

A Short history of Scott Motorcycles by Roger Moss incorporating details from an article on "Great Engines" by Mick Duckworth published in "Classic Bike" August 2011 (With Permission)

The Scott Motorcycle. The vision of a truly gifted Yorkshire engineer in 1908, to conceive and produce the optimum motorcycle from base principles, without slavishly following or being influenced by the work of others.

Alfred Angas Scott realised the importance of proving the durability of designs to eliminate any weaknesses before they were sold to the public and reasoned that their use in competition would be the quickest and surest way to achieve this. Alfred also recognised that to manufacture the best motorcycle would not in itself bring success. What was also needed was the publicity derived from demonstrating their superiority in competition, to a wider audience of hopefully prospective purchasers. In addition to their performance capability the motorcycle was to be presented with a mouth-watering specification and finished to the very highest standard.

The machine's qualities of light weight and excellent performance were further enhanced with what was arguably the world's first kick starter and telescopic front forks. An efficient combined clutch and two speed gears made best use of the engine output. The engine was carried low in the frame and this combined with the gyroscopic effect of the large central flywheel gave unusually stable handling. As regards presentation, as with all other aspects, no compromises were made to present what was clearly a machine of the highest quality. The iron cylinder barrel was first highly polished and then it was coated with a magenta translucent varnish, so that the shine from the polished iron beneath shone through to give a deep lustrous appearance that could not be obtained by a conventional paint. The iconic radiator was highly polished as were all bright plated items. The paintwork was by many coats of traditional coach paint all lovingly hand rubbed between coats and finished with a clear lacquer.

The final product was at least 20 years in advance of the opposition and must have caused similar consternation amongst the opposition as when, years later, the early Honda motorcycles were stripped and examined by incredulous British bike producing companies. Early Scott racers had such strong acceleration compared with their heavier four-stroke rivals that from 1908 to 1912, the ACU imposed a handicap, multiplying the engine

capacity by 1.32.

Scott's set the fastest laps in the first four Senior TTs held on the Isle of Man Mountain Course from 1911 to 1914 and were winners in 1912 and 1913. Like high-performance Yamahas of the 1970's the definitive Scott two-stroke 180-degree twin features inclined water cooled cylinders with piston port induction and positive lubrication.

Scott was a pioneer anticipating late 20th century designs, but his engine uses Victorian technology too. The overhung big end bearings on either side of a large flywheel were a feature of 19th century stationary steam and gas engines.

Born in Bradford, England, Alfred Angas Scott (1875-1923) trained in a Glasgow engine company Ailsa Craig and at the Gloucester works of marine engine makers W Sisson & Co. Attracted by the simplicity and light weight of the two cycle engine design patented by Joseph Day and Alfred Cock in 1891, he made his own version and attached it to a bicycle in 1901. In 1908, he won a major hill-climb on his first motorcycle, a 333cc air cooled twin with its engine low in the frame. As Scott did not, as yet, have manufacturing facilities of his own, the Jowett brothers who had facilities in nearby Bradford were commissioned to make six pre-production prototypes. These were intended for extensive evaluation and to give confidence to the prospective financial backers who would be needed if a new manufacturing plant was to be established to produce Scott's newest design. The TT entry of 1909 was a water cooled twin with a kick starter, the first seen on a motorcycle. By that time Scott was setting up his own motorcycle manufacturing plant in Bradford and in 1912, the company found a long-term home in nearby Shipley. Scott aspired to the highest standards of quality and precision, symbolised by the engineer's limit gauge that was chosen as the company logo. It was during this period that Scott demonstrated the extent of his engineering prowess by not only refining his current motorcycle design, winning a TT but also designing the special production machinery with which the new models would be manufactured. As though to prove that the abilities of this remarkable man were not restricted to design, Alfred was personally involved in the installation and commissioning of the machine tools ably assisted by Tim Wood. Both the latest motorcycle models and the "State of the art" manufacturing plant were featured in the Iliffe publication "The Automobile Engineer" in 1914 and 1916. The manufacturing methods employed by Scott were current in the UK until after WW2.

Although the company was named "The Scott Engineering Co." the majority shareholding

belonged to investors who had the prime objective of making a profit on their investments, not pursuing an engineering adventure. The emphasis of the company thus became the production of existing models, rather than the development of new concepts. Scott's minority shareholding limited his influence resulting in Scott deciding to take the value of his shares, granted in payment for his intellectual property rights and move on. Since the time that reliable motorcycles had been available to the general public, there had been a call for an ability to carry more passengers that had been answered by the sidecar. Scott considered that the motorcycle with a sidecar attached to be a compromise that fell short of what was acceptable to him. He therefore conceived a three wheeled vehicle constructed rather like a racing sidecar outfit of the 1990s to have greater stiffness for its weight. The vehicle would have weather protection for its occupants and be propelled by an engine which embodied rotary inlet valves, a principle he had employed with great success on his TT winning engines. Scott left the company bearing his name in 1917 and started producing his latest brainchild then named "The Sociable".

