

INTRODUCTION

This article was written in response to a request from Audrey Barrass, Secretary of the Belper Historical Society and a distant cousin of mine, to place on record my recollections of the activities of Rolls-Royce in Belper, following the outbreak of the Second World War, and in particular the role that Clan Foundry played between 1940 and 1950.

It is a personal recollection of the time that I spent as an engineering apprentice in Belper and Derby during the war, and my involvement in the war-time activities of Clan Foundry as a Research and Experimental Department of Rolls-Royce during the war.

This led to the evolution of the post-war Motor Car Division in Belper, before the Design and Detail Drawing Office moved to Crewe in 1950 to become integrated with the production activities in the Crewe factory.

It also includes my own personal activities within the Motor Car Division, until my retirement from Rolls-Royce Motor Cars (Crewe) in November 1985.

Reginald J. Spencer MBE
January 2005

R-R EVACUATION TO BELPER

When the Second World War was declared in September 1939, most of the engineering and clerical staff were moved from Derby, leaving only the main manufacturing facility at Nightingale Road, and several satellite workshops were scattered around the Derbyshire countryside to duplicate essential work, to prevent the disruption of production.

Belper and District was chosen as the evacuation area to accommodate the various essential services, and several properties were requisitioned to accommodate them.

As a young lad who walked daily from 94, Belper Lane (this house was initially built by Strutts in 1803 as the Parish Workhouse) to the Herbert Strutt School, between 1935 and 1939, I was intrigued to see the bare chassis of a Rolls-Royce car being driven along the A6 towards the Peak District where much of the road testing took place. The sight of the intrepid test drivers, wearing flat caps and goggles, fuelled my imagination and established a burning ambition to join this famous company.

This was to be my dream for the future.

I wrote to the company in Nightingale Road and was subsequently invited to attend for an interview with Mr H.A. Ward, the Apprentice Supervisor. I was requested to join the Mailing Department on the 8th March 1940, until the start of the intake for engineering apprentices in September of the same year.

The Mailing Dept. was located in the Lodge of Field Head House in Chesterfield Road, the old Courthouse, at the top of the 'jitty' leading from Field Lane to Chesterfield Road. The Mailing Office Manager was Mr Roe.

The GPO delivered to, and collected mail from, the Lodge, and after sorting, it was taken out by the 'Mail lads' to the various Aero Division locations in the Belper area. These included:

- Blounts Hosiery Factory, Spencer Road - Aero Service, Print Room and Purchase for Tank Division, Blounts Hosiery Factory, Penn St., - Powerplant Design Office
- Assembly Rooms, Derwent St., - Engine Design Office
- Castle Factory, Derwent St., - Performance & Stress Office, Rig Design
- Unity Mill, Derwent St., - Detail Drawing Office
- Campbell St., - Chassis Division Detail Drawing Office (The Food Office was downstairs)

- Field Head House, Chesterfield Rd., - Company Secretary's Office (John De Looze)
- Dalton's Silkolene oil works (first floor over garage), - Buying Office
- Brook Cottage on the Silkolene site - Engineering Management Office - A.G.Elliott (Chief Engineer) & Mr H.Royce (no relation to Sir Henry) - Chief Buyer.
- Swimming Baths in Gibfield Lane, - Detail Drawing Office & Rig Design Office

My particular round included Campbell Street, Silkolene and the Swimming Baths.

During both the First and Second World Wars, Rolls-Royce ceased car production and diverted their attention to the war effort, primarily designing, developing and producing aero engines.

The Chassis Division was left in the charge of W.A.Robotham (Rumpty), who had been Technical Assistant to Ernest Hives, where he specialised in car development.

Up to the outbreak of the Second World War it was known as the Chassis Division, as Rolls-Royce produced a framed chassis with engine, gearbox and transmission, to which a body was fitted by a variety of Coachbuilding companies, including H.J.Mulliners, James Young, Hoopers and Park Ward.

The first all-steel saloon, the Silver Dawn, was designed and built at Clan Foundry, and although a chassis continued to be supplied to various coachbuilders, the name of the Division was changed to the 'Rolls-Royce Motor Car Division'.

CLAN FOUNDRY

The Aero Engine Division had commandeered all available and suitable accommodation in Belper, and it was left to Robotham to find a suitable location to keep his Chassis Division team together. His attention was directed towards Clan Foundry, at the southern end of the town, alongside the A6, opposite Park Foundry, and late in 1939 he leased the premises from the foundry owners.

It was a derelict, rat infested, rusty corrugated-iron group of buildings, built on a slag heap overlooking the main railway line from Derby to Manchester, but Robotham saw that it had potential.

Clan Foundry was to become an important contributor to the war effort, and became the springboard for the post war Motor Car and Diesel Engine Divisions of Rolls-Royce Ltd..

Information supplied by George Barrass, in his excellent book "The Iron Men of Belper" indicates that Clan Foundry became operational in 1932, producing small cast iron goods such as fireplaces, grates and manhole covers and this continued until about 1938 when the foundry ceased trading.

Robotham delegated the responsibility for preparing Clan Foundry for operational duties to Harold Whyman, his right hand man who had been in charge of the experimental garage in Derby. Harold was a brilliant test driver, who, as a young man, had been appointed to supervise the maintenance of the Maharajah of Patiala's fleet of Rolls-Royce cars in India.

His first task was to overlay the black sand floor with a substantial layer of concrete, and he used the chassis division workforce to carry out the essential work on the buildings. The operating area was small, about the size of two tennis courts, but there was growth potential.

