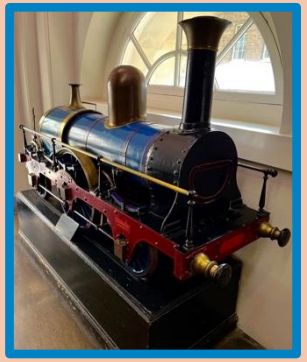
The Pearl Locomotive Project

The Great Hall Foyer
Kings Building
Strand Campus
Kings College London
2026



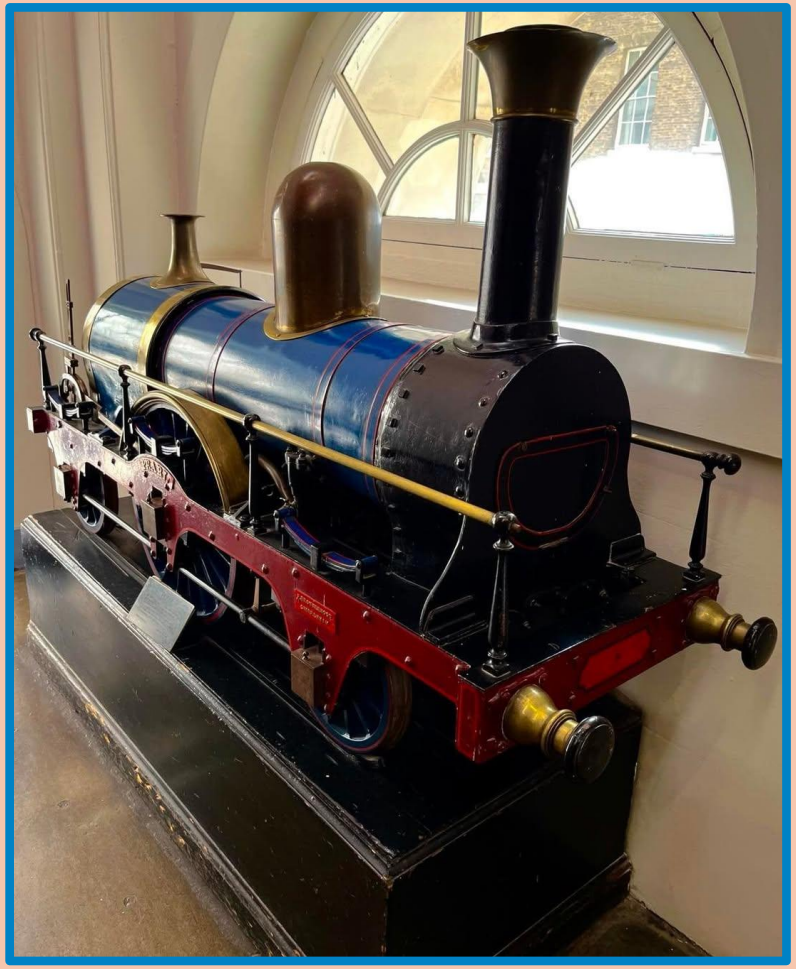
The Pearl Locomotive

Tucked within the historic Strand Campus of King's College London is a remarkable and often overlooked piece of engineering heritage.

Known as *"Pearl,"* this ¼-scale steam locomotive was built in the early 1860s by Peter Brotherhood, a distinguished engineer and former student of King's. Inspired by the pioneering broad-gauge locomotives of the Great Western Railway, the model reflects a formative period in Britain's railway development.

Acquired by the university in 1915, *Pearl* has remained part of King's for over a century. It was carefully restored between 1959 and 1961 by members of the King's College Railway Club, ensuring its preservation for future generations.

Today, it is believed to be one of the oldest surviving large-scale model steam locomotives in existence, a rare and tangible link to both the early evolution of railway engineering and the academic heritage of the institution itself.

