



Copenhagen Metro

Line M1 and M2

Wheel Lathe

Technical Specification

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Appendices**Appendix A - Tender Compliance Table**

Table 1 – Table of attachments

ATT No.	Title/Subject	Issuer's doc. ID	Format	File/volume name	Size
1	Ørestadsselskabet - Maintenance Building, Foundation and Basement Plan	KBBVEOSEA 17FD3M601	PDF	Maintenance building	519KB
2	Ørestadsselskabet - Maintenance Building, Under Ground Wheel Lathe	KBBVEOSEA 17FD3D619	PDF	Maintenance building - wheel lathe	184KB
3	Ørestadsselskabet - Rolling Stock General Arrangement	KBBVMMRJO 21GV00284	PDF	Passenger vehicle	129KB
4	Ørestadsselskabet - Rolling Stock Motor bogie –assembly	KBBVMMRBO 11GV00738	PDF	Motor bogie	268KB
5	Ørestadsselskabet - Rolling Stock Trailer Bogie - Return of ground Brush	KBBVMMRBO 51GV00732	PDF	Trailer bogie	166KB
6	Lucchini CRS – Cerchione routa elastic tram Copenhagen	66006_1/5	PDF	Wheel profile currently used on the Metro train	2.050 KB
7	Bonatrans – Výkres profile	D11-4-01584	PDF	Wheel profile to be used in the future on Metro trains	308KB
8	Track specifications	-	PDF	Track	238KB
9	Copenhagen Metro Phase 1+2a – General service locomotive, Detail design: General assembly	91-DDSVGL-0707-00134	PDF	Gleismac service vehicle (1)	133KB
10	Gleismac service vehicle – side view	-	PDF	Gleismac service vehicle (2)	141KB
11	Copenhagen Metro Phase 1+2a – General service locomotive, User's manual, page 20	KBBVMSSEK 06DV09447	PDF	Gleismac service vehicle -Technical characteristics	147KB
12	Gleismac service vehicle - Wheel	-	PDF	Gleismac service vehicle -Technical characteristics	131KB
13	Windhoff – Heavy diesel rail track OB 50 B	1.600.546 766-1b	PDF	Windhoff service vehicle	299KB

14	Ansaldo - Diesel-skinnekøretøjer og fladwaggoner, håndbog 1, page 52	KBBVMSSEK 06DV09508	PDF	Windhoff service vehicle - Technical characteristics	68KB
15	Windhoff - Flat bed rail car	1.600.552 860-2a	PDF	Flat carrier (1)	255KB
16	Windhoff - Carry wheelset for flat waggon	5.423.547 286-0	PDF	Flat carrier (2)	211KB

Revision summary

Version	Date	Scope of revision	Change description
1.0	03/06/2016	-	New document

1 Introduction

The present underfloor wheelset lathe located at the Copenhagen Metro Control and Maintenance Center (CMC) for the lines M1 and M2 has increasingly been the subject of repair and continual breakdowns. This document outlines the technical requirements for the purpose of replacing the wheel lathe for prospective bidders.

1.1 Purpose

The purpose of this document is to provide a technical specification to define Metroselskabet requirements for the replacement of the underfloor wheel lathe, associated equipment and supply services at the Metro Depot Metrovej CMC.

1.2 Scope

The scope of the tenders must encompass the following features:-

- A tender list declaring (from the point of contract award) all moneys required by the supplier stating when required.
- An outline project / installation project plan incorporating sufficient time for all activities (removal of old machine, civil works (if any), installation of new machine etc.).
- Details of lathe interface requirements.
- Details of civil engineering work required to modify the existing lathe pit to accommodate the proposed wheel lathe, including an outline drawing of the pit (notice that the civil works activities will be handled by the Employer).
- A list of relevant standards the machine must conform to with a confirmation of compliance.
- A full description of the machine operation including screen displays and an explanation of how the machine calculates optimum profile.
- A list of key performance parameters for the machine including maximum throughput time per bogie, achievable accuracy and information on airborne noise emission.
- A procedure for achieving economical tyre cutting with the proposed lathe.
- A completed tender compliance table (see Appendix A).

The bid must include itemised costs for:-

- Removal of the existing lathe and disposal thereof
- Supply and installation of the new wheel lathe including all testing and commissioning required
- Vehicle movement system operated from lathe pit
- Fully inclusive warranty over a period of 24 months
- Spare parts which the supplier anticipates will be required over a 12 months operation period after warranty period expires
- Training, covering operation and running maintenance to be carried out over a two week period following the delivery and commissioning of the machine

Optional items:-

The bid must also provide costs for the following options:-

- The cost reduction of using the existing Windhoff road railer in the vehicle positioning system including the Radio control of this feature.
- Yearly maintenance for the life of the machine for the first year after commissioning

1.3 References

1.3.1 The lathe supplied is to comply with relevant EU standards. The Machinery Directive and its associated standards are mandatory and take precedence over all others detailed herein.

