



The University of Sheffield Heritage Collection Civil & Structural Engineering collections student research project

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Throughout the summer of 2024, I have had the opportunity to carry out a research project into the engineering collections that are held within the University's Heritage Collections. The objects that I researched are all in the domain of civil engineering, mathematics and mining and were transferred from the Civil and Structural Engineering Department. I had relatively little prior knowledge of objects within this subject, therefore the research that was conducted was not only to explore the provenance of the objects but also to give insight into how, and why the objects were used. My research project has also enabled updating the heritage catalogue for these objects with further information.

Through my research I discovered that all the objects have an incredibly interesting history relating to engineering, surveying and social history. The provenance of the objects not only holds relevance to the objects themselves, but often it gives enlightenment to a wider historical understanding which is something I found particularly interesting. I have chosen three types of objects to focus on for this blog; planimeters, calculators and measuring tapes where I have looked into their provenance and manufacture, as well as how they have evolved over the 20th century to enable surveying and engineering to advance towards its practice.

Planimeters: developed throughout time

The heritage collection contains four planimeters which serve as testament to the technological and manufacturing changes of planimeters throughout the twentieth century. A planimeter is a table-top instrument for measuring areas of irregular regions on a map or photograph. The earliest of the planimeters in the collection was manufactured by Cooke, Troughton & Simms Ltd in 1924 who were based in York. This planimeter is made primarily of metal, and it constitutes a very simple design. Metal cogs are attached to adjust the object, and the measurements that the planimeter can give are reasonably limited and dependant on how well a person is able to read them from the planimeter. There is a spirit level on this planimeter; spirit levels consist of a liquid that has a bubble in it and it is contained by visible glass, the positioning of the bubble on a spirit level can be used to determine whether an object is being placed on a straight or horizontal surface. This planimeter can be described as a very simple object, that while perhaps not being entirely precise, is able to fulfil the function of a planimeter, which is to measure areas primarily in photographs. This planimeter is contained by a leather pouch that is unoriginal to the object.



ID: 1812 Planimeter

The second earliest planimeter within the collection was manufactured by P.T.I. Co Ltd. An inscription on this planimeter dates it from 1940. Much like the earlier planimeter, this planimeter is a foldable object made from primarily metal, it also contains a spirit level. Overall, its design is incredibly similar to the earlier planimeter, despite the fact that they are dated 16 years apart. The continuity could be representative of many things, one possibility is that perhaps that design of planimeter was sufficient for the type of surveying done between 1924-1940 meaning there was no reason to change. Another possibility is that, as the second planimeter was made during WW2, that simply there was a lack of skilled craftsmen, or resources to be producing different designs of planimeters, and that it was easier to just reproduce models that have older designs.



ID: 1816 Planimeter

The third earliest planimeter within the collection was manufactured by Stanley in the 1950's and comes in a case which is inscribed by Allbrit; Stanley and Allbrit collaborated to create the Allbrit Polar Planimeter. When I first picked up this planimeter and looked at it, straight away the main difference between this planimeter and the earlier two planimeters was obvious: their greatly differing weights. Whilst this planimeter was similarly made from metal, and aesthetically of a similar design, it weighed significantly less. This clearly shows how the different use of planimeters throughout history, the less an instrument weighs, then the more transportable that instrument is. Furthermore, this planimeter is contained in a strong plastic box, which includes an instruction manual, this certainly would have made this planimeter easier to transport and be more durable to transport than the other planimeter which has been placed in a leather pouch.

Through my research I concluded that by the 1950's planimeters were regularly brought onto sights such as mines, therefore having them transportable was highly beneficial. A key difference, between this planimeter and the earlier two, is that it does not include a spirit level, this is because the object has been designed in such a way that a spirit level is no longer needed as a way of ensuring the object is straight, this shows a significant change from the earlier planimeters.

I found it interesting that between 1924-1940 there was little change in the design of planimeters, but between 1940-c.1950's there was a large change in the design of planimeters. Potentially the acceleration in the development of planimeters between the 1940's-1950's could be a result of industrial development after WW2.



ID: 696 Allbrit Planimeter

The fourth planimeter within the collection was manufactured by Coradi in 1963. The object is once again constructed of metal; however, it is significantly smaller in size than the three previous planimeters. As can be imagined, as the planimeter is smaller in size, it also weighs less again. Therefore, it can be said again that planimeters changed in design in order to become easier to transport. What really struck me about this planimeter was the wood and vinyl case that contains the planimeter. The case is of a very neat design and clinical appearance. The case looks as though significantly more effort was put into designing it than the earlier two cases made of leather; this has a more pleasing aesthetic whilst also being robust and hard wearing to protect the instrument.