The Chassis Division Design Office was located in somewhat squalid quarters at the front of the site adjacent to the A6, but life was very primitive and tough during those early stages of developing the site, and a graphic description is given by Frank Shaw, who, as a young draughtsman, had moved to 'Clan' from Derby, and has presented a very informative and interesting paper on the concept and development of the Cromwell Tank, to the Sir Henry Royce Memorial Foundation in 1981. This paper was presented again in 1995 at the Autumn Lecture.

Frank Shaw is the Chairman of the Trustees for the Sir Henry Royce Memorial Foundation that was established in 1977 as a permanent centre devoted to the life and works of Sir Frederick Henry Royce, OBE, to his distinguished colleagues and successors, and to the advancement of engineering. It is located at The Hunt House, Paulerspury, Northamptonshire, NN12 7NA, and special emphasis is given to the encouragement and support of apprentices and young engineers, and in perpetuating Sir Henry's engineering philosophy ~ the pursuit of excellence.

A canteen was eventually set up at the north end of the site, by the main road, run by Mrs Hall of Milford. The stores area, workshop, and rig testing was situated at the south end (Milford end) of the foundry, with the important experimental garage section at the north end, facing the railway line.

Subsequently a machine shop was established south of the offices and at the front of the site. An antiquated boiler was eased into life to provide heating for the offices and a supply of steam for the workshops. A test bed for engine testing was built at the southwest corner of the site, using second-hand corrugated iron sheets.

In 1945 a brick building was constructed in the field, about two hundred yards south of the foundry, and this housed both the Design & Detail Drawing Office and the Print Room facilities. The Detail Drawing Office moving from Campbell Street around 1946.

In the early days of the war, slit trenches were dug in this field. Their true purpose was unknown, but the instruction to dig them may have been influenced by the setting up of a Local Defence Volunteers (LDV) squad - the forerunner of the Home Guard. My father, Lewis Spencer, was a member of this organization.

Robotham also set up a design office/nerve centre in a squash court which he had had built in the garden of his house in Duffield, Park Leys, before the war, and was moved to a location on the West side of the Clan Foundry site, overlooking the railway.

The design team included Ivan Evernden, who had joined Henry Royce at West Wittering in 1921, and had become an expert in styling and conceptual design, Charlie Jenner, another member of Royce's personal design team at West Wittering who was regarded as being one of the finest engine designers in the history of Rolls-Royce, and Bill Allen, a stylist. It was recounted that Bill Allen, who was a dedicated railway buff, would frequently stand up during a meeting to observe that a passing train was running way behind schedule - even after sixty years we are having similar problems!

Sir Henry Royce's personal driver, Frank Dodd, also worked at Clan Foundry as a test driver, before moving to Crewe to become Head of Car Test. The first task was to complete all those chassis division drawings, which had been interrupted at the declaration of war, and to store them in readiness for the cessation of hostilities.

Two sets of drawings were produced. One set of drawings and two complete cars (a Silver Dawn 80 and a Bentley 11-B-V - known as the 'Scalded Cat') were sent to Canada, and one set of drawings were stored in a bank strong room in Ashby-de-la-Zouch.

EARLY WORK

At this stage Robotham allocated a portion of the working area to aero engine repair; and Peregrine, Kestrel and Merlin engines, which had been retrieved from crashed aircraft were brought to Clan Foundry to be stripped, washed, inspected and rebuilt, prior to testing and re-entry into service. Even the drawing office staff helped to strip engines on Sundays.

It was during this period that I was transferred from Nightingale Road, Derby to Clan Foundry in 1941; and the transition from operating a lathe in No.2 Machine Shop, with alternating 12-hour shifts of 13 days and 13 nights, to stripping dirty engines, was a marked contrast.

One of the engineers, responsible for pistons and connecting rods, was Harry Lomas of Milford, whose son Bill Lomas attended Strutt School at the same time as me, and was later to become famous as a racing motor-cyclist and a NSU works rider, achieving world status.

It was dirty, arduous work, but essential to maintain a supply of engines to the R.A.F., and your thoughts often wandered to consider the circumstances that had led to the situation that we now faced.

Robotham was always on the lookout for projects that he considered would befit the talents that he had amassed in his chassis division, and he became involved in development work for the mounting of a 40 mm aircraft cannon, which had been devised by Dr Viale, an Italian designer seconded to Rolls-Royce, who worked from his home on Burton Road, Littleover.

It was eventually considered that this type of work was best left to the experts in the field, such as Vickers, Bofors and Oerlikon, and the project was abandoned.

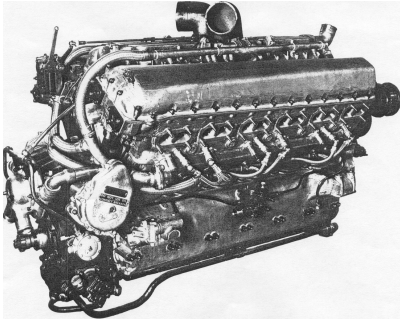
THE CROMWELL TANK

In Harold Nockolds book – The Magic of a Name – published in 1949, a Special Edition of which was produced for Rolls-Royce Employees only, he devotes Chapter IV to describing the activities surrounding the birth of the Cromwell tank and the part played by Rolls-Royce in Belper in designing and developing its engine and running gear, before transferring the responsibility for its manufacture and further development to Rovers.

When an effort was made to produce tanks quickly, just before the war, the only engine designs available were the American Liberty aero-engine, which had first seen the light of day in 1916, and the Meadows engine made in Wolverhampton. The Liberty engine developed only 320-330 h.p., which was not nearly enough for the heavier tanks then envisaged, and plans were already being made for the large-scale manufacture of Liberty engines in new factories.

This situation provided an opportunity for Robotham and his redundant car engineers to set about the task of substituting one of the existing Rolls-Royce aero-engines for the Liberty engine.

