



FOUNDATION

SIR HENRY ROYCE MEMORIAL FOUNDATION LECTURE AND EVENTS LIST FOR 2021

WEDNESDAY 7 JULY

The Gloster Meteor and its Development Rod Dean

Rod has already given excellent lectures to the Foundation on the Spitfire and flying vintage aircraft. Now he will review the development of the Meteor and its use of Rolls-Royce Welland, Derwent and Nene engines. He will also tell us what it is like to fly such an iconic aircraft.

WEDNESDAY 6 OCTOBER

The Fall and Rise of Rolls Royce Ltd Alan Edge

Alan's book on this subject will probably be published before the lecture. It is significant to do this lecture in 2021 being the 50th Anniversary on 4 February of the RR 'crash'. He is also working on lectures on similar lines with both Rolls-Royce Heritage Trust and the Derby Branch of The Royal Aeronautical Society.

WEDNESDAY 3 NOVEMBER

Sixty years at the sharp end - a pilot's retrospective on 60 years of change John Hutchinson

John Hutchinson has flown more than 70 types of aircraft from the Harvard to the Concorde. His lecture in 2019 on Concorde was enthralling and we are inviting him back for this fascinating review.

SATURDAY 20 AND SUNDAY 21 NOVEMBER

Royce Heritage Weekend and Foundation AGM

COVID-19 regulations are still fluid and an unknown quantity so please keep an eye on our website for up to date details and booking arrangements.



Chairman's Notes

I WAS HONOURED that your trustees unanimously elected me as chairman at the start of 2021. I became a Foundation Life Member in 2014, as I believed in both its charity 'objects' and in Sir Henry's ethos and values. For those who need reminding, the SHRMF charity 'objects' are summarised at the end of this article.

As a hands-on career professional Chartered Engineer (see LinkedIn for more detail), the active promotion of science, technology, engineering and mathematics (STEM) is a critical element of my personal credo. Because I am not a member of the RREC and have no inherent bias towards automotive, I can legitimately offer unconflicted and independent contributions to board governance.

Having originally embarked on a 'proper' apprenticeship in 1967, my whole career has been spent in the defence, aerospace, power generation, process plant and transport industries. Consequentially, whilst being determined to improve the relationship with our current partners, I shall be seeking to secure the widest possible sectoral alliances and relationships as we seek to reinforce the sustainability of the SHRMF charity.

The development growth of underpinning knowledge, craftsmanship and technical skills, particularly in heritage applications will be a key part of our forward strategy. Early discussions in this area already provide significant encouragement that

future outcomes may be fruitful.

Currently most SHRMF members hail from an interest in the automotive sector however, the 'objects' of the charity are non-sector specific. We should be mindful that Sir Henry's activities embraced electrical as well as mechanical applications from a wide range of sectors, in addition to his aerospace, defence and automotive interests. Going forward, we shall seek to enrich the membership mix and engage with people from all enterprises embracing science and technology throughout the economy. This will also apply to Governance of the charity as the board evolves over time.

Abridged Articles of Sir Henry Royce Memorial Foundation Ltd

To increase understanding of the importance of the pursuit of excellence in STEM for Public Benefit.

To promote its history and development To advance these objectives by providing and maintaining

- Museum to preserve SHR/WOB and relevant others' legacy
- Library
- Artefacts
- Workshops
- Learned papers/documents
- Grants/scholarships/loans/awards
- Developing collaborative partnerships with education providers and other institutions

Bill McGawley OBE

In praise of the 'influencers' who really mattered

THE RAPID EXPANSION of technology in the 19th and 20th centuries was precipitated by the brilliance of British engineers. William Morris, Geoffrey de Havilland, Charles Parsons, Frank Whittle, Tommy Sopwith, William Lyons and numerous like-minded colleagues, all contributed to our prosperity.

However, the gentlemen pictured below were probably two of the most influential people of their time.

RJ and Sir Henry both started their illustrious careers as apprentices in the rail locomotive industry, studying tech drawing, maths and engineering theory at night school. In rapid time they advanced their expertise into conception, design, development and coordination of iconic and truly crucial products that ensured our survival against a determined and well-equipped adversary.

