

London Underground Limited

Introduction of New Wheel Re-profiling Production Lines and Remote Wheel Diagnostic Facilities.

During the last quarter of 1998 a study was undertaken to investigate and report on the possible system wide introduction of new self contained wheel re-profiling facilities. Initially a generic solution was developed which could be modified to suit the particular constraints encountered at the depots identified for introduction of the facility.

LUL's aim was to process the train unit (up to four cars) within a single shift including all processes normally undertaken in association with their normally wheel re-profiling procedure (approx. every four years and undertaken in the lifting shop). These included adjustment in bogie ride height and ultrasonic axle crack detection. Additionally brake block exchange and automatic bogie ride height measurement was considered.

The process was developed around an underfloor wheel lathe with a remote controlled shunter and production times for all allied processes were to fall within the process time for the wheel turning cycle.

An Interlock system was specified to ensure safe operation of the process.

The feasibility for the introduction of remotely sited wheel diagnostics equipment was also undertaken.

Major tasks incorporated within the exercise for the generic solution were:

- Identification of the processes currently undertaken in association with the approx. four yearly wheel re-profiling cycle and process times for same
- Development of generic wheel re-profiling process line
- Development of generic wheel re-profiling timeline drawings, process drawings, and descriptions
- Development of generic safety interlocks proposal
- Plant list including all equipment necessary for self contained facility
- Utilities list for generic proposal
- Schedule of proposed maintenance activities
- Identification of potential lathe suppliers and pre-qualification evaluation
- Compilation of performance specifications for major items of plant e.g. wheel lathe (tandem and single), shunter, bogie lowering and support systems to allow LUL to issue invitations to tender
- Compilation of performance specifications for remaining items
- Detailed cost analysis
- Preparation of detailed Programmes
- After presentation of the generic proposal, D&P were tasked to develop and modify the generic proposal to allow the construction of new facilities at five identified sites.

Major tasks incorporated within the exercise for the site specific solutions were:

- Surveys of all sites to identify placement of facilities and inherent space constraints
- Survey of rolling stock maintained at particular sites to identify particular vehicle design constraints
- Development of site specific processes
- Development of site specific timeline drawing, process drawings and descriptions
- Development of site specific safety interlocks proposals
- On receipt of quotations for lathe and shunter, evaluate and make technical recommendation for preferred supplier
- In conjunction with civil construction consultants development of site specific facilities for housing of process lines
- Develop modifications to trackwork as necessary to connect with process lines
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As mentioned previously D&P were tasked to consider the introduction of remotely sited wheel diagnostic systems. LUL had some experience with one system but this was used only for wheel wear checking and the ability to identify wheel flats was not available on that particular system.

D&P undertook to look at expanding the checking possibilities by introducing a direct link to the underfloor wheel lathe CNC (Computer Numerically Controlled) system control with a view to direct downloading of wheel wear parameters for depth of cut calculation for re-profiling. Additionally, facilities for vehicle/component identification, flat spot detection, ultrasonic crack detection of wheel treads, and ovality were considered.

Major tasks incorporated within the wheel diagnostic system exercise were:

- Survey of existing LUL equipment to ascertain potential
- Identification of other suitable suppliers
- Compilation of performance specification to enable LUL to seek quotations

- Survey of all LUL sites to identify suitable installation sites
- Assessment of effect on LUL depot operations due to the various implications of installation of particular suppliers designs.
- Preparation of Detailed Programmes