Having first considered the unsupercharged Kestrel engine, and proving on bench tests that with modified carburettor and ignition settings it developed considerably more power than the Liberty engine, whilst occupying less space, it nevertheless did not meet the long term demands to have an engine of at least 600 h.p. to provide the power-weight ratio of 20 h.p. per ton that was envisaged for the heavier tanks.



The Merlin was therefore considered to be most eminently suitable for this project. The Merlin was more compact than the Liberty, and it would be readily interchangeable with the Liberty in any installation that had been designed to receive this engine.

The initial stage was to omit the entire supercharger, wheel case, reduction gears, boost controls, fuel pump, oil relief valve, sump, generator drive, carburettors, induction manifold, and auxiliary drives from the camshaft. This action eliminated most of the features peculiar to the aircraft engine, and it considerably reduced the machining time, with a corresponding decrease in complexity and manufacturing cost.

The next step was to install a modified Merlin, with Zenith carburettors, into a Crusader tank and put it through its paces. It took about five months to prepare the project for its first test run, and this took place at Aldershot in September 1941, under military supervision, and was timed over a half-mile course. This was quite successful, and somewhat alarming, as the automatic recorder in the tank registered its maximum reading of 50 m.p.h. – not bad for a vehicle weighing 27 tons, with a fuel consumption of 1.35 m.p.g.!

Further tests amounting to 3,600 miles revealed the inability of the Crusader to withstand the strain of being propelled by an engine of twice the power for which its transmission and suspension had been designed. The Government asked Rolls-Royce to set up a small research and experimental establishment to assist in developing not only the unsupercharged Merlin as a tank engine, but the dynamic components of the whole tank, including its steering, transmission, suspension, electrical, hydraulic ancillaries, accommodation for the crew, and ammunition stowage.

The responsibility for setting up this facility was accorded to Robotham; and Clan Foundry, Belper was the ideal site to carry out this task. To enhance the project Hives located some waste ground at the top of Burley Hill, Allestree, adjacent to Quarndon Lane, which would be ideally suitable for a test track and was only about 5 miles from Clan Foundry.

Keeping the engine cool, in the confines of a tank engine compartment, as opposed to an aircraft, created special problems. The fan efficiency was raised from below 20% to greater than 60%, and most of the credit for this must go to Fred Hardy, who made it his special project.

Fred headed the development team of the Chassis Division throughout the Second World War at Clan Foundry, and he was ably assisted by Geoff Bastow and his brother Don Bastow, who was later to play an important role in the development of the suspension for the Cromwell tank.



A Cromwell tank entering Clan Foundry off the A6

A test bed was built at the South West corner of the site, and this consisted of a steel tank to replicate the engine compartment of the tank, with a wooden cover on which were mounted several glass thermometers and thermo-couples, to record hull temperatures. Two exhaust stacks protruded rearwards and upwards at an angle of 45 degrees, and were about 10 feet long. The whole set-up was contained within a flimsy structure made out of second-hand corrugated-iron sheets.

When the engine was running at maximum power the exhaust stacks glowed red for almost five feet from the rear of the hull. Charlie Caisley was in charge of the testing, and as a young apprentice it was my job to periodically climb on top of the hull to record engine temperatures. There were no Health and Safety regulations to worry about in those days, but ear plugs were a necessity!

As an engineering apprentice you were expected to move through all the various activities within Clan Foundry, and there were many. At one period I was employed in machining some of the large forged steel suspension arms for the tank, on a Richards Horizontal Boring Machine, that were required for suspension development, and at others in the operation of test rigs, such as the Bump Test.

The Bump Rig consisted of a large electric motor which was housed in a well in the ground, to which was coupled a six foot diameter steel drum. A steel band, about one foot wide, was attached to the periphery of the drum and was offset with wooden blocks to provide a rise and fall of six inches per revolution.

A preloaded tank suspension arm and wheel was then run for many hours to test the durability of the system. On one occasion, without any warning, the whole shop was bombarded with lumps of wood from the rapidly disintegrating rig, fortunately without any injuries to anyone in the vicinity.



Soon after taking delivery of a Crusader tank, there was a period during which a sharp learner curve was evolved for those delegated to drive this vehicle, as the technique for steering a tracked vehicle was entirely different to that for a motor car.

I recall the time when we were alarmed in the adjacent machine shop to see the breezeblock partition start to bulge when a driver demonstrated his 'ability' to spin the tank in its own length without taking into account the confined space between the stores and the machine shop.

Cromwell I Tank

We also got into trouble with the county authorities when we took a Cromwell tank for a test run, heading North through Belper along the A6. As we passed along Bridge Street, between Field Lane and the Triangle we happened to run over the line of 'cats-eyes' with the off side track.

As the track moves over the front sprocket it opens up the pitch and on reaching the road surface it closes and remains stationary until it moves upwards to pass over the rear sprocket. On this occasion we succeeded in picking up several newly laid 'cats-eyes' and flung them in the air with, fortunately, no apparent damage to people or property - but Derbyshire County Council were not amused!.

Frank Shaw's paper explains in great detail the way in which the Cromwell tank was developed, covering both the engine and other dynamic components.