RJ Mitchell designed 23 other aircraft for Supermarine before the Spitfire. Similarly, Henry Royce engineered a wide range of technical products before investing private funds in the PV12 engine which was developed into the Merlin.

EMBRACING EXCELLENCE

Both men had laid-down innovative design concepts that provided excellent growth potential. They then assembled and led teams of loyal, high-calibre specialists who collectively embraced excellence and a total lack of compromise when driving solutions to the technical challenges that materialised.

The key factor in Spitfire success was the wing design. It provided minimal boundary layer lift-induced drag thanks to the application of its elliptical profile. Being very slender, too, it cut through the air with minimum resistance. Despite its apparent flimsy construction, thanks to its D-shaped leading edge torsion box profile and its single telescopic main spar operating as a leaf spring, it was both strong and flexible. Consequentially, it was structurally capable of containing weapons, ammo, landing gear and providing sound locations for the engine, fuel tanks and indeed the cockpit.

More than 22,000 airframes were built and there were 47 major evolutionary upgrades through the Spitfire's service life between 1938 and 1953. During that time, weight increased by 40%, service ceiling by 10,000 feet and top speed by over 100mph. Regrettably, RJ did not live

to savour his success. Medical knowledge of cancer at that time was not sufficiently advanced and he passed-away at the age of 43. Nevertheless, his influence lived on thanks to his team.

Whilst RJ was developing the host airframe, Royce progressively refined and privately developed the engines that powered the Supermarine seaplanes used to win successive Schneider Trophies. The enhanced 800hp PV12 was renamed as Merlin. It incorporated new materials incorporating the latest metallurgical knowledge that Royce realised was a key internal skill for any company in pursuit of high mechanical reliability and performance. The preferred configuration was an upright 60-degree, liquid cooled 27 litre V12 with SU carburation. The conventional crankshaft was mounted in seven bearings, the slightly over-square engine boasted five-ring pistons, four valve heads with concentric double valve springs. Progressive supercharger developments made dramatic improvements to performance, keeping its host aircraft competitive in the air.

In combat, the Merlin-powered Spitfire was initially challenged by the Daimler-Benz powered Me109. Its powerpack was a 33-litre inverted V12 with pressure fuel injection. Initial versions of the Merlin suffered fuel starvation when dog-fighting in negative gravity dives, as the input pressure from the SU carburettor at only 5 psi caused turbulent flow in the fuel line. However, a famous 'fix' was conceived, developed and incorporated into the fuel supply by Beatrice Shilling, an engineer at RAE Farnborough. Dr Shilling realised that a simple annular restrictor would do the trick and her solution became known as 'the Shilling Orifice'. This elegant, simple solution bought sufficient time for Royce to engineer and introduce a Bendix

Stromberg pressure carb, which eliminated the problem. Incidentally, Dr Shilling was an accomplished fast lady who had been awarded the Brooklands Gold Star in 1934 for lapping the circuit at 106mph on a 500cc Norton. She knew all about performance and fuel flow both in theory and in practice.

INCREMENTAL IMPROVEMENT

All-in-all, 100,000 Merlins were produced in the UK and 50,000 were made by Packard, Canada under licence. Over 40 aircraft of all types had Merlin propulsion. During its service life, engine power increased from 800hp to 2,100hp - a tribute to the sustainability and growth potential of the basic core design. This pattern of incremental growth remains a feature of Rolls-Royce designs today, the original RB211 gas turbine developed 18,000 lb thrust in 1972. Today, its direct evolutionary descendant (the Trent) provides over 100,000 lb to power the current cohort of wide-body jets.

Both RJ and Sir Henry embraced the same four simple mantras that are still highly relevant today:

- Quality is remembered long after price.
- Excellence in every small iteration is cumulative and the key to success.
- Strive for perfection, accept nothing as good enough.
- Recruit the best, demand the best, build and lead ambitious teams from the front.

This was from an era when actions spoke louder than words. We still desperately need people of action and they still exist, but the people who apparently influence society nowadays are far less credible.