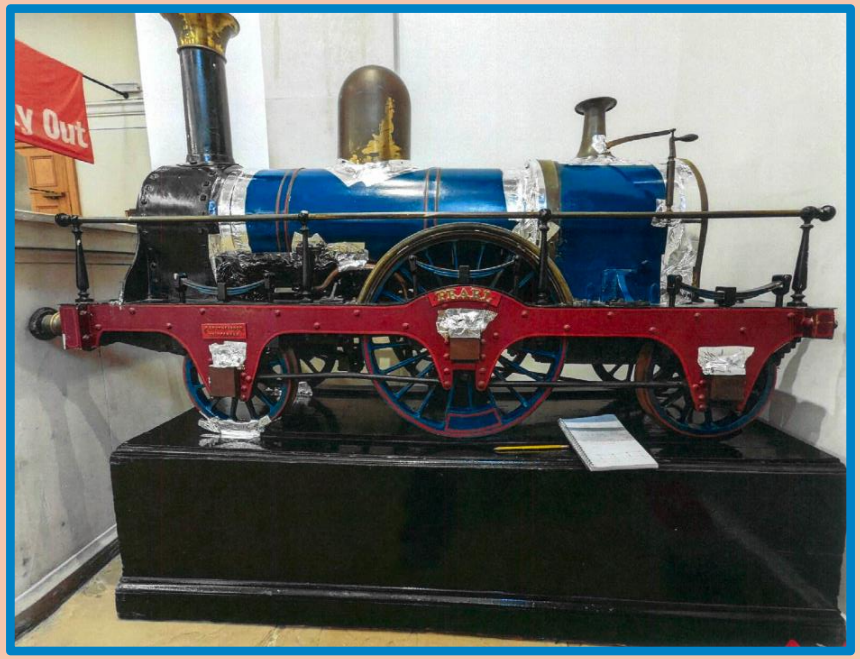


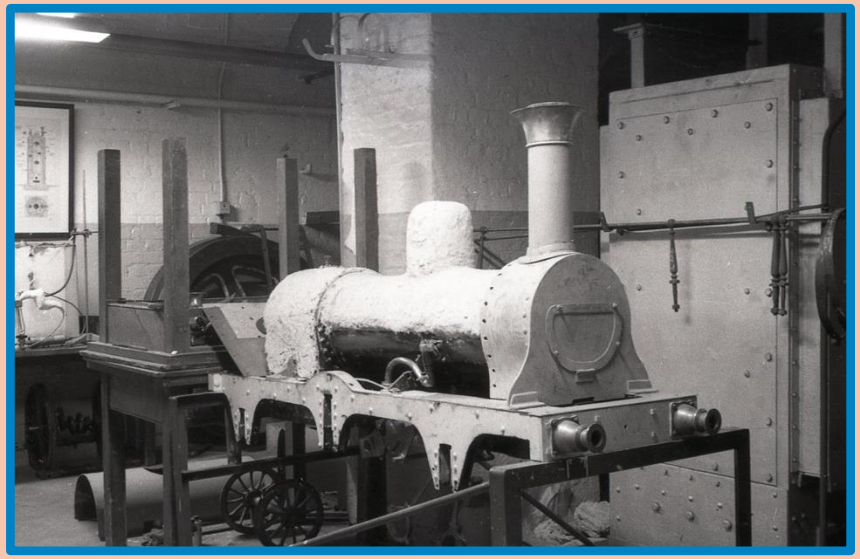
The Brief

Beneath its historic exterior, the *Pearl* locomotive contained asbestos-based insulation materials within its boiler and associated components, reflecting common engineering practices of the 19th and early 20th centuries.

King's College London required the safe removal of these materials to eliminate risk, while ensuring the complete preservation of the locomotive for future restoration and display. AA Woods was appointed as Principal Contractor to deliver a solution that would:

- Safely remove asbestos-containing materials in full compliance with current legislation
- Protect and preserve the integrity of a 160-year-old heritage artefact
- Carefully dismantle and handle components without damage
- Manage all works within a live university environment, minimising disruption
- Facilitate a clean and controlled handover for subsequent conservation works



