

## CASE STUDY

### CONSTRUCTION PHASE



## Holyhead Wheel Lathe

**Since taking on the lease in 2019, TfW developed a strategic aim to upgrade facilities at Holyhead depot, maximise usage and broaden operational capabilities.**

These initiatives were primarily to ensure that an increased volume of rolling stock could be stabled and maintained at the depot, enabling TfW to provide an increased and enhanced level of service and reliability across Wales.

There is also a desire to create jobs in the area, increase visitors and tourism and to provide better connectivity to Holyhead Port.

There was only one functioning Ground Wheel Lathe in the depots leased by TfW. This presented an operational risk to the business in terms of reliability and created logistical problems with all rolling stock having to travel to Canton Depot where the single-headed lathe is situated.

In mitigating these risks, TfW incurred additional costs by having trains lathed at non-TfW depot facilities, to ensure stock was suitably maintained in terms of both planned and reactive maintenance.

The purchase of new and cascaded rolling stock fleets in Wales demanded that new infrastructure be introduced at Holyhead Depot and in this case, a brand-new single-headed Ground Wheel Lathe, in readiness for the delivery and commissioning of the impending rolling stock.

## PROJECT DETAILS

**Client:** Transport for Wales

**Designer:** Arcadis

**Contractor:** Balfour Beatty

**Project Value:** c £14.5m

**Contract:** NEC4 Option E





### What is an Exemplar project?

An ‘Exemplar’ is defined as ‘something worthy of being imitated or copied’ and this is exactly what we continue to seek to achieve with this programme.

Exemplars are intended to offer good practical examples of how to achieve Best Value Sustainable Construction solutions. An Exemplar considers all aspects of sustainability, including economic, social and environmental, demonstrating that the scheme is well rounded and has incorporated best practice and collaboration.

Our approach to Exemplar has been updated to reflect the Wellbeing of Future Generations Act

and to provide greater value as well as inviting a programme approach to the process. It is anticipated that embarking on the Exemplar process will, in itself, lead to higher value being obtained from a project.

Case studies are normally prepared at 3 Key Stages; Design stage, Construction phase and Post-occupation, but we have recently added a Pre-design phase to our programme.

Addressing these phases ensures that lessons learnt can be demonstrated throughout the development of a project.

### Project Overview

Rolling stock manufacturers specify the frequency with which wheelsets should be maintained. Their specifications are based on data from the route and timetable operated, track profile, track condition and rolling stock configuration. In practice this data is distilled into a specified distance, which once completed will lead to a maintenance event.

The other occasions when maintenance occurs are based upon when a defect is likely to or has occurred. This ensures:

- safe operation of the rolling stock;
- ride quality;
- the potential to cause damage to the rolling stock is reduced;
- damage to the wheel-track interface is avoided, which could cause damage to other rolling stock.

The primary tool for maintaining wheelsets is an Underground wheel lathe (UWL). It is installed in a designed pit, under a maintenance track within a depot and measures the centricity, profile, and other critical parameters, of individual wheels within a wheelset, to assess their overall condition.

Based on this data the wheelsets are then automatically reprofiled by moving the rolling stock along the maintenance track without the need to dismount them from the rolling stock.

TfW had a need for additional maintenance facilities throughout the network to ease pressures on existing sites as their fleet expands. The development at Holyhead Depot has assisted in this but the primary purpose was to accommodate a UWL facility.

The location where Fuel Line 3 was formerly situated at Holyhead Depot – to the south-east of the existing maintenance sheds – is the location for the new UWL building in which the apparatus is situated along with a bespoke pit and all associated civils, power, mechanical and electrical works, and new Permanent Way to connect to existing railway infrastructure.

The new Hegenscheidt U2000-400D Single Headed Wheel Lathe, was installed by the supplier Richardson Machine Tool Services, who were contracted directly by TfW. The facility will serve

Mk4 Class 197 DMU trains in 2- vehicle and 3- vehicle sets. The project has also provided a new Depot Protection System (DPS). The purpose of the DPS is to provide personnel and infrastructure protection to both the existing depot facility, and the new wheel lathe building.

In addition to the Wheel Lathe Facility, there was a requirement to provide a storage area for wheel sets, additional staff accommodation and welfare and car parking provision.

Balfour Beatty were appointed as Principal Contractor for the works and also provided the Principal Designer role. Arcadis were appointed as Designer by Balfour Beatty as part of the integrated team.



