist mill, a mower or reaper, a thrasher or a stalk cutter, a stump or rock puller, and made useful in pumping or draining operations, digging a cellar or laying up a wall, also in ditching and trenching.

We may have to wait several years yet for a servant so dextrous and docile, yet I feel confident that our children will enjoy and appreciate its handiwork.  

Allis-Chalmers provided the fulfillment of this dream.  

Merritt studied the farm census figures and discovered that of the 6,800,000 American farms, some 4,000,000 were under 100 acres. But most of the 1,200,000 tractors in the country were working farms of more than 100 acres. In order to bring tractors into use on smaller farms, the Model “B” tractor was designed and placed in production in 1938. It was revolutionary in regard to price, weight and adaptability. This 2,100 pound tractor cost only $495. It weighed and cost only one-third as much as tractors of ten years before, but it would do 20 per cent more work with 25 per cent less fuel. It could pull a sixteen-inch moldboard plow at 3 to 4 miles per hour. To haul a load of hay a farmer could hitch a trailer and roll it along (on rubber tires) at about 7 miles per hour. To saw logs, he could attach a belt to the pulley wheel which would be geared to the tractor transmission. The belt could operate a circular saw. Also, shaft-driven machinery such as a mower could be powered by a take-off on the rear axle. Designated as the “successor to the horse,” the Model “B” was all that Horace Greeley had called for, and much more.

For the first time in agricultural history it was possible to operate a completely mechanized farm of 100 acres for an investment of only $10 an acre. The Model “B” cost $495. The next most expensive investment might be the 40-inch All-Crop Harvester with power take-off which cost $345. With these machines the small farmer could thresh all his small grains, beans, and seeds without outside help. For plowing, a farmer could buy an Allis-Chalmers no. 116 Moldboard Plow for $85; it plowed the soil deeper and

23 Quoted in Rubber Invades the Farm, undated tractor mas., pp. 5 f.

24 In 1915 Allis-Chalmers engineers developed the radically different 6-12 tractor as a direct substitute for the horse. This unique tractor had two steel driving wheels in front, pivoted by a turning mechanism at the center. The driving wheels were obviously the direct substitute for the horse and the operator sat at the end of a long pole on lighter wheels at the rear. By removing the sulky, the tractor could be attached to any two-row, horse drawn implement, thus saving the farmer a great deal of expense. Although the 6-12 was an ingenious machine it never captured the imagination of the conservative American farmer who was just becoming accustomed to the conventional tractor.

25 Annual Review, 1937, p. 64; Arthur Van Vliet, “50,000,000 New Dollars a Year,” Forbes, June 1, 1938, pp. 34 f.; A Decade of Allis-Chalmers Pioneering p. 30; also, p. 50 f; Allis-Chalmers Milestones in Farm Mechanization, p. 10; Fortune, May, 1939, p. 150. The Fortune article points out that by 1938 the protests of the Horse and Mule Association had been reduced to the rather obvious fact that tractors were inferior to animals because they produced no manure.
pulverised it better at twice the speed of horses. Finally, he could buy a one-row cultivator for $50.25, which was adaptable to all row crops. If, as some have maintained, the small farmer has traditionally been the backbone of American society, Allis-Chalmers did much in the 1930’s to maintain his independence by making him economically competitive.

Allis-Chalmers’ engineering and innovation had a profound effect on the agricultural equipment industry as a whole. From a position of relative insignificance as a producer of tractors and agricultural equipment, the company shot rapidly upward to third place in this field during the middle and late 30’s. It is estimated that during that decade, Allis-Chalmers had no more than one-twelfth of the salesmen in the field, but by 1937 it was selling 18 percent of the products of the industry as a whole. This percentage increased during the two succeeding years so that by 1939 the company was selling more than one-fifth of the national product.

The Tractor Division had gained a significant, in fact, a predominant position within the company. It had also, through the revolutionary nature and excellence of its products, produced a revitalization of the industry as a whole. But perhaps more importantly it had contributed in a significant fashion to American agriculture and the economy of the nation as a whole. Calvin Coolidge once remarked philosophically, “Farmers have never made money, I don’t believe we can do much about it.” Allis-Chalmers’ tractors and implements in the decade of the 30’s helped the farmer in general and the small farmer in particular perform his work more effectively, more efficiently, and more profitably than ever before. In the early days of the American Republic, something like 85 per cent of the nation’s workers were actually needed to produce food for themselves and the other 15 per cent of the population. By 1940, 15 per cent of the population could feed themselves and all other Americans as well as export enormous amounts of food stuffs to our allies during World War II. Allis-Chalmers had played a leading role in the agricultural revolution of the 1930’s.

26 Allis-Chalmers Milestones in Farm Mechanization, p. 11.