

on the cultural segment of industrial architecture from the second half of the 20th century. Where necessary, it extends its focus back into the interwar period and forward into the transformational 1990s. In a parallel line of inquiry, it explores the attendant social phenomena of the observed period, which led to a need and a search for new interpretative approaches to industrial heritage and to the emergence of systematic efforts to protect it.

The selected topic, its focus, and its planned practical applications and publication outcomes have been chosen to ensure that the results can be directly applied in the areas of work of professional and educational organisations, public administration, local and regional government, private subjects, research institutions, the professional community, and the general public.

**Find out more** on work on the project and its outcomes.



Machine nº 1 in operation in the Fábrica de papel da Abelheira (Graham&Cª) around 1950 (APAI Photographic Archive, photo nº 61)

## PORTUGAL

### WHERE TO NEXT? BIG MACHINERY'S NEW LIFE AFTER THE FACTORY

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The Abelheira Paper Factory, located in São Julião do Tojal, within the municipality of Loures, stands as an institution with a century-long history in paper manufacturing in Portugal. Its origins can be traced back to the use of one of the water mills of the Trancão River by the São Vicente Monastery at Quinta da Abelheira, marking the beginning of artisanal paper production. Following the dissolution of the religious orders in 1834, the estate

was acquired by João Gualberto de Oliveira, who established the future Abelheira Paper Factory between 1836 and 1839, outfitting it with a steam engine and the first continuous system paper machine in Portugal. One of his later heirs, Astley Campbell, son of William Smith, purchased the 1873 paper machine we put under focus on this article, which replaced the original number 1 machine and stayed in use until 2016.

In 1899, the factory was acquired by the Scottish firm William Graham Junior & Co., initiating a period of enhancements and diversification in paper production with the acquisition of a new machine, number 3, for sophisticated YK wrapping papers. In 1964, the factory changed its name to Graham – Abelheira Paper Industry, although the Graham management concluded. The factory was declared bankrupt in 1973, yet it reopened later that year under new



Current image of machine nº 1, inside the factory, 2024 (photo by FAPAJAL)

management and was renamed Fábrica de Papel do Tojal – FAPA-JAL. After the Portuguese Carnation Revolution, the factory was nationalized and managed by Portucel from 1976 to 1999 before becoming privatized again from 2000 onwards, focusing on tissue paper production.

Technological evolution in paper production was a constant for this industrial unit. Initially, the production was artisanal, harnessing the power of the Trancão River as an energy source for the mill. João Gualberto de Oliveira's acquisition marked the beginning of the factory's modernization, introducing energy production via a steam engine and two continuous system machines for the production of writing and printing paper.

From 1899 onwards, under the stewardship of William Graham Junior & Co., the factory experienced a period of significant innovations and improvements. New methods and equipment were introduced, aiming to continuously enhance the quality and diversity of papers produced. As such, the factory was equipped with two Fourdrinier paper-making machines from the 19th century, a Yanque type (1905) and another Fourdrinier from 1953, along with other vital equipment for modernizing the paper production processes.

The first paper-making machine from 1873 was designated number 1 and has survived to the present day, though its future is now uncertain. The Fourdrinier-type machine operated between 1873 and 2016. It measures six meters in width, thirty meters in length, and five meters high and has an estimated weight of about a hundred tons. The marks on its wheels trace back to the company "Mason Scott & Co. Ltd."

Noteworthy is also the involvement and context of machine number 1, particularly the wooden truss roofing that still survives in this factory location, a type of structure increasingly rare as the rehabilitation of buildings continues to dispose of these roofs.

