

Robert Bray

Born 1956. Clock maker.

Available online at www.livesretold.co.uk



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1. Introduction

The following chapter was archived in 2021, with acknowledgement and thanks, from the website of the Academie Horlogere des Createurs Independants (AHCI) at www.ahci.ch.



Born in 1956, Robert Bray came turned to clock making relatively late in life. Leaving school at 15 he embarked upon a craft engineering apprenticeship with a small company who specialised in making of precision gears. Gaining sufficient qualifications at Technical College he was able to embark on a Production Engineering Degree at Brunel University where he obtained a first class honours Degree in 1979.

From then till 1995 he continued to work for the same company in various positions and was involved in all aspects of engineering, from Design through to Production and the Quality control of small gears and gearboxes for Aerospace, Defence and Medical applications.

In 1995, looking for a new challenge, he took over a failing Sinclair Harding of Cheltenham thus ensuring a famous clock making name would survive and at the same time he started to redirect his skills to the art clock making.

Now the company is 15 strong with all the employees personally trained by Robert Bray. Unlike many of the clock and watch making companies almost everything is made in his ever expanding workshop and the same

exacting standards learned in the Aerospace environment are used in clocks made by Robert Bray and his team.

Skeleton clocks predominate the range offered by this small Yorkshire based team, with everything on view attention to detail is paramount. The most impressive piece in the range is a $\frac{3}{4}$ sized model of John Harrison's H1 which sits on a rocking base and is a mind boggling demonstration piece of Harrison's fascinating inventions.



The parish church of Emley, West Yorkshire. Emley is the home of Robert Bray's clockmaking business.

2. Clockmaking

This chapter was archived in 2021, with acknowledgement and thanks, from the Robert Bray Sinclair Harding website at www.clockmakers.com.



The exquisite detail of the clocks, each one crafted to suit the individual requirements of each client, is testament to the trademark skill and dedication of Robert Bray FBHI and his fellow craftsmen, with every delicate stage of production carried out in our Yorkshire based workshop.

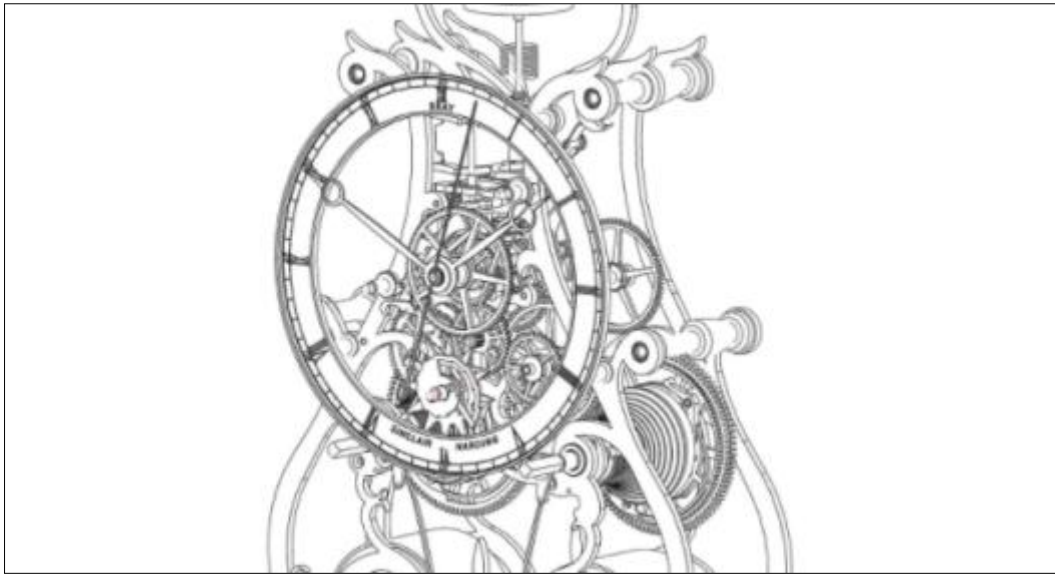
While we continue to preserve original reproduction techniques, investment in latest technology has allowed us much greater flexibility for developing new, exciting ideas, while enabling us to maintain the highest level of accuracy and attention to detail that Sinclair Harding is renowned for. This mix of traditional skills and hi-tech processes ensures that we offer all our customers the very best service possible.

Any Sinclair Harding project begins with the customer and their bespoke requirements, however complex they may be. We encourage our customers to get involved with their clock design at every stage of the process, making each project a unique and rewarding experience.

Computer Aided Design

Following initial discussions with each customer, we produce highly detailed 3D screen models of all working parts and assemblies using SolidWorks technology. This enables us to give our customers a clear picture of their own exclusive design, viewable from any angle.