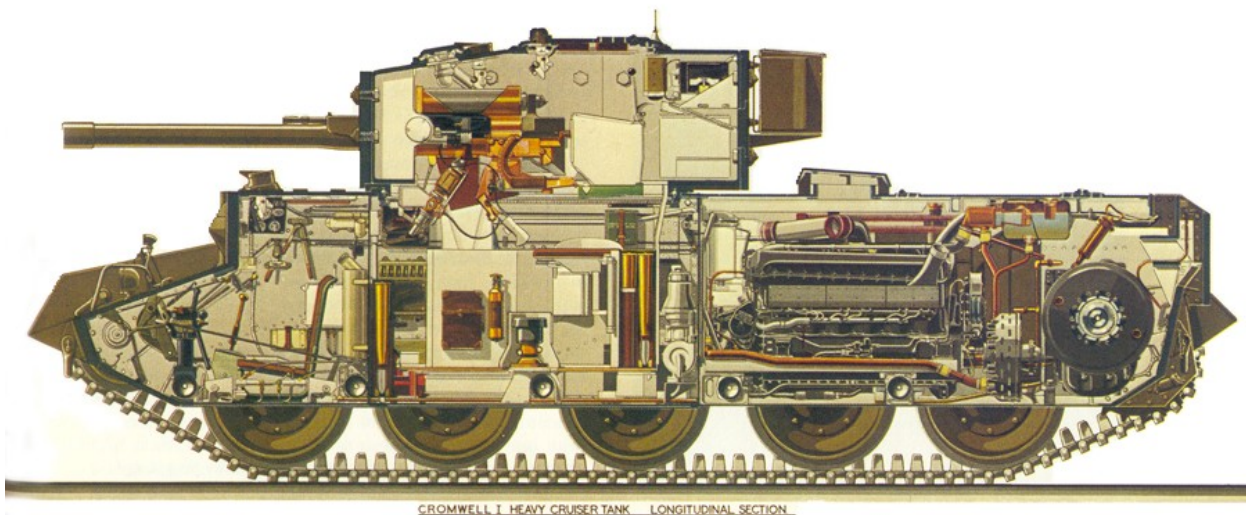
In September 1941 a chance conversation between Robotham and Harry Moyses of the Birmingham Railway Carriage and Wagon Company suggested that the two firms should combine to produce the new heavy cruiser tank with the Meteor engine, and the idea was given official approval soon afterwards.

In 1942/3 there was a meeting over lunch between Lord Hives of Rolls-Royce and Spencer Bernau Wilks of Rover when Lord Hives suggested that the manufacture of the Meteor engine for tanks should be switched to Rover in exchange for Rolls-Royce taking over the future development of the Whittle Gas Turbine engines.

This was a significant milestone in the history of Rolls-Royce.

By coincidence, Frank Shaw left Rolls-Royce to join Rover late in 1943, and he was able to follow the progression of the Cromwell tank through its further development, to become a front line fighting vehicle.

It was at this stage that Robotham was seconded to the Ministry of Supply as Chief Engineer – Tanks.



The Cromwell Tank with a Meteor engine, performed with distinction in North Africa in 1943, and again when the Allies invaded France in June 1944.

Unbeknown to me, my brother, Arnold Spencer, who was an engineer at Bemrose Printers in Derby, was involved in making sprockets and exhaust manifolds for the Cromwell tank in their engineering department, and the sectional drawing, shown above, is reproduced from the Bemrose publication - "The History of the Future". It was drawn by Frank Shaw, and coloured by Bill Allen, to assist Frank in designing the ergonomics of the tank.

In a letter from Major-General G.L.Verney, the Commander of the 7th Armoured Division, to the War Office, he wrote,

“At dawn on August 31st we started our advance from south of the Seine, and it has carried us 250 miles into Ghent in six days. The tremendous speed, when the going has been good, has alone made this great advance possible, and I wish that you and the people who have made the tanks could have seen them tearing along through all these French and Belgian villages. It has been a most inspiring sight and it has thrilled the inhabitants to a really remarkable degree, especially here in Belgium.”

ENGINE DESIGN & DEVELOPMENT

Engine design at Clan Foundry was led by Charlie Jenner, who had joined Rolls-Royce in 1911, and as a member of Sir Henry Royce's personal staff, was responsible for much of the work on the 20 hp engine and its derivatives.

Charlie Jenner's influence on Rolls-Royce engines was considerable; he was a deep thinker and was always approachable, in spite of the awe he created to junior members of his team, with his immaculate dress sense, bow tie and rimless glasses, and I owe much to the leadership that he showed. He was an intuitive engineer, who had a pragmatic approach to many problems.

Apart from spearheading the evolution of the Meteor tank engine from the Merlin, he was responsible for the design of the 'B' range of rationalised petrol engines which powered the wheeled fighting vehicles of the British Army, and the post-war Rolls-Royce and Bentley cars.

His attention then turned to a single cylinder oil engine, which was designed and developed at Clan Foundry. This eventually led to the setting up of the Oil Engine Division at Salford, which subsequently moved to the old Sentinel Works in Shrewsbury and became the Rolls-Royce Diesel Engine Division.

One of the engineers on the gun project was Jack Phillips, who subsequently became Assistant Chief Designer (Engines) and led the engine design team at Clan Foundry, consisting of Les Robinson, George Griffiths, Fritz Feller and Jack Birkinshaw.

In October 1945, I was called up for the Royal Air Force and on my return from service with the RAF in India I joined the Engine Design Team in 1948,. All under the watchful eye of Charlie Jenner.

I recall a simple method that Charlie Jenner used for the calculation of the torsional stiffness of a crankshaft.

In the early 1960's I was called upon by Harry Grylls, the Chief Engineer of the Motor Car Division, to produce an estimate for the torsional stiffness of a six-cylinder in-line petrol engine that I had been project designing for use as a military engine in a light-weight tank, and which Mr Issigonis, the famous designer of the Mini was interested in, to re-engine the Vanden Plas Princess – R. I was given 24 hours to produce the required figures.

In those days all our calculations were carried out using seven-figure logarithmic tables, and a considerable amount of future business hung on achieving these objectives. Alex Issigonis was notorious for wanting results yesterday.