1.3.2 It shall be the responsibility of the tenderer to identify all applicable standards, see Tender Compliance Table (Appendix A) and Table 3.

1.3.3 Two attachments are supplied with this specification showing the location of the existing lathe installation in the Copenhagen Metro CMC (attachments 1 and 2). These documents are known to differ slightly from the installation at the Copenhagen Metro CMC and therefore may be used as a rough guide only. The supplier will be responsible for ensuring that the lathe and supporting equipment supplied will fit and interface with the depot infrastructure. Potential suppliers will be invited to inspect the Copenhagen Metro CMC and take measurements of the pit.

1.3.4 The supplier will declare if they are compliant to the list of standards in Table 2. This list is not an exhaustive list of necessary requirements. The supplier will be responsible for defining the full scope of standards for compliance.

1.3.5 The supplier will ensure Danish working environmental rules are followed with regard to the installation of suitable walkways and/or handrails in the area of the lathe.

1.3.6 A number of drawings are attached for information showing the Metroselskabet passenger vehicle, the motor bogie and the trailer bogie (attachments 3, 4 and 5), the wheel profile currently used and the wheel profile to be used in the future (attachments 6 and 7), track specifications (attachment 8), and the diesel service vehicles and flat beds (attachments 9 to 16). Notice that the wheel lathe also shall be used for re-profiling of the service vehicles in the Metroselskabet fleet.

Table 2 – Manufacturing Standards

Code	Reference description
2006/42/EC	The Machinery Directive
2004/108/EC	Electro-Magnetic Compatibility (EMC) Directive
1998 No. 2306	Provision and use of Work Equipment Regulations 1998.
DS DS/EN ISO 7010/A5	Graphical symbols — Safety colours and safety signs — Registered safety signs (27/01/2015)
DS DS/ISO 3864-3	Graphical symbols - Safety colours and safety signs Part 3: Design principles for graphical symbols for use in safety signs
DS DS/EN ISO 4413	Hydraulic fluid power — General rules and safety requirements for systems and their components
DS DS/EN 13715+A1	Railway applications —Wheelsets and bogies —Wheels — Tread profile
DS DS/EN 13262+A2	Railway applications —Wheelsets and bogies —Wheels — Product requirements

2 Scope of work

2.1 Mandatory Scope

- 2.1.1 The new machine shall be installed in the present location of the existing underfloor wheelset lathe.
- 2.1.2 The supplier shall provide and fit the new wheel lathe.
- 2.1.3 The supplier shall provide details of all civil engineering work and any alteration required to the pit dimensions.
- 2.1.4 The supplier will connect the machine to the existing structures and services within the pit.
- 2.1.5 The supplier shall propose a method of working which protects the normal day to day maintenance work within the depot from adverse effects of all aspects of the installation.
- 2.1.6 The supplier shall decommission, remove and dispose of the existing wheel lathe from the Copenhagen Metroselskabet Depot.
- 2.1.7 An all-encompassing project plan geared to minimum lathe down time must be provided.
- 2.1.8 The supplier shall deliver training for the Metroselskabet lathe operators and maintenance personnel. This will occur over a two week period following commissioning of the lathe.
- 2.1.9 The supplier shall provide a detailed list of required spare parts for the maintenance of the wheel lathe including costs valid for the time of lathe installation.
- 2.1.10 The cost of the machine quoted will encompass all spare parts which the supplier anticipates will be required over a 12 months operation period.
- 2.1.11 The supplier shall issue a detailed warranty package to cover a period of 24 months all-inclusive warranty.
- 2.1.12 Rails are required in front and behind the machine, enabling a vehicle to be easily loaded/unloaded onto the machine. The bridging rails shall conform to UIC 60 rail section.
- 2.1.13 Existing handrails for the lathe pit area may be compatible with the installation of the new wheel lathe. If these are to be reused the supplier is to ensure that any new or reused handrails are robust, secure and compatible to the required safety standards.
- 2.1.14 Any contracted workforce that is to work in the workshop area must attend a safety induction course held at the Copenhagen Metro Control and Maintenance Centre before commencing any work activities.