SolidWorks also gives us the flexibility to develop new design ideas and innovations and make running changes far more efficiently and effectively than ever before.



CNC Machining

From the 3D model, engineering drawings are produced so that CNC programmes can be generated via CAM software. Wire erosion begins to produce the plates, taking 2-3 days. Plates are milled, serial numbered, stamped and engraved. Bridges and springs are fitted to the clock plates.



Fusee Chains

Our Fusee chain suppliers, Mavis and David decided to retire at Christmas 2013, with nobody coming forward to carry the business on, we agreed to buy their business and in January 2014 collected the first batch of machinery from David's workshop in Devon and moved it to Huddersfield. Over the following few months David and Mavis shared their knowledge

acquired over many years and we have been painstakingly learning this almost lost art. This wonderful addition to Sinclair Harding must make us about the most complete clock making company to be found.



Hand Finishing

Every part is polished to a high degree of finish, mostly by hand, but with the help of a wide variety of tools. Each part, seen or unseen, is given the same amount of care and attention. The screws are polished and blued, the dials are wax filled grained and hand silvered using traditional methods.



Cleaning and Inspection

After polishing, the parts are cleaned in an aqueous ultrasonic cleaning tank and meticulously inspected for any imperfections, which can still be corrected at this stage. Each dial is inspected before being lacquered and waxed.



Electroplating

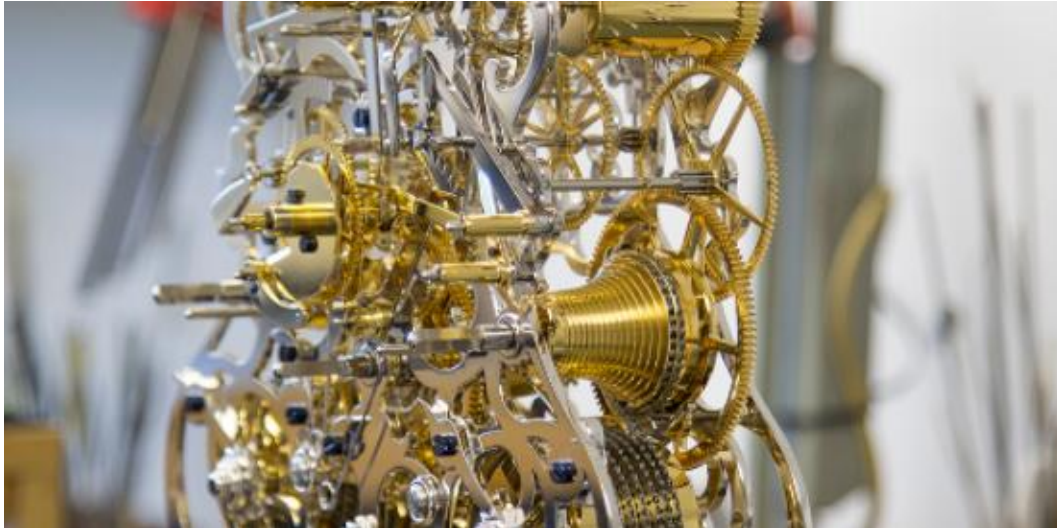
The final process prior to assembly is the plating, either in Gold or Rhodium of all the Brass parts. Since 2015 we have expanded our facilities and set up our electroplating line. We have the capabilities to plate Gold, Rhodium and Nickel.



This gives us the control of our plating to ensure this is at the highest standard for our clocks.

Assembly

We begin with the pinion assemblies and greasing of the mainsprings. With every part polished and every screw, pin and spring in place, the final assembly begins. Every bore is given a careful last burnish and any tapped holes re-tapped and cleaned.



Testing

Thorough checks are made at every stage to ensure that on completion the clock will operate perfectly from the very first moment.

The most exciting part in the whole process for us is when the movement starts ticking for the very first time.



Base and Glass Shades

Our bases and protective glass shades are made in our workshop. The bases are usually made from marble or wood, which has been French, polished

over a number of weeks. The movement is fitted to the base and the glass shade carefully placed in position to allow perfect visibility. Over the years we have been developing our opening door bevelled glass shade, the opening door has made the clock easier to wind and has enhanced the clocks appearance.



And finally we even make the flight cases! Our clocks are shipped all over the world, so we have worked hard to develop a style of case that ensures our clocks arrive at their final destination in perfect working order.

3. The Sinclair Harding H1

This chapter was archived in 2021, with acknowledgement and thanks, from the Robert Bray Sinclair Harding website at www.clockmakers.com.