Unfortunately, the general buying public being unable to see the engineering beauty in the vehicle, judged it by its unusual appearance and thus sales fell short of what the effectiveness of the vehicle deserved. Scott had made the classic mistake of the advanced designer that in business, it is not what can be made that is important, but what the public will buy!

Scott's appetite for adventure and discovery had led him to take an interest in exploring the many pot holes found in his area and this eventually was his undoing. Returning to surface soaked after a subterranean trip in 1923, he drove home without changing out of wet clothes and contracted pneumonia and died. The world had to wait about another thirty years before another gifted engineer, Walter Kaarden, arose to make further significant advances to the two stroke engine.

Without Scott's input, the development of the machine proceeded by evolution and reaction to any aspect that proved unreliable. The first post WW1 model was the 1920 Squirrel followed in the mid 1920's by 500cc and 600cc Super Squirrels and then the more powerful Flying Squirrel.

As the public demanded more power and speed to maintain parity with the rapidly improving four stroke models from other factories, a three speed gearbox was designed by Harry Shackleton to go with the larger engines and the package finished with a heavier duplex frame and telescopic forks. The lightweight Two Speed models had secured a

devoted following and so were kept in production until 1933. The Flying Squirrel had an engine with a stroke of 68.25mm which gave impressive torque at low / medium revs but not an especially high maximum speed. Feeling the need to respond to the ever increasing performance of the competition, Harry Shackleton revised the engine design in 1928 by lengthening the stroke to 71.40mm to create the "Long Stroke" engine. This design uplift enabled the ports to remain open slightly longer than the 68.25 stroke "Short Stroke" version, which like the Two Speeder also stayed in production until 1933. It should be borne in mind that this design modification took place when the octane rating of the available petrol was 60. And this should be considered against the 75 octane of the universally reviled "Pool" petrol which was all that was available for a period after WW2. This "Long Stroke" engine was the last significant design uplift to the traditional Scott engine design and continued dimensionally unchanged until 1968. The engine basic design endured in production for 60 years which is a testament to the soundness of Alfred Scott's original concept. Although a Scott with the then new long stroke engine had gained third place in the 1928 Senior IOM TT races, it was considered that the engine was in need of a more fundamental design uplift. Quite apart from engine output, the concept of having a cylinder barrel with an integral cylinder head had become unfashionable and needed changing to preserve an "Up to date" image. Seeing this business opportunity, the "Hemmings" company in 1930, produced an aftermarket interchangeable barrel with detachable aluminium cylinder head under the trade name "Paramount". More far reaching changes were in hand at the Scott works in 1929, as their first completely new engine was being designed since 1908. The true sign of a top designer is that the design should be simple, elegant and economical to produce. An unnecessarily complicated design is not a sign of cleverness but an indication that a mediocre designer was the author. We should, however feel some sympathy for any designer who had been called upon to conceive a design to outshine the original concept by Alfred Scott. A vertical twin was designed with a full crankshaft to replace the original overhung single sided design which, after introduction of the Long Stroke version, had proved to be of suspect durability. The drive from the engine was from the extreme left hand side in the style of post WW2 British twins. The drive being on a different line, was taken to the left hand mounted clutch of a special magnesium bodied gearbox which had its final drive on the right hand side of the machine. The gearbox was a complete special having needle bearings throughout. Special racing machines to this design were sent to the Isle of Man

to compete in the 1930 Senior TT races, but unfortunately, the vibration was so excessive that the machines were unusable. As Scott's had machines entered for the races, some machines to the original design used in the 1929 TT races were hurriedly despatched to the Isle of Man for use in the race in which they were now outclassed. The world financial circumstances had become unfavourable so it was decided to retain the original engine design, but to introduce a barrel with an aluminium cylinder head. The user feedback of owners who had purchased the earlier Paramount after market barrel with an aluminium cylinder head had indicated problems with head to barrel sealing. The Paramount used 9 studs but the single central stud position was not strongly located. Having reviewed the user evidence Scott's played safe and their detachable cylinder head introduced in 1934 was secured with sixteen studs. The image of the Scott as a top sportster was beginning to fail and although it was still a high quality Sports Tourer, it was expensive to produce. In order to maintain a credible selling price that would cover production costs, it was decided that their gearbox, with only three speeds, needed replacing with a four speed version if the respect of the marketplace was to be retained. Unfortunately the new design was complicated, significantly more expensive to produce than the engine and did not function properly. Its reputation of being the gearbox with four speed and sixteen neutrals says it all!. The gearboxes were advertised in 1934 at an extra £5 which bore scant relation to their production cost. After many were returned to rectify faulty operation and with no economic solution in sight, the customers were urged to return their bikes, have a three speed box fitted free of charge and their extra money refunded.

It is believed that only six of these gearboxes remained in the hands of customers. Forty years later a design study resulted in a modest modification that would cure the malfunction, but although the design could be made to work reliably, it was unacceptably expensive for commercial production.