Over recent months we have all witnessed a new form of self-proclaimed 'influencers' who have gained prominence through social media and seek to promote their importance, often by preening, posing and posting from glam locations. The influence that Mitchell and Royce made through their intelligent understanding of science, technology and the consistent application of this talent to engineer world-defining solutions is huge in comparison.

Thank goodness, the current breed of 'influencers' were not present when Herr Hitler was prominent. The outcome of their endeavour would have been quite different from that of RJ and Sir H. **Bill McGawley OBE**





Business manager John Baker gives an overview of the Sir Henry Royce Memorial Foundation AGM 2020

THE PAST 12 MONTHS have been exceptional in many areas. COVID-19 has completely reshaped the way business is conducted and the Foundation has endeavoured to embrace the technology needed to continue functioning: nothing more clearly displayed this than our 2020 AGM. For the first time we held the meeting in a remote format with members registering their intention to join beforehand. I can report that the event was a technological success with the only significant drawback of such a virtual meeting being the lack of socialisation.

In general, our members use the AGM as a social platform too and this year they could not meet up, chat about their cars or enjoy a meal with like-minded friends at the Hunt House: key elements that make the Foundation what it is.

Despite this we managed to co-ordinate and hold a meeting that met the legal requirements of a very trying year; a year that has seen our income streams vanish because of the lockdowns. Fortunately, the technology did not fail us and the meeting proceeded without a hiccup and more detail of the day's business is outlined below.

- The AGM provided an opportunity for voting members to log in and see that the Foundation is alive and working towards adapting to the New World.
- The meeting was chaired by Mr Bill McGawley, appointed by the board of trustees to conduct the meeting: Bill is an independent trustee, with a clear focus on preserving the work, historic

documents and legacy of Sir Henry whilst actively promoting the benefits of engineering. Furthermore, I can report that three trustees: Dr Cedric Ashley, Messrs Chris Ball and John Beecroft were re-elected to the board unopposed and this is evidence that members consider the trustees are working in the best interests of the Foundation regardless of an unpleasant campaign of unfounded accusations that has been circulating on social media during the last 12 months.

- The on-line format limited the scope of our usual question and answer session, with members restricted to two questions each because of time constraints but the questions forwarded by members were searching and the responses offered by the Foundation were comprehensive. Several of the questions referred to the business relationship of the Foundation with the new board of directors of the RREC: regardless of the recent turmoil and events within the Club, the Foundation is building a very positive working relationship with the directors and looking towards a bright future. A full set of the questions and answers will be attached to the AGM minutes and issued in due course with a summary published in the next issue of the *Foundation Matters*.
- Returning to the meeting, our accountants – Millhall, who inspect the Foundation's books, were re-appointed by the members and Millhall were content with the veracity of the financial procedures and practices operated by the Foundation. No adverse observations were raised by them as

part of the inspection and the Financial Statement and Report for the year 2019-20 were accepted. In order to be open and transparent in our reporting to members, the meeting was then adjourned by the chairman to allow some outstanding matters to be fully resolved and any impact reported back to members at the re-convened meeting. There were no visible signs of disagreement to this course of action from those present and the adjournment was effected accordingly.

- Overall, the AGM was a resounding success and following the continued impact of COVID-19, it is likely that the re-convened meeting to conclude business will be held in a similar format within the next two months. Therefore, we urge members who have not done so to provide an authorisation to allow email correspondence, so permitting the Foundation to invite them to future meetings: the relevant form can be found on our website. Using email saves the Foundation considerable money in postage charges.
- In conclusion, a big "thank you" must go to members and donors for their continued support during this unusual time – the *Foundation Matters*. We hope to see more of you at forthcoming virtual events or when The Hunt House reopens. Under Government guidelines, the building is expected to remain closed until restrictions are lifted but the Foundation is open for business with remote working and reduced office hours during the pandemic: the latest updates and news are being posted on our website.

The Sir Henry Royce Memorial Foundation

President: Charles Tabor Chairman: Bill McGawley OBE Deputy Chairman: John Beecroft Company Secretary: Mark Griffiths

Trustees/Directors: Cedric Ashley CBE, Chris Ball, James Black, Stephen Byrne, Duncan Feetham, Clive Green, Philip Hall, Business Manager: John Baker

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