2.2 Employers Scope

- 2.2.1 The Employer will enter into agreement with a civil works contractor that will perform the modifications of the pit, if any modifications are required. The Employer bears the cost for the civil works contractor.
- 2.2.2 The Employer will set up a temporary solution for wheel turning during the wheel lathe down time. The Employer will manage all aspects of the temporary solution for wheel turning.

2.2.3 The final schedule for decommissioning and removal of the existing wheel lathe and installation and commissioning of the new wheel lathe, shall respect the availability of the temporary solution for wheel turning and the availability of the CW contractor.

3 Performance requirements

3.1 Mandatory Performance Requirements

3.1.1 The proposed underfloor wheel re-profiling machine shall be designed to accurately re-profile wheelsets fitted to the Metroselskabet fleet without the need to remove the wheelset from the vehicle.

3.1.2 The machine shall also be capable of machining wheelsets mounted in an uncoupled bogie and single wheelsets.

3.1.3 The machining of brake discs is currently not required. It shall however be possible to use the wheel lathe for machining of brake discs in the future, for example by procuring additional hardware and/or software.

3.1.4 All wheelsets will be to 1435mm track gauge.

3.1.5 The Wheel lathe shall be capable of re-profiling both wheels of the same axle simultaneously.

3.1.6 The machine shall be of rigid construction and capable of withstanding static loads in excess of 180kN per axle.

3.1.7 The design of the machine shall allow for securing, levelling and alignment of the machine on the required foundations within the pit.

3.1.8 The supplier shall put in place the correct interfacing arrangements between adjacent rails.

3.1.9 The supplier will state in the tender the maximum depth of cut which may be practically taken in normal operation.

3.1.10 The supplier will declare in the tender the accuracy achievable in the following list whilst machining the maximum depth of cut.

- Roundness (true running error).
- Lateral Wobble (face true running).
- Profile Geometry permissible variation.
- Surface Finish.
- Maximum diametrical difference across turned wheels of a wheelset.
- Maximum Back to Back permissible variation (Measurement taken following machining on an unloaded wheelset).

3.1.11 The supplier will state the maximum throughput time to machine a bogie of two wheelsets, assuming a single cut under a maximum depth of cut.

- The process will be measured from the point at which the first axle of the bogie comes to rest in the correct location on the lathe for the machine to engage and safely commence the turning process.
- Completion will be measured at the point at which the second wheelset of the same bogie has completed the machining process and the engagement device is released to allow the vehicle to move on to the next bogie.
- Safe practices must be observed at all time in the machining process.

- The bidder may declare any assumptions they have made in the estimate of this time.
- Metroselskabet retain the right to confirm the time declared in the tender.

3.1.12 The machine shall be equipped with a suitable range of tool feeds and turning speeds to achieve this.

3.1.13 The machine shall achieve a minimum of 95% availability taking account of maintenance and repair times only. (Available for a full 95 days out of 100 days of operation). Determined by average annually.

3.1.14 In the worst case, it will be possible to procure spares and repair the lathe within 10 working days.

3.1.15 The machine shall have a minimum design life of 15 years. Spare parts shall be available for the lifetime of the machine.

3.1.16 The Wheel Lathe should be designed for the Metroselskabet bogie and wheelset operation and must be fully adapted in its finished and installed form to achieve this.

3.1.17 The lathe supplied must incorporate all necessary standard systems, air conditioning, hydraulic power and control systems.

3.1.18 All lathe equipment must fit inside the pit with the exception of the warning lights, the vehicle movement system, the dust extraction collector and the swarf collector for which elements must be outside the pitted environment.

3.1.19 The fume/dust extraction system shall be equipped with noise reduction measures.

3.1.20 With regards to section 1.7.4.2 of the Machinery Directive, the supplier will indicate in the tender the information they anticipate will be provided to satisfy item u (information on airborne noise emissions) and state if this anticipation is supported by:-

- Previous measurement of a similar system (similar installation)
- Previous measurement of an identical system (similar installation)
- Or derived by another means.

3.1.21 Equipment which is situated outside the pit must not be positioned in a location which will interfere with depot operation.

3.1.22 The space envelope taken by all equipment must be shown on an outline drawing supplied with the tender.

3.1.23 This drawing must clearly show the clearance available around equipment in the pit to allow sufficient room for both maintenance and operation.

3.1.24 The lathe will be designed to apply economic cutting of wheels. The supplier will submit a procedure for achieving economical tyre cutting with the proposed lathe.