In May of 1714 representations from Her Majesty's Fleet, Merchants and Merchant-Men demanded the Government to encourage the solution of the Longitude problem and in July of that year the Longitude Act was passed offering up to £20,000 for a method of determining Longitude at Sea.

In the mid 1720's Yorkshire born John Harrison started work on what would be the first of his clocks, the H1, that would work on board a ships and so solve the Longitude problem. In 1772 after a lifetime's work, culminating in the watch H4, John Harrison was paid the final balance of the £20,000 reward.

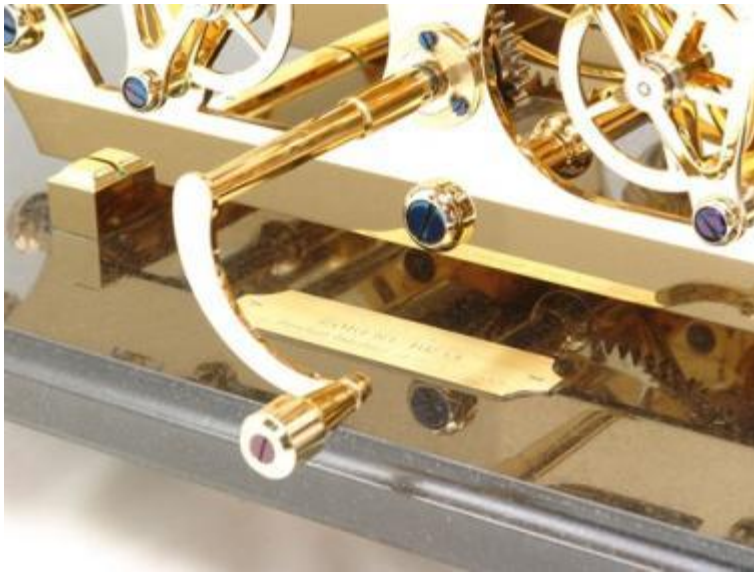


In 1999 Sinclair Harding started to work on a clock in homage of John Harrison. Nearly 5 Years in development, the Sinclair Harding H1 is a wonderful combination of art and fascinating mechanics, all finished to the exquisite standard.

To demonstrate the H1's capability to work at sea the movement is mounted onto a granite base, which in turn is suspended on pivots. The whole piece sits on a table designed to the customer's specification and is counter balanced by a massive weight. A tiny hidden DC motor rotates a small weight, which puts the whole assembly out of balance, and a gentle

rocking motion ensues, creating a fascinating spectacle inside the elegantly engineered glass case.

Winding The Clock



The Sinclair Harding H1, unlike the original, is designed to be a practical piece and needs to be wound every 7 days, it will in fact go for nearly 8. A substantial cranked key winds the Fusee through a 2:1 step down gear ratio making the once a week experience almost effortless.

Power



The power to drive the H1 is provided by 2 springs housed in barrels. The right hand larger barrel shown in the opposite picture, around which the cable is wound is empty and the spring is actually housed in the left hand smaller barrel. The cable drives a 2 start Fusee, carefully matched to the two springs and in order to ensure the escapement continues to operate while winding, maintaining power is provided to the Fusee Assembly.

No Friction



John Harrison was very clever and wanted to avoid using lubrication wherever possible. The arbors around which the springs are wound are mounted on rollers. On the Sinclair Harding H1, these rollers are positioned on the outside of the plates and if viewed carefully can be seen rotating very slowly.

Wheels N' Pinions



Harrison used wooden wheels and pinions throughout, using the *Lignum Vitii*, a wood which exudes its own oils. On the Sinclair Harding model, the wheels and pinions were purposely made in brass and polished steel. The interaction provides a fascinating spectacle and reflections from the plates and highly polished wheels serve only to deceive the observer.

4. The CNC Machine

The following chapter, which describes the use of Computerised Numerical Control (CNC) machines, was archived in 2021, with acknowledgement and thanks, from the Haas website at www.haas.co.uk.



In the late 1700s, English scientist and engineer John Harrison won the government-sponsored Longitude Prize for designing and building a clock that could keep accurate time while aboard a ship at sea – a project that

took most of his working life to achieve. For the first time, sailors were able to estimate their east-west position by the accurate comparison of Greenwich Mean Time (set on the clock) with local time (deducible by gauging the passage of the sun). Harrison's original creation resides in the National Maritime Museum in Greenwich . . . which is where Robert Bray, owner and managing director of Yorkshire-based Sinclair Harding, spent 3 hours studying its movements, before building his own homage to Harrison's genius.