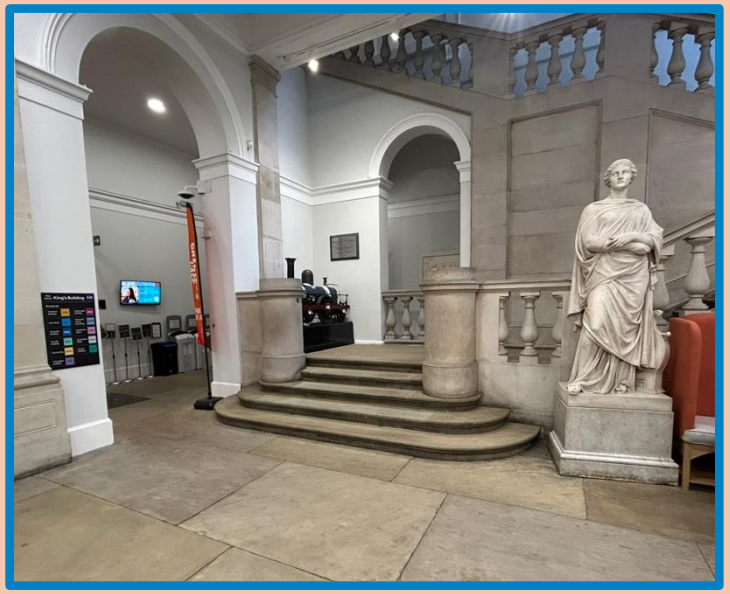


Lifting & Relocation

The project demanded a highly controlled approach, one that combined licensed asbestos expertise with precision engineering and conservation awareness.

Before any asbestos removal works could begin, the *Pearl* locomotive needed to be carefully relocated from its position within the Kings Building to a controlled external environment.

This presented a significant logistical challenge. Positioned within the Great Hall foyer, the locomotive was surrounded by architectural constraints, with no direct route for conventional removal. In addition, its age and construction required that no undue stress or movement be introduced during handling.



To overcome this, we developed a bespoke lifting strategy centred around a custom-designed scaffold lifting frame and certified rigging system. Every element of the lift was meticulously planned:

- Structural assessment of the locomotive to identify safe lifting points
- Installation of a purpose-built scaffold gantry system
- Use of rated lifting equipment and controlled winching methods

Suspended securely within specialist lifting slings, the locomotive was gradually raised, stabilised, and carefully manoeuvred out of its internal setting before being transported approximately 70 metres to a purpose-built external work area elsewhere within the Campus, where an asbestos enclosure had been previously prepared by ourselves.

Throughout the operation, the priority remained constant:

To ensure the complete protection of a 160-year-old artefact, while executing a complex lift within a live and sensitive environment.

Creating a Controlled Environment

Prior to the relocation of the locomotive, we established a fully controlled environment to receive the asset immediately upon removal from the building.

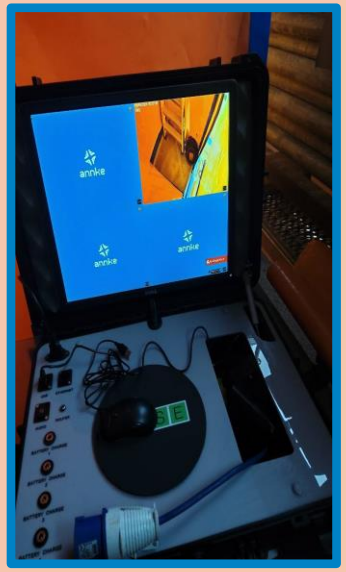
Given the sensitive nature of both the asbestos works and the historic artefact, the enclosure was developed through a carefully phased construction process, ensuring that containment, access, and decontamination systems were fully operational before the locomotive was moved.

The works commenced with the erection of a scaffold framework, forming the structural basis of the enclosure. A dedicated Decontamination Unit (DCU) was then positioned and connected directly to the enclosure via a purpose-built tunnel system, incorporating integrated bag-lock chambers for controlled waste transfer.

The enclosure itself was then constructed using timber hoarding and airtight sheeting, creating a sealed working space, with one elevation intentionally left open to allow for the controlled introduction of the locomotive.