Coradi is a Swiss company, and through my research I discovered that by the 1960's mathematical instruments were ever more commonly being imported from other countries rather than being produced domestically. I think that the pleasant design of the case of the planimeter, could indicate some competition between mathematical instrument makers had risen since the 1960's, therefore the case was made to look appealing as a unique selling point for the Coradi planimeter. This shows a change in the overall purpose of planimeters, whilst beforehand they were simply to form a measurement purpose, by the 1960's there was perhaps an element of needing to look more aesthetically appealing than their competitors.



ID: 1809 Coradi Planimeter

The most recent planimeter within the collection was manufactured by Planix around 2000. Straight away it is obvious that this planimeter is completely unlike the others, that being for one main reason; it is an electronic device. This planimeter works through connection with a mains power source which is included with the object. This planimeter has a numbers grid on its side, and a small screen which is used to read out the measurements. The planimeter is of a completely different design to the other three, as it has parts which can rotate. The small screen reads very precise measurements, meaning that this planimeter is able to give more accurate measurements than earlier planimeters.

This planimeter is significantly larger than the other planimeters within the collection, this is perhaps because it needs space to incorporate the electronic parts of the device. Ultimately, it can be inferred from this planimeter, that by the year 2000 planimeters had

completely changed in their design from the year 1924, essentially the introduction of electronic mechanical devices allowed the planimeter to incorporate electronic capabilities in order to give much more precise measurements.



ID: 1811 Planix planimeter

However, while this planimeter certainly is very different from the other planimeters within the collection, there is some continuity. Like all the other planimeters, this one too is made from primarily metal. This therefore shows that while the accuracy, design, and appearance of planimeters has changed greatly over the twentieth century, this does not mean that the raw materials used to make planimeters has greatly changed. One potential reason that all of the planimeters have been made from metal is because of the fact that metal is durable. Planimeters are used as objects that will constantly get adjusted and moved, therefore making them durable is essential. The importance of the durability of planimeters is an aspect that has continued throughout the course of the twentieth century. Furthermore, in a similar fashion to the earlier Coradi planimeter, this planimeter is uniquely coloured. The Planix planimeter is bright orange, which may again be representative of an attempt to make it aesthetically different from other planimeters.

Calculators: identifying the change in use of calculators

The next objects I would like to focus on are the two calculators within the collection. There is the Brunsviga calculator and the Pocket calculator. The two calculators vary greatly in how they are designed, and I believe that this shows the change in the role of calculators from complex mathematics and working out distances, to having domestic uses.

The first calculator is a Brunsviga: it is a large and bulky object made entirely from metal, therefore meaning it is very heavy and not transportable. It also appears complex and must have been complicated to use. The calculator is dated c.1950's and was produced by the company; Brunsviga Maschinenwerke AG, who were a machinery manufacturer based in Western Germany.



ID: 695 Brunsviga calculator

The second calculator is a pocket calculator made by Detson in the 1970's. This is very different to the Brunsviga calculator as it is very small, to the point that it can be hand-held, transportable, it is made from plastic, therefore it is much lighter, and it has a very simple set of buttons which make mathematical calculations easier.

The switch from big mechanical calculators to pocket calculators had a profound impact on the way in which calculators were viewed in society. Earlier calculators, such as the Brunsviga calculator, would have been used by people working within a mathematical, scientific, or engineering field, whereas pocket calculators brought the automation of mathematical calculations to everyday life.



ID: 690 Pocket calculator

Pocket calculators now are light, easy to use, transportable and are relatively inexpensive, although calculators were extremely expensive when they first came out. By the 1970s they were a viable method of calculating for the average person. Pocket calculators were revolutionary for everyday people who wanted to work out their tax bills, cost of their shopping, budgeting for a year/month. These are all things that these days people take for granted, almost everyone has a calculator available to them via their phone, and therefore this ability to do automated calculations is widespread. However, it was not until the introduction of pocket calculators that automated calculations were available to the average person for everyday life, instead calculators were created solely for people working in the mathematical domain. The two calculators within the collection not only are interesting objects in their own right, but when analysed together they make for a really potent demonstration of the changes in how calculators are conceived by society. I really think that the way in which the design of the two calculators represents the change in how, and who used calculators is a really interesting way to gather a more social history around mathematics and everyday life.

Measuring tapes: Chesterman's and links with local history

The final object which I would like to turn my attention to is a tape measure that was made in the late 19th century by Chesterman, Sheffield. Having lived in Sheffield for the past two years, this tape measure understandably took my interest due to its connection with my university city.



ID: 1814 Chesterman's Tape Measure

When researching this particular tape measure, I took a special interest in the company Chesterman Sheffield which manufactured it, with a particular aim of finding out the company's position within Sheffield prominent industrial history.