I had retained the guidance given by Charlie Jenner and used his empirical formula to produce an estimated set of results. On the basis of these figures Rolls-Royce were requested to proceed with the detailed design of this engine for the British Motor Corporation, and I was charged with the task of carrying this out.

We subsequently produced a prototype engine, which made its maiden run on the test-bed having a torsiongraph fitted to the front end of the crankshaft, and accompanied with a lot of trepidation. Imagine our relief when the results of this first test showed that the torsional stiffness was within 2% of the estimated figure.

Congratulations to Charlie Jenner – this was a demonstration of the calibre of the engineers that guided Rolls-Royce through these formative years of the Car Division at Clan Foundry during the 1940's.

'B' RANGE ENGINES

By the time that the Cromwell tank was fully launched, the establishment at Clan Foundry had grown into a comprehensive organization capable of undertaking other kinds of vehicle research and development work. The staff had increased to 300, and facilities were available for making full-scale wooden models (another member of the Spencer

family – Radford Spencer, a cousin – was employed as a carpenter in this department) and a variety of testing rigs, which had been devised for cars at Derby before the war, were now erected and in many cases improved.

With the responsibility for the manufacture and further development of the Meteor engines transferred to Rover, Clan Foundry turned its attention to a project that had been lying fallow.

Since 1904, Henry Royce had been using a high degree of rationalization in components, such as pistons, cylinders and valves, in the first range of 10, 15, 20 and 30 h.p. Rolls-Royce cars.

The concept of this was now being considered for a range of petrol engines of 4, 6, and 8-cylinder in-line configuration, that could be developed with three aims in view: to provide the maximum power consistent with the minimum outside dimensions and weight; to use standardised components and so facilitate servicing and the stocking of spare parts; and to obtain the highest efficiency with low grade fuels.

The return of Robotham to Clan Foundry from the Ministry of Supply in the autumn of 1943 was timely in that he returned with the news that Rolls-Royce's rationalised range of petrol engines would be used to power a broad spread of army vehicles.

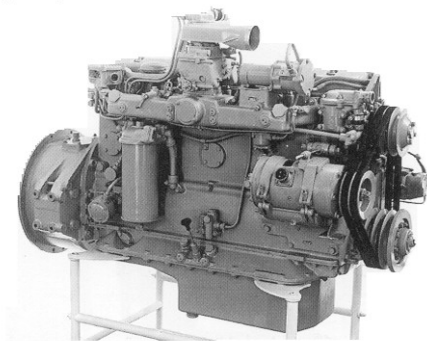
The 'B' range became the standard power unit for all the British Army's wheeled combat vehicles, and full scale production of the engines began at the Crewe factory in 1947.

As an apprentice in the Machine Shop, Harry Newbold, a Manager at Clan Foundry, asked me to visit Richards of Altrincham, to receive instruction on a new Richards Boring Machine that was being supplied to Rolls-Royce for the machining of the prototype cast-iron crankcases that were cast by Leyland Motors.

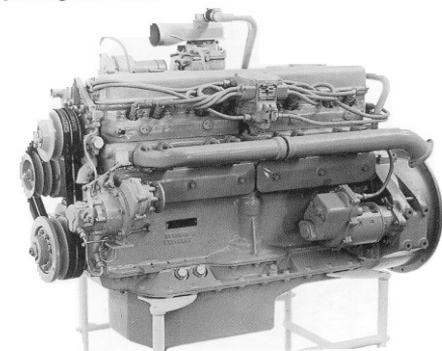
I subsequently had the responsibility for fully machining the first 8-cylinder crankcase (B 80), a task which took two weeks to complete.

This was the start of an association with the 'B' range of engines which covered design at Clan Foundry and Crewe, and with which I was involved for almost forty years!

front left-hand view



front right-hand view



B80, Mk 5H engine as used in FV14103 'Nubian' (RR)

There is an excellent book, "The Rolls-Royce 'B Series' Engine in National Service", written by Pat Ware, (to which I made a contribution) which describes in detail the role which this engine played in British Military Vehicles.

The use that was made of this range of engines is considerable, and apart from its military role its utilisation as a commercial power unit is equally impressive.

It was used in numerous fire engines produced by Dennis, including their F24 appliance with an Allison automatic gearbox. This vehicle, with a B 81 engine (gross vehicle weight of 8 tons – developing 197 b.h.p at 3750 r.p.m.) had a top speed of 72 m.p.h., and during a demonstration drive at Silverstone I had it almost sideways on at Stowe corner!

ERF fire engines, snorkels and tankers; Harrington luxury touring coaches; Douglas twin rotary snowploughs; a Vickers Heavy Hovercraft for transporting transformers (using four B 81 engines for the blowers)

In 1942/3 a new brick building was built in the field, to the south of the foundry, to accommodate the Design & Detail Drawing offices and the Print Room facilities. This building was constructed by Ford & Weston who were the general contractors at that time to Rolls-Royce.

The smallest engine in the range was the four-cylinder B40 unit, which had a swept-volume capacity of 2838 ccs., and a gross output of 80 bhp at 3750 rpm. About 20,000 of these engines were built.

One of these engines was used for a 10 KVA stand-by generating set, for Duffield Bank House, a location that was used extensively by Rolls-Royce for high-level meetings, and the outbuildings housed the project engineers and model makers from Derby. The bulk of the engines were used in the Austin 'Champ', a small lightweight field car, similar to the Jeep.

The mid range engine was the six-cylinder B60, which had a swept-volume capacity of 4256 ccs., and a gross output of 130 bhp at 3750 rpm.. About 14,500 of these engines were built. These engines were mainly fitted to the Daimler 'Ferret' Armoured Scout Car and the Humber 1 ton Truck.