Following the lifting and relocation process, the Pearl locomotive was transferred directly into this partially completed enclosure. Once safely positioned, the final elements of the scaffold and enclosure were completed to form a fully sealed asbestos enclosure incorporating:

- Negative Pressure Units (NPUs) to maintain inward airflow
- Direct DCU access via enclosed tunnel connection
- Controlled waste handling through integrated bag-lock chambers
- Continuous environmental monitoring throughout

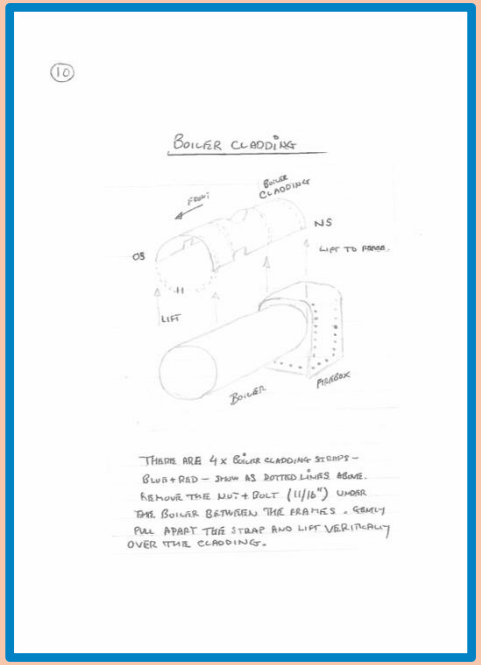


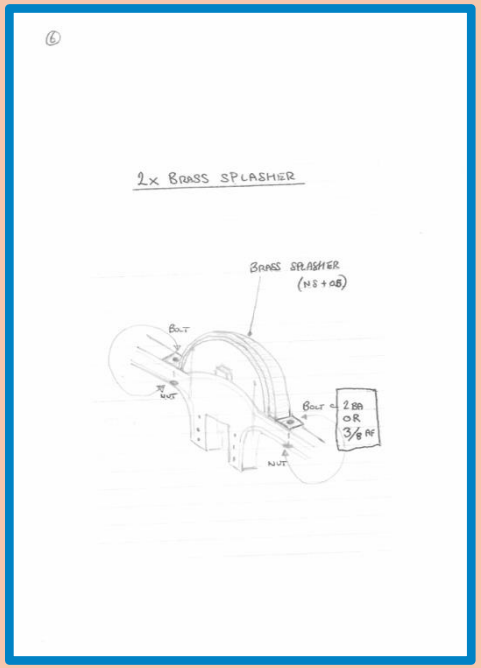
Specialist Removal & Preservation

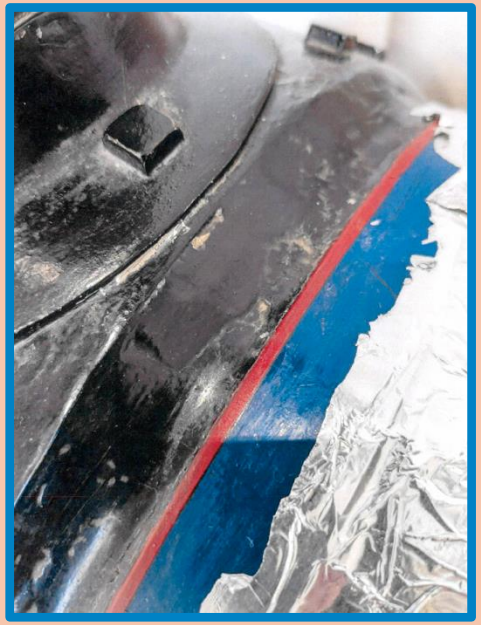
With the enclosure fully established, our highly trained operatives commenced the removal of the locomotive's boiler and associated components.

The works were guided by engineering notes, sketches, and photographic references, providing critical insight into how the locomotive had originally been assembled and how it should be dismantled without damage.