### Key Outputs

The infrastructure required for the new UWL facility comprised the following:

- New building for the apparatus along with overhead crane, bespoke pit and all associated civils, power, mechanical and electrical works to operate the facility;
- New track connection to the mainline and existing maintenance depot
- Demolition of redundant foundations/buildings;
- Relocation and utilisation of any operational services; drainage;
- Noise attenuation/mitigation;
- Storage provision for spare wheel sets, materials and tools;
- Pedestrian and vehicular track crossings;
- Pedestrian walkways inc. lighting, line markings, signage and fencing/segregation, access gates and fencing, as required;
- Vehicular access road and parking, inc. Lighting, road markings, signage and fencing/vehicular restraint system where required; and Passive provision for EV charging
- New standalone welfare unit for staff which comprises a 4-bay modular unit, including locker rooms, accessible office spaces, canteen, toilets and shower rooms including a DDA compliant toilet.



### Environmental Issues

A full Environmental management plan was completed along with ecology. Vegetation clearance was carried out to allow installation of the new wheel lathe facility and Environmental Management Design Hazard reviews were carried out at regular intervals.

The following were the principal environmental issues successfully dealt with by the project team:

- Unforeseen Ground conditions – including unknown buried services, unfavourable ground conditions, archaeological features such as a turntable from circa 1800
- Weather conditions affecting lifting operations
- Ground sample testing found some areas of the site had contaminated ground that needed to be safely deposited at an authorised site.



### Sustainability

The following were some of the best practice initiatives developed by the team as part of their sustainability objectives:

- Carbon reduction with the use of U1 waste licences used for removal of the site spoil utilising local farmers to reduce the carbon footprint with c12,000 tons reused locally.
- Waste reduction by the re-use of on-site construction materials, with crushing and repurposing of old foundations, buildings, walkways etc and removing the need for importing c400 tons of new material
- Sustainable drainage with installation of a large attenuation tank reducing the risk of flooding,
- Use of local supply chain with c £4m spent locally on hotels, plant hire and material companies and employing 8 local staff members during construction, minimising Carbon footprint and benefitting the local community.
- Utilisation of ECO Welfare and site facilities with Solar and Battery hybrid to reduce the use of fossil fuels.





## Value

The project has delivered value in a variety of ways; the high-level aspects can be summarised as follows:

- **Technical** - Hegensheidt UWL is a similar design and shares parts and support to most other UWLs installed in the UK including the existing UWL at Canton.
- **Operational** - The commonality with existing equipment will assist in training and operation.
- **Strategic** - This project represents a clear representation of the forward thinking, best practice and sound management of the business.
- **Economic** - Major investment in north Wales, with benefits during construction and then leading to long-term employment of 12 additional staff members.

## Value Engineering

Value Engineering was carried out, resulting in cost reductions, including:

- Sewer connection omitted and replaced with Holding Tank combined with Drainage outfall connections
- Revision of Access Road and drainage runs
- Changing deep excavation and concrete foundations for Piles
- Descoping rainwater harvesting
- Change of construction materials for MVP

## Stakeholder Engagement

There were some critical interfaces that the project team had to deal with. The project boundary extended over two lease areas, the first being the current operational depot which is Network Rail- owned and leased to TfW Rail Limited (TfWRL) for the franchise duration, and the second area is land which was obtained by TfW on a long lease and sub-leased to TfWRL.

The project team worked with Network Rail and the relevant parts of TfW and TfWRL to manage the interfaces (existing depot lease area and mainline railway) to ensure that any works as part of the project were communicated and controlled, with a minimal risk to existing infrastructure and operations.

In addition to Network Rail,TfW and TfWRL, the other principal stakeholders with which the project team engaged extensively were:

- Anglesey County Council
- Anglesey fire and rescue
- Archaeology Wales
- Utility providers and suppliers – Welsh Water, SPEN etc
- TfW Drivers and Trade Unions
- Immediate neighbours and local community

## Key Challenges

The following were the principal challenges addressed successfully by the project team:

- Environmental challenges, particularly water flows and local flooding
- Archaeological features such as two Turntables, and old Maintenance pits and outbuildings
- Variable Ground conditions with both hard granite rock and soft ground,
- Constrained working area with challenging access so construction sequencing needed to be carefully planned
- Asset protection with items such as the adjacent retaining wall, culvert, 33Kv power cable, open Mainline track and operational depot
- Budget/programme – working with a constrained budget and time scale

## Lessons Learned

The principal lessons learned identified by the team were as follows:

- Balfour Beatty developed a successful supply chain of Sub-Contractors following due diligence carried out in their Procurement process, which can be used on future similar projects.
- Environmental challenges to be addressed earlier in the project as risks; investigations to be carried out at early stage, and include them in the programme e.g., archaeology, GI investigations, unknown buried services, adverse weather conditions impacting lifting operations etc.
- Value Engineering design to be carried out at an earlier stage instead of during the construction phase, to avoid late scope changes and potential delays.



