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Electrifying Women: Understanding the Long History of Women in Engineering

Elizabeth Bruton and Emily Rees
Science Museum and University of Leeds

Image: Women's Engineering Society visit to a power station, c.1938 Source: NAEST 092/07/01 Caroline Haslett papers, Institution of Engineering & Technology Archives

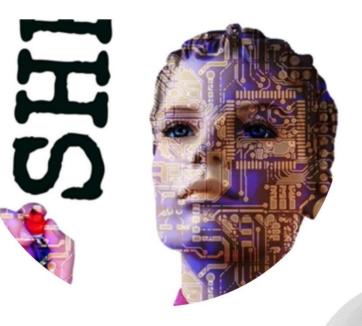
Electrifying Women Project

Who we are

- Dr Emily Rees (Research and Engagement Assistant, University of Leeds)
- Dr Elizabeth Bruton (Curator of Engineering and Technology, Science Museum)
- Professor Graeme Gooday (Professor of Science and Technology, University of Leeds)

Project aims

- To highlight the long history of women in engineering
- To share it with as wide an audience as possible
- Working in partnership with Women's Engineering Society (WES) and Institution of Engineering and Technology (IET)
- Increased participation creative writing, discussions and wikithons





- Talks
- Blog posts
- Creative Writing
- Archives taster sessions
- Wikithons
- Volunteers



Where are the women in engineering history?

Not always recorded in 'mainstream' histories so we have to look at:

- Census data
- Patent records
- Biography/autobiography
- Archives e.g. IET archives (WES; Caroline Haslett papers)
- Newspapers

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DECORATIVE ELECTRICITY

Alie M. Mrs. J. E. H. GORDON.

BTIW

A CHAPTER ON FIRE RISKS

BY

J. E. H. GORDON, B.A., M. INST. C. E.,

DIRECTOR OF AND CONSULTING ENGINEER TO THE METROPOLITAN ELECTRIC SUPPLY COMPANY.

ILLUSTRATED BY HERBERT FELL.

LONDON: .

FIDOMONI GELDIN 1 N

SAMPSON LOW, MARSTON, SEARLE, & RIVINGTON,

\$1. Bunstan's Coust, FETTER LANE, FLEET STREET, E.C. 1891.

[All rights reserved.]

Women in Engineering pre-1919

• Few formal opportunities; rare for women to study at university,

exceptions include Hertha Ayrton, Ruth Pirret, Margaret Rowbotham, Eily Smith Keary, Alice Perry

- Women gained engineering experience through familial collaboration/working for family company e.g. Blanche Thornycroft, Henrietta Vansittart
- 'Engineers by marriage': Alice Gordon, Katharine Parsons, Margaret Moir
- Census records suggest more stories to uncover: more research to be done

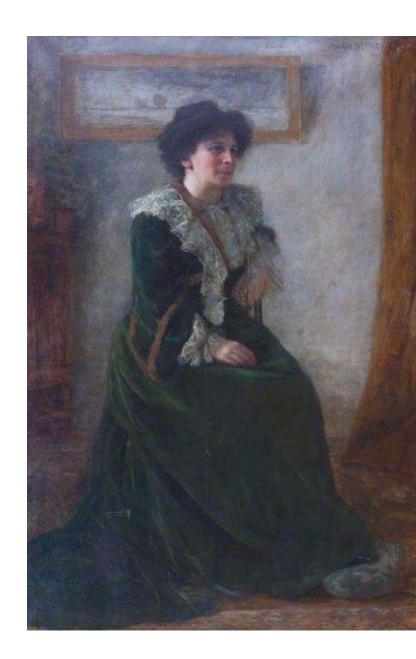


Lady Margaret Moir, 1864-1942, born Edinburgh, co-founder of Women's Engineering Society, 1919, President of WES 1929-30.

FIRST FEMALE ELECTRICAL ENGINEER IN UK

- **1899:** Hertha Ayrton (1854–1923) elected first female member of the Institution of Electrical Engineers
- Feminist, mathematician, inventor, patent holder, physicist (with some material science), electrical engineer, and suffragist

Right: Portrait of Hertha Ayrton, Girton College, University of Cambridge painted by Héléna Arsène Darmesteter (nee Hartog) [Ayrton's first cousin once removed]; supplied by The Public Catalogue Foundation



EARLY LIFE

1854: Born Phoebe Sarah Marks

1863: Invited by her maternal aunt Marion Hartog to live with her cousins and to be educated with them

1870: Worked independently as a governess

1876: Began studying at Girton College, Cambridge University

1881: Received external BSc from University of London

1884: Granted first patent for line divider



Girton College archive GPCH 10/2/41 Girton College Fire Brigade 1878 featuring Hertha Ayrton. Image courtesy of the The Mistress and Fellows, Girton College, Cambridge.

PHYSICIST & ELECTRICAL ENGINEER

1884: Studied Physics at Finsbury Technical College, meets Professor William Ayrton

Early 1890s: Began researching electrical arcs – powerful outdoor and indoor lighting, work which included aspects of material science

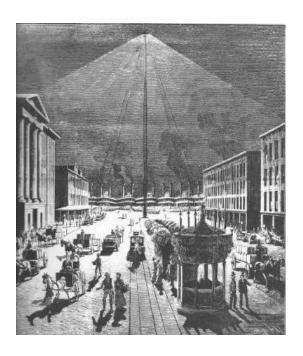
1899: Elected first female member of the Institution of Electrical Engineers for her work on electrical arcs

1916: Ayrton anti-gas fan used in WW1 trenches – over 100,000 issued to British Army in France.