The eight-cylinder engine was built in two basic configurations. The B80 having the same bore (3.50 ins.) & stroke (4.50 ins.) as the B40 and B60 engines with a swept volume of 5675 ccs., whilst the B81 had a bore size of 3.75 ins. (swept volume – 6516 ccs.).



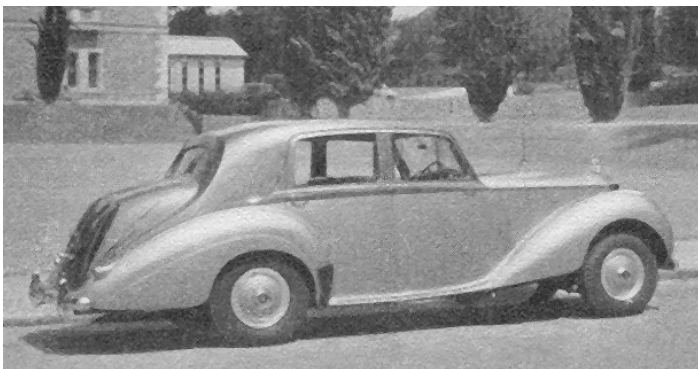
Alvis 'Stalwart' in action

The B80 had a gross output of 165bhp at 3750 rpm and the B81 developed 195 bhp at 3750 rpm..About 4700 B80 engines were produced, and around 4000 B81 engines.

Both types of eight-cylinder engines were used in a wide variety of installations ranging from the Alvis 'Saladin', and 'Saracen' fighting vehicles to the Thornycroft 'Nubian', Heavy Ferry Pontoons, Alvis 'Stalwart' amphibious load carrier and 'Salamander' airfield crash tenders.

BIRTH OF THE MOTOR CAR DIVISION

As previously stated, up to the outbreak of WW2, the motor car activities had always been referred to in Derby as the Chassis Division, due no doubt to the fact that the company only made a chassis, leaving the construction of the coachwork to specialist firms, such as Hooper & Co., H.J.Mulliner, James Young and Park Ward.



The Silver Dawn

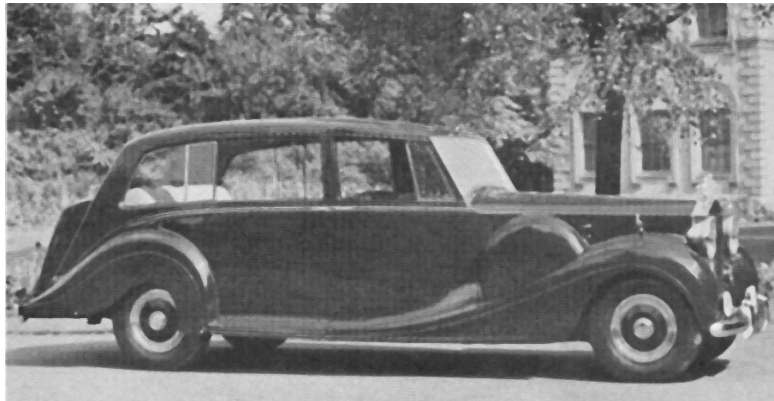
This continued for some time after the war, but from Clan Foundry, in 1949, there emerged a new model called the Silver Dawn – an all-steel body, designed and constructed by Rolls-Royce Ltd.. This car was intended for export only, and was exhibited for the first time at the International World Fair at Toronto – the price quoted was £3,500 !.

The man of vision, who had a great influence on the design of this car and other immediate post-war cars was Ivan Evernden, who carried with him the experience of being a stylist on Henry Royce's personal design team.



He was also the stylist responsible for the design of the Bentley Continental, which was conceived at Clan Foundry during the early and middle part of 1950.

Ivan Evernden and the prototype Bentley Continental



Royal Phantom IV

In 1949 Rolls-Royce received an order from the Royal Household for a Phantom IV for their Royal Highnesses Princess Elizabeth and Prince Philip the Duke of Edinburgh. The coachwork was to be the responsibility of H.J.Mulliner and the chassis was designed and built at Clan Foundry.

Prince Philip had previously tried out one of our experimental cars, aptly known as the 'Scalded Cat'.

The engine for this car was a derivative of the 8-cylinder 'B' Range engine, and a version of this was installed in a pick-up truck (affectionately known as Big Bertha) which was built at 'Clan' earlier in the war, and ran thousands of miles at high speed, delivering and collecting material.

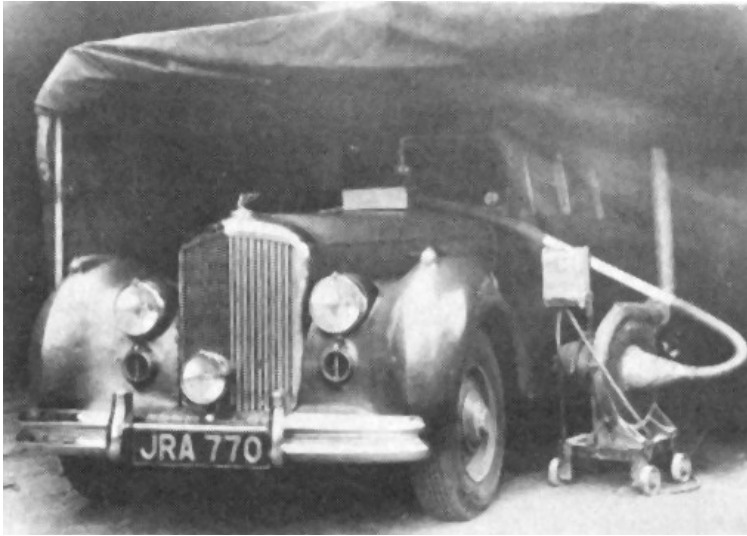
Henry Royce's dictate was "Whatever is rightly done, however humble, is noble" and it was this creed that dictated that every single part should receive meticulous care, both in design and construction.