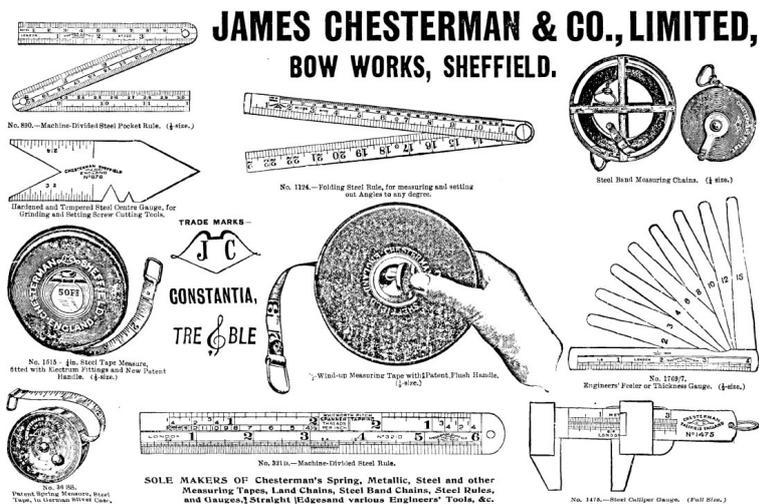


Image 1: Chesterman's advertisement c.1880

Chesterman's began manufacturing patent spring rewinding measuring tapes in the 1830's in Sheffield, then sometime in the 1840's Chesterman partnered with John Priston Cutts and started manufacturing metallic measuring tapes.

From research into the history of Chesterman, I came upon this 1862 advert:

JAMES CHESTERMAN & CO.,

(LATE CUTTS, CHESTERMAN, AND BEDINGTON.)

BOW WORKS, NURSERY STREET,

SHEFFIELD,

AND 5, EYRE STREET HILL, HATTON GARDEN,

LONDON,

SOLE MANUFACTURERS OF

CHESTERMAN'S PATENT

SPRING, METALLIC, STEEL,

AND OTHER TAPE MEASURES,

STEEL RULES, SQUARES, & STRAIGHT EDGES

IRON & HARDENED & TEMPERED STEEL LAND CHAINS.

ENGINEERS' TOOLS, SCISSORS, BUSKS,

CAP SPRINGS,

CRINOLINE STEEL, &c., &c.

MANUFACTURERS OF THE

PATENT SPRING JOINT SCISSORS,

AND THE

PATENT PORTABLE TENT.

CORPORATE



MARK.

Image 2: Chesterman's advertisement 1862

As the advert states, in 1862 Chesterman Sheffield was based in a building on Nursery Street which is situated adjacent to the River Don. However, in an entry to a Sheffield local Register in 1867 Chesterman Sheffield is detailed to be located on Ecclesall Road.

I then discovered that the Chesterman's building was located on Pomona Street which is located in the Sharrow area of Sheffield. This building still exists, and the facade of the building has kept its original design, with the logo of Chesterman's engraved on the building. The old Chesterman's building is currently used as an office block.



Image 3: Bow Works, Pomona Street, Sheffield

This relocation of the building which housed Chesterman's from Nursery Street to Pomona Street really took my interest as to why the company moved. The answer relates towards the Great Sheffield Flood of 1864.

The Great Sheffield Flood was a monumental moment in Sheffield's history. The Dam Dyke, in the Peak District, overflowed which caused flooding down the river Loxley towards Sheffield. The flooding swept into Sheffield from the Northern suburbs of Hillsborough and Walkley before affecting the River Don and badly flooding the industrial areas around Kelham Island and Neepsend which are the lower parts of Sheffield. Nursery Street was badly affected by the flood, and hence the buildings on the street were severely damaged.



Image 4: Photograph of Sheffield during the 1864 flood

Due to the damages on the Chesterman building on Nursery Street, James Chesterman, the owner, was awarded a sum of £538 as compensation, with this money Chesterman was able to relocate to a more remote area of Pomona Street.

Chesterman's displacement from Nursery Street to Pomona Street is an interesting aspect of Sheffield history due to the effects that the Great Sheffield Flood had on businesses and manufacturers of Sheffield.

The history of the tape measure, and its manufacturer Chesterman, acted for me as a gateway into the history of Sheffield and the devastating flood that affected the city so greatly. Therefore, the story of the tape measure allows for an insightful engagement into some of the interesting local History to my University city.

References:

- Image 1:
https://www.sheffieldhistory.co.uk/forums/uploads/monthly_09_2013/post-188-0-10937800-1379967933.jpg
- Image 2:
Image found in 'Pawson & Brailsford's Illustrated Guide to Sheffield (1862)'

- Image 3:
https://www.sheffieldhistory.co.uk/forums/uploads/monthly_03_2008/post-764-1206055649.jpg
- Image 4:
<https://www.thestar.co.uk/heritage-and-retro/retro/pictures-reveal-devastation-caused-by-the-great-sheffield-flood-which-tore-apart-the-city-and-killed-hundreds-of-people-2445543>