Right: Hertha Ayrton in her home laboratory, date unknown. Source: Hertha Ayrton 1854–1923: A Memoir, by Evelyn Sharp (London: 1926).



1899: HERTHA AYRTON





Top Left: Moonlight lamps aka electric arc lighting, late 19th century; top right: Ayrton flapper fan, courtesy of IWM.

Right: Illustration of Hertha Ayrton from STEM: The Game by George Doutsiopoulos, freelance illustrator.

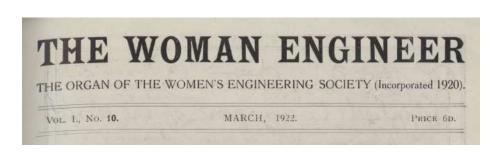


Mrs Hertha Ayrton was I think the first member of the fair, but no longer frail sex, to distinguish herself in the engineering world, though perhaps the woman engineer would not have arrived yet, had not the war, which upset so many masculine traditions, proved that woman was capable of doing many things which had hitherto been considered strictly within the provenience of the more assertive male...

Stewart, A, 1923, 'On Making the Best of It', *The Woman Engineer*1, pp 284–286

1919: WOMEN'S ENGINEERING SOCIETY

- First women's engineering society in the world
- Lady Katharine Parsons and Rachel Parsons, cofounders of WES with Lady Margaret Moir and four other women
- Hertha Ayrton: Early member and supporter of WES
- Caroline Haslett: "Organising secretary" from 1919; and first editor of *The Woman Engineer*









Above-left: Rachel Mary Parsons (1885-1956). Above-right: Caroline Haslett (1895-1957). Images courtesy of IET Archives.

Above: WES conference, 1923. Image courtesy of WES.

Founding Members of WES



Laura Willson Halifax house builder Caroline Haslett WES's 1st Secretary Margaret Partridge Consulting engineer



Early patrons and Presidents: Rachel Parsons (above)

Lady Margaret Moir 'engineer by marriage'





WES's Founding Aims

- To ensure the jobs created for women in WW1 were not threatened
- To promote the study and practice of engineering among women; and...
- To enable technical women to meet and to facilitate the exchange of ideas respecting the interests, training, and employment of technical women and the publications and communication on such subjects

WES founder Lady Katharine Parsons

Women in materials: Lady Gertrude Crawford (1868–1937): master wood turner

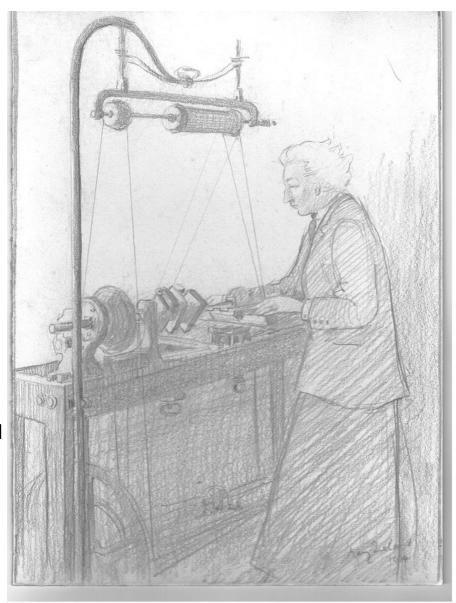
1907: Granted the freedom of the Worshipful Company of Turners; her work was not beaten in any competition held by the company since 1905

1915: Made a Master Turner in recognition of "her eminent ability as a turner and her patriotic efforts in supervising the manufacture of munitions"

1929/1934: Won the company's Premier Award, which included Freedom of the City of London – barred as a woman

1932: Work was placed in a class of its own "above first class"

Pencil drawing of Lady Crawford with Holztapffel lathe by Mary Ireland, 1904. Image courtesy of the History of Science Museum, Oxford.





Inv Num 26440 Collection of turned ivory and other objects, by Lady Gertrude E. Crawford. Image courtesy of the History of Science Museum.

Cleone Benest (1880-1963)

- First woman to take motor engineering examination and to drive an omnibus
- Founded The Stainless Steel and Non-Corrosive Metals Company Limited in Birmingham in 1922, which employed only women
- Joined WES in 1920 (chair 1922-26) under name Miss C Griff



MISS GRIFF, A.M.I.A.E.

Constance Tipper (1894-1995)

- One of the first women to take the Natural Science Tripos (Newnham College Cambridge)
- Devised the Tipper test as a means of ascertaining the brittleness of steel under cold temperatures
- Her WW2 work was on deformation and fracture of iron and steel, investigating the failures occurring in all-welded ships, the so-called Liberty cargo ships
- Worked in the metallurgical department at the NPL and then at the Royal School of Mines
- First female full-time faculty member at Cambridge University Department of Engineering



Ella Collin (1903-1973)

- Metallurgist specialising in analysis of non-ferrous and precious metals
- Her PhD in metallurgical chemistry from the University of London studied electrolytic analysis for determination of impurities in ores
- Published several papers on metals
- Later she became an HM Schools Technical Inspector & WES President in 1952
- No Wikipedia page!



Marion McQuillan (1922-1998)

- Metallurgist, authority on titanium alloys and Vice President of The Institute of Metals in 1973
- Worked at the RAE 1942-47, then Aeronautical Research Laboratory. Later at ICI Metals, becoming Technical Director of the New Metals Division of IMI in 1967
- She was the founder member of a team set up to develop materials for gas turbine engines
- No Wikipedia page!





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Keep in touch



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