He also made the famous quote,

"Strive for perfection in everything you do.
Take the best that exists and make it better.
When it does not exist, design it.
Accept nothing nearly right or good enough."

When the war came to an end it was decided to retain the old iron foundry premises in Belper for vehicle research and development, and to adapt the Merlin shadow factory in Crewe to become the production facility for the post war Motor Car Division.

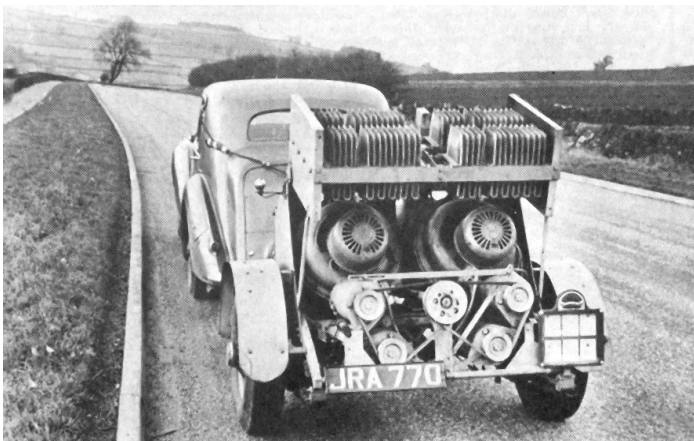
Before the war, the experimental department in Derby had a substantial collection of test rigs which would enable components and parts of all kinds to be tested to destruction in a fraction of the time that would be required to achieve the same results on the road. The results from the rig testing complements the road testing, and is not a substitute for it.



This smoke test is to check that the coachwork is free from any small chinks and minor orifices through which it would be possible for draughts, dust or fumes to enter the body. The car is placed in the tent and a trolley carrying a large centrifugal fan driven by an electric motor is wheeled in.

The fan blows smoke, through its delivery pipe, to any desired point of the body. An observer gets into the car, shuts all the windows, turns on the interior lights, and the flap of the tent is closed. In the current climate of Health & Safety at Work I don't think that this practice would be allowed today, but it obtained the desired result.

Smoke Tent



This is a power absorbing trailer, which was designed and developed by Fred Hardy. When investigating a vibration or noise, which occurs at a particular speed, it is sometimes necessary to run the vehicle at full throttle for prolonged periods at a constant and generally low speed.

This trailer, will hold a 4^{1/4}-litre Bentley Mk. VI down to 12-15 mph in top gear and to about 23 mph in first gear. The electrical absorption of the power is through air-cooled resistances.

This mobile test rig proved to be a most effective piece of test equipment.

Trailer Brake

(Photo taken on the A6, at Broadholme, just past the Cemetery)

There was a very interesting and informative article in The Autocar, dated 16th July 1948 – entitled 'No Stone Unturned' in which Montague Tombs (Technical Editor) describes the multiplicity of rigs at Clan Foundry, and the unceasing investigations that were carried out.

At the cessation of hostilities in 1945, we immediately commenced our programme of research and development for the car division, and it was at this time that I was drafted in to the Royal Air Force, along with many other Rolls-Royce apprentices who had just completed their apprenticeship. In a relatively short period of time I was sent out to India to join Lord Mountbatten's staff at Air Headquarters India, he being the Viceroy of India, based in Delhi. My basic task was to service the Merlin T 24 engines fitted to his York aircraft.

I was 'demobbed' in January 1948, and returned to Clan Foundry. After a short rehabilitation process in the gearbox section I was transferred to the Detail Drawing Office, joining Jack Phillips' Engine Design team some nine months later.

By this time Clan Foundry was well into the post war design and development of motor cars, as well as the continuing design of 'B'Range engines to suit the many varying installations being formulated by the Fighting Vehicle and Research Design Establishment (FVRDE) at Chertsey, in Surrey.

The Design and Detail Drawing Office staff were by now located in the brick building at the Milford end of the site and were well integrated in to business and social activities.



Clan Foundry Drawing Office Staff - 1949

W.A.Robotham is in the middle of the group, on the second row, with his right hand inside his jacket.

Some of the group transferred over to Crewe in 1950 and the others moved to Sinfin with the Oil Engine Division in 1950/51.

The Chief Draughtsman was Harold Hunt, who conducted the Clan Foundry Male Voice Choir, and provided entertainment to the local troops during the war, along with 'Trot' Salt (magician), Sylvia Whyman (Harold Whyman's daughter) who had a beautiful soprano voice, Ken Wright who played the accordion, and was a talented comedian. Denis 'Tarzan' Lee, (who still lives in Belper) gave support to the choir with his rich baritone voice.

The choir was often referred to as the Clan Foundry 'Ale Voice Choir – on account of their partiality for the local Offilers brew.

OIL ENGINES

It was W.A.Robotham's idea that Rolls-Royce should manufacture diesel engines, or oil engines as he preferred to call them. This was born out of an idea that he had developed during a recent visit to the USA, when he observed that the American truck manufacturers were going to great lengths to reduce the weight of their vehicles. It was Robotham's idea to produce the oil engines using light alloys, wherever possible.

In 1949 he authorised the design of a single cylinder oil engine, which was tested extensively on the new test beds built at the North end of the Clan Foundry facility, as a pilot study.

As a result the 'C' range was born, and as with the 'B' range of petrol engines the principles of rationalisation were adopted. Initially twenty light-alloy six-cylinder development engines were built for assessment purposes.