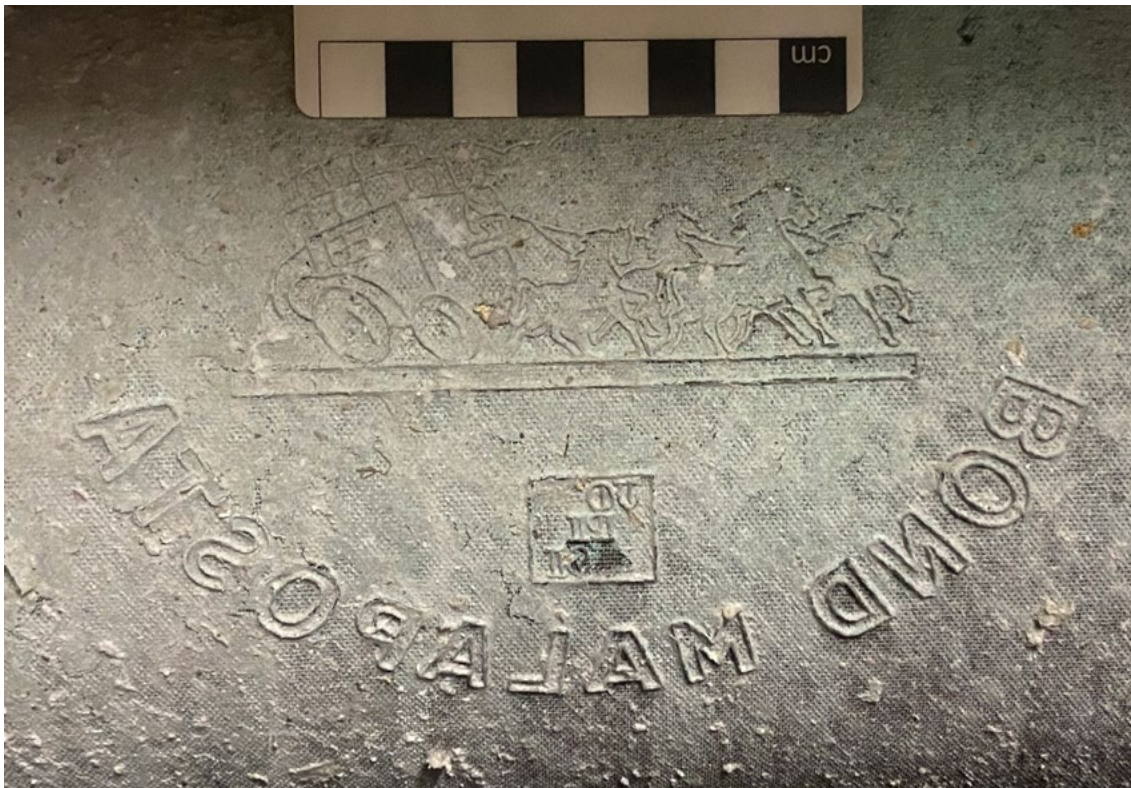
In 1939, the factory acquired a new Babcock & Wilcox boiler, marking a significant advancement in production efficiency. This boiler, along with others already in place, enabled greater power and was crucial for installing a turbogenerator that improved the factory's energy efficiency.

Another critical technological milestone was the acquisition of machine number 4 in 1953, a Fourdrinier-type paper-making machine purchased from Bertrams Ltd., allowing for a significantly increased hourly production, ranging between 700 to 1,300 kilograms, depending on the quality of the paper produced. This machine produced a wide variety of multi-ply bags and other paper products, but it is no longer in the factory.

With reprivatization and management by FAPAJAL since the year 2000, the factory continued to innovate, investing in modern equipment for tissue paper production and improvements to production processes, including the installation of an Industrial Wastewater Treatment Station (ETARI), a thermal power plant, and a new natural gas-fired boiler.

The factory's centenary machine, nº 1 – Fourdrinier, which has been producing writing and printing paper since 1873, was refurbished to produce smooth papers for manufacturing tablecloths and hand towels but was deactivated in recent years. Today, the growth and





Example of a watermark roll of the type "Bond Malaposta," 2020 (photo by Leonor Medeiros)

technological update of the factory lead to discussions about the future of this machine, studying best practices for its preservation and valorization.

In 2021, a partnership began between the Municipality of Loures (CML), the New University of Lisbon (NOVA FCSH), and the Portuguese Association for Industrial Archaeology (APAI) to start surveying and registering the factory's oldest structures, including the survey of three energy production areas. Archaeology undergraduates contributed to this work, including prospecting on the estate lands and collecting historical plans.

The research team also intervened in 2022 in the recording and safeguarding of watermark rolls ("filigree rolls"), inventorying and photographing a set of more than two dozen different watermarks, an essential part of the story of this machine and the products it produced.

FAPAJAL, the current owner of this factory, heir to an industry operating in this territory since the 18th century, together with the Municipality of Loures, NOVA FCSH, and APAI, are seeking solutions for the future, and all suggestions are welcome.

Please send us examples or suggestions to help us safeguard century Machine n° 1 with the utmost respect for its context and history while simultaneously allowing this century-old industry to continue updating and modernizing. This is a challenge, after all, so current in much of our industrial heritage! You can reach us at [leonormedeiros@fcs.unl.pt](mailto:leonormedeiros@fcs.unl.pt) or [conceicao\\_serodio@cm-loures.pt](mailto:conceicao_serodio@cm-loures.pt).

[Watch a video about the factory.](#)

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