"Our version of the Harrison clock is the Sinclair Harding H1," says Bray, "a three-quarter-size representation that we started in 1999, and which took five years to develop and finish. It started with a visit to see the original. The curators at the museum won't allow photographs, so the only way to replicate the workings of the original is to memorise them long enough to make a sketch."

Sinclair Harding also hand-builds intricate skeleton clocks, prettily decorated sun-and-moon clocks, mesmerising Congreve (rolling ball) clocks, elegant long-case grandfather and grandmother clocks and less well-known but enigmatically named "table regulators."



"The company was started in 1967 by a man named Mike Harding, and was originally based in Cheltenham," says Bray. "My uncle, Brian Kitson, had a passion for clocks, and went to see Harding two weeks before the company was due to cease trading." Kitson bought what was left of the company, which included its most important asset, its reputation, and not much else.

Little more than a decade later, the staff of the resurrected Sinclair Harding have shaped and polished that reputation into something as precious as one of its creations. Its many clients, including private collectors and prestigious jewelers, seem to agree: the company's order books are in rude health [that's good health, in British parlance].

"Every year, we exhibit at the big clock- and watchmaking show in Basel, Switzerland," says Bray, "and every time, we come away with enough work for the next 12 months. We use traditional methods to build our clocks," Bray adds, "but we also use the best available technology to make the component parts."

In the tightly packed industrial unit that Sinclair Harding calls home, sits a variety of machine tools, some ancient and well used, others as shiny as the day they were installed, such as the company's Haas Mini Mill and Haas OL-1 Office Lathe.

"Before we bought the Haas machines, we compiled a wish list of functionality," Bray recalls, "but we didn't think we'd get everything we really wanted for the money we had available. I guess that's why it was a wish list!" After the company's relocation fell through, the idea of squeezing even more equipment into its already "busy" workspace seemed ridiculous. But it wasn't just the size of the Haas machines that persuaded Bray he'd found what he was looking for.

"Within five minutes of using the Haas control, I was convinced," he says. "It was so intuitive and easy to use. As soon as the machines were installed, we started transferring part programs. We thought the machines would be busy at least two days a week; they haven't stopped since!"

Bray bought the Haas OL-1 Office Lathe as a second machine to support his main lathe. "As the workshop is very cramped, it's the perfect size," he says. "With the same control as the Mini Mill, it was quick and easy to learn."

CNC machines have made the clockmaker's task faster and less labour-intensive, but traditional craftsmanship – not dissimilar to the methods used by Harrison 300 years ago – still accounts for about 50 percent of the time taken to make a Sinclair Harding clock.

"Every last piece, even those you cannot see, is hand polished," says Bray. "We also make springs from strips of brass, which we hammer out to give them the shape and spring qualities. Our dials are made of brass, engraved and filled with wax. We finish them by rubbing the dial with a concoction of silver nitrate crystals, salt and cream of tartar, which deposits silver onto the surface. It's a very old process, and the mixture recipe is a closely guarded secret." Sinclair Harding also builds movements for other, well-known manufacturers. "This is an important side to our business," Bray

explains, “but client confidentiality means it’s not something we typically talk about.”



However, Bray can reveal that he personally designed and made the clock that was presented to the Queen at the opening of the refurbished St. Pancras train station in November 2007. The shape of the clock reflected the architecture of the famous engine shed, and the dial was a faithful copy of the large clock in the station, which in turn is a replica of the clock made when the station was first opened in the 19th century.

One of the challenges was machining the 3-dimensional filigree around the outside of the dial. Bray made the drawings from a photograph of the original clock dial, and used CAM software from OneCNC to create the program.

“We were only making one piece at the time – there being only one Queen – from a solid piece of 1 mm-thick engraving brass,” Bray relates. “The blank is clamped through the centre and on the outside, and the first part of the operation is to engrave some of the detail at different depths to give the part a 3D look. I engraved the pockets and the inside diameter detail, removed the centre, re-clamped over the engraved filigree and engraved the outside detail.”

The original machining cycle took a whole day, but the company subsequently won a repeat order, and after much “playing around,” Bray got the time down to about 1 hour and 10 minutes. “Mind you,” he says, “the cycle times are not that important. There’s always plenty of hand-finishing to do while the Mini Mill is running.”

X. The Next Generation



Robert Bray with his son Domonic, who works in the family firm.

Robert Bray says that training his staff, many of whom are close family members including his son Domonic, to work on his creations is his proudest achievement.

Robert is fully committed to safeguarding the future of the British clockmaking industry by training up apprentices, something he finds highly rewarding. “Apprentices are particularly fulfilling, seeing them on day one almost clueless and watching them grow in confidence to such an extent that they are able to make decisions and produce work that lives up to our exacting standards,” he says.