As if these design failures were not enough, the company decided to design and produce a three cylinder model, but the delicacy, elegance, light weight, economy of production and fitness for purpose that typified the original design concept of Alfred Scott were totally absent. The financiers who controlled the Scott Company were not engineers like Alfred Scott and so were not able to pass judgement on any chief designer they might employ in the hope that his inspired designs would lead them out of their deepening mire. Thus the company cast about with different uneconomic projects that progressively weakened their financial position. The Duplex framed Scott with the Long Stroke engine but with

detachable cylinder head, soldiered on until 1950 when the company directors at last gave up the unequal financial struggle.

Scotts when in good condition are, in all objectivity, a remarkably fine machine to ride. The engine has a very flat torque curve and the bike handles at least equal to the best of its competitors or better. It is no surprise that almost all who tried a Scott became fervent admirers of the marque.

Amongst these was Matt Holder an engineer from Birmingham who having been financially fortunate decided to buy the name and residual stock of the Shipley concern.

With the assistance of Bill Read from the late Shipley concern, Matt set about modernising the machine with a modern welded loop frame with Dowty Olio Pneumatic front forks derived from aircraft landing gear and pivoted fork rear suspension. These machines were built to order until 1968 and in good condition are fine machines.

Another dedicated enthusiast of Scott's was George Silk. George's father was a lifelong Scott fan and apprenticed his young son to Tom Ward who carried on a business repairing Scotts from his home at 59 Wilfred Street Derby. Tom Ward had worked with Alfred Scott before WW1 and thus he was able to pass on valuable information that had a direct line to Alfred. After completing his apprenticeship, George Silk worked for an engine rebuilding company Alan Cotterill where he was employed to grind truck crankshafts. George was looking for a way to set up his own company and was able to realise his ambition in partnership with another long time Scott fan Maurice Patey in premises at Boars Head Mill. At first George and Maurice were engaged in repairing Scotts and reconditioning engines. At this time I (Roger Moss) was in close contact with George as we both were interested in racing Scotts in races for Historic motorcycles. In my case, our family had a substantial business engaged in the design and manufacture of special production plant for companies such as Ford, Rolls Royce etc. , thus my involvement was totally private with the sole exception of manufacturing replacement Scott crankshafts and head bearings from 1968.

In the vicinity of George's plant at Derby was a renowned builder of rolling chassis for road racing, as, at that time, the engines produced by Yamaha, for example, were more advanced than their frames.

George requested that Bob Stevenson the head of Spondon Engineering should make a stretched version of these lightweight racing frames at their Moor Street factory at

Spondon. In these George intended to fit tuned Scott engines with four speed Velocette gearboxes. The original intention was to purchase new Scott engines from Matt Holder, but unfortunately through whatever reason it is perhaps better not to delve into, a lack of goodwill arose between the companies. It is perhaps pertinent to point out that some of the more extreme Scott owners were undiplomatic to tell Matt Holder that, in their opinion, his bikes were not proper Scotts as only Scotts made at Shipley could be considered as genuine "Scotts" This to a proud man who had spent a fortune to try and keep alive the Scott name was profoundly unappreciated. The result was that Matt declined to supply George with engines so only about 25 Silk Scott machines were built using engines supplied by the customers. Faced with this position, George made the courageous decision to manufacture his own engine based on the Scott / Day cycle deflector piston engine, but with fully supported crankshafts. The Dave Midgelow designed Silk engine uses a unit gearbox with Velocette internals and our company produced all the gear profiles for the complete run of Silk machines. The production of a hand built motorcycle was expensive and this brave project was finally brought to an end by financial realities. George went on the use his inventive flair by designing and building on site machining rigs which were a much better financial proposition. George retired in 2010.

Finally I must add details of my long involvement with Scotts so as to complete the story, although we all hope that others come along after us. In 1970 I started road racing on Laverda and then Ducati twin cylinder machines. I was also racing a 1939 Triumph Tiger 100 and a 1930-style Scott.

The punishment metered out in racing indicated the areas that were in need of enhancement and much design time and investigation was expended to define the specification for the strongest possible crankshafts. With the decline of the manufacturing base in the UK, a lack of customers led to the demise of our family machine tool manufacturing company. This brought about a significant change in my circumstances. I found a modest cottage with a workshop in the garden and over almost 20 years have built up a plant dedicated to the rebuilding of Scott Engines. With the aid of top ex Rolls Royce designer Ted Hills it has been discovered that Alfred's basic engine design has an unexpected unutilised capacity to improve durability, smoothness and torque and to take advantage of the much superior fuel currently available, compared with the 60 octane fuel that was the norm at the time of the last design uplift in 1928.

A 600cc Scott in good condition gives 19bhp. By internal modifications without changing external appearance or original design principles, this can be raised by 28% with standard exhaust and 100% with a modern exhaust. Cranks from 110TT aerospace steel will insure against the fear of crank breakage and fitting an additional weight ring in the flywheel will much improve snatch free running at lower revs and handling stability. To spend this latter part of my life rebuilding engines that will bring much pleasure to owners is a privilege. The cherry on the cake is to campaign my Scott racer which has 45 bhp at the crankshaft, weighs 100 kg and has a Scott 4 speed gearbox that actually works! If any reader has not ridden a good Scott, --- Then you do not know what you are missing!

Roger Moss December 2011