Rolls-Royce C6 SFL Oil Engine

It was decided that Dr Llewellyn Smith would head the post war Motor Car Division in Crewe, a position that Robotham had hoped would be his. Robotham was appointed Managing Director of the Oil Engine Division.

On the 6th July 1951, the Derby Evening Telegraph reported:

“A new Rolls-Royce oil-engine, designed and produced in the company’s new factory in Victory Road, Derby will power a new crawler tractor with which Britain will challenge America’s monopoly in the heavy tractor and earth-moving field.” This would be a supercharged six cylinder 12.17 litres engine.

This heralded the birth of the Oil Engine Division, which had been conceived by Robotham at Clan Foundry, Belper.

When the Car Division Design and Drawing Office personnel moved to Crewe, I was asked to join them, but as my studies at Derby Technical College had been interrupted by service in the Royal Air Force, I was allowed by Dr Llewellyn Smith to remain behind in Belper, until these were completed.

I was married in September 1949, and I finally moved to Crewe in August 1950, with my wife, Eileen, to continue the dream.

IN CONCLUSION

This article is intended to put on record the activities of Rolls-Royce in Belper, between 1940 and 1950, and the important part that Clan Foundry, in particular, played in the post war development of this world renowned company.

I would like to recount part of a description by Montague Tombs, Technical Editor of the Autocar, in his July 1948 article, which gives an independent impression of Clan Foundry.

“In the town of Belper, about ten miles from Derby, and situated in a valley by the side of the River Derwent, there is an unassuming factory premises called Clan Foundry, where the Rolls-Royce and Bentley engineers, designers, testers and research workers revolve continuously in their special orbits. It is the inner temple of R-R Automobile Division development, and is presided over by ‘Rm’ (Robotham).

“It is a place where there is no room for doubt. Nothing is taken for granted. Every soul on the ground is intent that nothing should fail on a car once Belper has passed it out as sound. And that tradition, of course, is the reason for Rolls-Royce and Bentley products reaching the highest standards in the world, and maintaining their unique reputation through wars and the broken pieces after the wars. Although tradition may be an abstract quality, the maintaining of a tradition is very definitely a concrete matter. It has to be carried on every day with wide-awake minds directing skilful hands to operate intricate machinery. No stone must be left unturned. Nothing can be left to chance. In Rolls-Royce engineering, belief has no place: only proof is valid.”

I was indeed fortunate to have had the opportunity to serve an engineering apprenticeship at Rolls-Royce, predominantly at Clan Foundry. I subsequently spent over fifteen years on engine design, and it was during this period that a third member of Henry Royce’s personal design team at West Wittering influenced my life, W.G. (Bill) Hardy, when he became Chief Designer of the Motor Car Division in Crewe, and I was a senior engine designer on his staff. During the war he was in charge of the Aero Engine Crankcase and Stress Sections in Belper, prior to being appointed Assistant Chief Designer of Aero Engine Development.

My next appointment was Design Liaison Engineer for Military and Commercial Installations, a role which took me to many parts of the world, including an intimate involvement with the K 60 engine in the Swedish 'S' tank.

In 1971 I was asked by Richard E. Garner, the then Divisional Materials Director, to be Chief Inspector of the Motor Car, Specialist & Light Aircraft Engine and Investment Foundry Divisions, a position which he had filled with distinction in 1945, and I was unable to refuse the confidence he placed in me.

Dick Garner was a highly respected engineer, who in his youth had been the Rolls-Royce Riding Mechanic to Kaye Don when they broke the world water speed record at a mean speed of 119.81 mph in Miss England III, on Loch Lomond in 1932; and Tommy Fisher, a Clan Foundry supervisor, was responsible for maintaining the Rolls-Royce 'R' engines.

(I am currently preparing a documented account of Dick Garner's involvement with the Miss England project)

This was a major redirection of my career. I retired as Quality Improvement Manager in November 1985, after more than 45 years service with Rolls-Royce.

The pinnacle of my career was being nominated by Rolls-Royce Motor Cars Ltd. for services to the automobile industry and the community, being appointed a MBE in the 1982 New Years Honours List, and receiving this honour from Queen Elizabeth II, at Buckingham Palace, in March 1982, in the presence of my family.

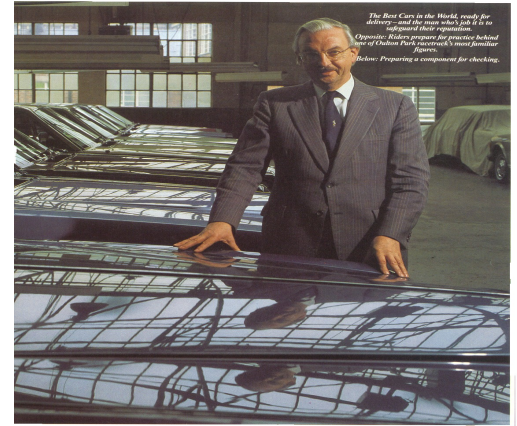
My dream had come true - but the activities at Clan Foundry, Belper, both during and after the Second World War, needs to be remembered for the significant part that it played in the history of Rolls-Royce.

Who would have thought, in 1940, that the derelict iron foundry, at the south end of Belper, would house the talent and men of vision that produced the Cromwell tank, created the 'B' Range of rationalised petrol engines for military & commercial purposes and moulded the post war activities of the Motor Car and Diesel Engine Divisions which shaped the future of Rolls-Royce.

And the man who deserves the credit for directing these visions is W.A. Robotham.



W. A. (Roy) Robotham.



I hope that this account of my recollections has provided a record of the important part that Belper played in defining the history of Rolls-Royce Limited.

Reginald James Spencer MBE CEng. FIEE, FIQA.