Given the bespoke construction of the locomotive, King's College London supplied us with the original tools used in the Pearl's construction, allowing fixings and components to be released in a manner consistent with its original assembly. This approach was essential in preventing damage to aged materials and delicate finishes.







Using this methodology, external elements, including the chimney and protective cladding, were carefully removed, revealing asbestos lagging, hand applied in 1960, beneath.

The dismantling process was carried out methodically to ensure:

- No components were carefully released and lifted in sequence
- No elements were forced or removed without full understanding
- All original finishes and surfaces were protected throughout

It was during this phase that an incredible discovery was made…

Discovery Within the Structure

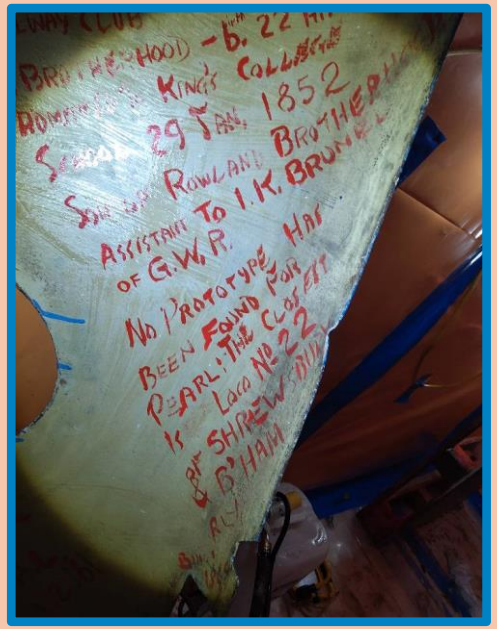
As sections of the outer casing were carefully removed, the team uncovered an unexpected and remarkable detail.

On the inner face of the boiler cladding, hidden from view for decades, were handwritten inscriptions in red paint, left by those involved in the locomotive's restoration during the late 1950s and early 1960s.

The markings included names, dates, and notes referencing the work undertaken at King's College, offering a direct and personal connection to the students and engineers who had preserved the locomotive over half a century earlier.

Among these inscriptions were references to the Brotherhood name, linking the restoration work back to the son of Peter Brotherhood, the original builder of Pearl, and to a lineage with Rowland Brotherhood, an engineer connected to Isambard Kingdom Brunel.

What had been discovered was not just part of the locomotive's structure, but a record of its custodianship a hidden archive of those who had contributed to its survival.



Removal, Cleaning, Clearance & Handover
The exposed hand applied asbestos lagging was initially subjected to a controlled wet injection process, utilising multiple needle injection points to fully saturate the insulation prior to removal.

Once fully saturated, the asbestos lagging was carefully removed in manageable sections, placed into asbestos waste sacks, sealed, double-bagged and transferred through the bag lock system for safe removal and disposal in accordance with licensed asbestos waste procedures.

Working within the controlled enclosure, our highly trained operatives then carried out a meticulous fine clean of all surfaces, ensuring that no residual contamination remained.

Specialist techniques were used throughout, combining controlled wet wiping and H-type vacuuming, with particular focus given to intricate areas such as joints, fixings, and internal surfaces where fibres could settle.

This process was carried out systematically, from top to bottom, to ensure a complete and consistent standard of cleanliness. Every effort was made to preserve the integrity of the original materials while achieving full compliance with asbestos removal standards.

Once cleaning was complete, the enclosure and surrounding work area underwent rigorous inspection and preparation for independent verification. A 4-stage clearance process was undertaken by an independent analyst, confirming that the area was safe, clean, and suitable for reoccupation.

Following successful clearance, the enclosure was dismantled in a controlled manner, and the locomotive, now free from asbestos, was carefully handed back to King's College London.

In line with the agreed conservation strategy, the protective casing was not reinstalled. Instead, all removed components were retained by King's College London alongside the locomotive itself.

The intention is for the engine to undergo specialist restoration and reconstruction, ahead of its planned reintroduction as a central feature of the University's celebrations in 2027.

What began as a complex asbestos removal project concluded as something far more significant: the careful preparation of a historic engineering artefact for its next chapter.