- Use of Option E contract in a project with significant change throughout to be considered carefully
- Entry into Service requirements and actions being prepared ahead of schedule and regular communication and reviews being maintained is good practice

## Community Engagement & Social Value

The project team delivered social value through identifying and then delivering outcomes based around agreed **‘Themes Outcomes and Measures’ (TOMs)** relevant to the Holyhead Wheel Lathe Project, TfW’s values and sustainable development goals and the local community:

- Building on relationships with Local Job centre, colleges and CITB to engage with local young people to develop skills including employability skills, CVs, interview preparation etc
- Develop and offer work experience programme to meet the skills development needs for local students /NEET/ unemployed
- Volunteer time to local community projects /and or charities to meet the needs of the community and add value

- Deliver diversity training to Balfour Beatty and Supply chain staff directly working on project as part of induction

Some notable social value achievements were:

- **16 hours support into work assistance** provided to unemployed people
- **1.3 weeks of work experience** provided for local young people
- **16 hours spent** on local school and college visits
- **33 hours of volunteering** provided on local community projects
- **18 hours of equality, diversity and inclusion training** provided for staff and supply chain



## Collaborative Working

The team exhibited best practice collaborative working throughout the project delivery both internally among the team partners and with external organisations, particularly:

- Balfour Beatty/Arcadis/TfW worked collaboratively throughout the design stage and into the construction phase.
- Project was handed over to the TfW Infrastructure Team at Stage E and the team integrated well into the project.
- Weekly interface meetings between TfW/Balfour Beatty and Network Rail, and weekly designer meetings with Arcadis were held
- Gwynedd shipping and Hendriks yard used for site access and compound area

## Health and Safety

Prior to commencement of design and construction, a Design Risk Assessment & Risk Register were produced by the contractor Balfour Beatty and designer Arcadis to account for all identifiable hazards, risks and appropriate mitigation throughout the life of the project.

**A Construction Phase Plan and Work Package Plan** were produced by Balfour Beatty along with all other associated health; safety, environmental, quality and sustainability- related documentation in accordance with Network Rail Standards, CDM Regulations (2015) and TfW procedures. **All identified risks and hazards were integrated into the Construction Phase Plan and Risk Register with specific risk owners allocated.**

### There were two principal safety objectives for the project:

- To ensure that the design and construction of the new and changed Depot facilities was as safe as reasonably practicable, to enable its safe operational use.
- To ensure that operational and maintenance processes were in place to enable TfWRL to continue to safely operate and maintain the Depot.

The project required the involvement of the TfW System Review Panel in reviewing and endorsing the work prior to Entry into Service of the changes. The project also required approval from TfWRL Safety Validation Panel to request Safety Approval for entering the changes into operational service.

The project team coordinated with TfWRL and other relevant external organisations (e.g. Network Rail) to identify and manage specific residual hazards that could not be fully mitigated by the project and needed to be transferred to third parties.

Safe integration of the new systems (and any associated processes) with the operational and maintenance regimes in place was also undertaken. The project implemented an Asset Management Process to ensure safe handover to the Owner/Operator/Maintainer.

## Well-Being of Future Generations Act

**The Act requires public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change.**

CEWales was commissioned by the FG Commissioner, in conjunction with CLAW, to develop a Project Directory framework which guides clients through the various phases of project delivery in relation to the requirements of the Act.

Pilot projects are being trialled for schools with the intention of rolling it out to all buildings and civils projects. The Act will increase in prominence within our Exemplar process going forward.

## TfW Exemplar Programme

**CEWales has set up an Exemplar programme with TfW. A number of projects, at varying stages of development, are identified for inclusion in the annual programme.**

**In this fifth year (2024/25) there are five projects. The Holyhead Wheel Lathe is the second case study completed for the year.**



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