3.1.25 In case of lathe failures that cannot be repaired by local technicians, the supplier shall be able to provide onsite support at Metroselskabets depot within 48 hours. If the failure occurs immediately before a weekend or a bank holiday period, the support shall be onsite the first weekday after the weekend/bank

holidays. Onsite support shall be available for the life of the machine. Onsite support activities can be charged according to expenditure (i.e. the cost of the onsite support activities is not a part of the tender).

4 Functional Requirements

4.1 Drive Rollers

4.1.1 Drive rollers shall be provided which shall be capable of lifting and lowering wheelsets from the bridging rails, centring it to the machine and also rotating it for the machining operation.

4.1.2 The drive rollers shall bear onto the wheel rim tread and incorporate an "anti-slip" facility

4.1.3 The drive rollers shall be surface hardened and designed to be adjustable, to enable profile irregularities to be accommodated without loss of transmission, torque or profile accuracy.

4.1.4 It shall be possible to remove the drive rollers for replacement/re-profiling without the need for special tools unless provided.

4.1.5 An interlock system shall be provided to prevent the bridging rails from being opened or closed unless the wheelset is fully supported by the drive rollers.

4.1.6 The design of the machine in all of its aspects must be to fail safe in any circumstance.

4.2 Axle Box Centring and Hold Down

4.2.1 Wheelsets shall be supported and rotated about their axle bearings and the machine shall be capable of restraining them during turning and measuring cycles by means of a powered hold down device.

4.2.2 The hold down device shall be capable of exerting sufficient force such that the maximum depth of cut can be safely taken without causing detriment to the vehicle or wheelsets.

4.2.3 The machine shall be provided with axial support rollers to guide and stabilise the wheel set(s) in the axial direction, and to support the wheel set(s) against both axial and lateral forces which are imparted during the cutting operation.

4.3 Gauging

4.3.1 The machine shall be capable of gauging both wheel profiles on both wheels simultaneously.

4.3.2 The profile gauge should measure the wheel tread, back to back, tread gauge, radial run out, wheel wobble, flange height and flange thickness and record the difference between the optimum and actual worn profiles.

4.3.3 The measurements shall be taken both pre and post machining and provision shall be made to display and print out the measured dimensions along with the optimum and actual profiles.

4.3.4 A system for diameter error compensation shall be provided to enable the diameter measurement of damaged/flatted wheels.

4.3.5 The profile gauging system along with the Computer Numerically Controlled (CNC) system shall be capable of automatically establishing the minimum amount of material to be removed to restore the wheelset(s) to the correct profile and a common diameter.

4.4 Tool Slides and Tool Posts

4.4.1 The cutting tool(s) shall be indexable and be capable of being replaced quickly and easily if broken, without requiring the removal of the wheelset(s).

4.4.2 It shall be possible to return the tool post to its pre-selected operating cycle without having to be reset.

4.5 Processing and Conveying Swarf

4.5.1 Provision shall be made to cut/crush the swarf into manageable sized pieces.

4.5.2 The swarf crusher(s) shall be completely interfaced with the machine.

4.5.3 The starting procedure for the crusher(s) shall be staged with the commencement of the conveyor such that "balling" does not occur.

4.5.4 The crusher(s) shall incorporate a reverse motion which shall allow solid objects to be cleared and discharged with the crushed swarf.

4.5.5 The actual control of the crusher(s) (stop, start, reverse) shall be selectable at the operating position.

4.5.6 The crusher(s) shall be interlocked with the conveyor system and guards such that the conveyors are running and safety guard system closed before the crusher(s) can be started. Stopping of the conveyor and opening of the safety guard shall also stop the crusher(s).

4.5.7 The swarf shall be conveyed from the pit area and discharged into a skip adjacent to the lathe pit.

4.5.8 All moving parts of the crusher and conveyor shall be suitably enclosed to prevent operator injury. A swarf guidance system requiring no manual intervention shall be provided.

4.5.9 The conveyor controls located at the operator position shall be provided by the machine supplier and shall as a minimum consist of stop and start buttons and a light to indicate that the conveyor is running.

4.5.10 Machine parts, i.e. hoses, cables etc. shall be suitably protected from the effects of swarf.

4.5.11 Operator swarf guards shall be provided. The swarf guards shall be interlocked with the machine controls such that opening/removal of the swarf guards shall interrupt the machine cycle.

4.5.12 It will be acceptable to use the existing bins for swarf collection. The tenderer shall state in Appendix A if the existing bins are reused and confirm that the reused bins are fully compatible with the proposed system (suitable height and dimension).

4.6 Fume/Dust Extraction

4.6.1 A self-contained dust/fume extraction system to extract airborne pollutants generated by the machining process and discharging them to atmosphere via filtration shall be provided by the machine supplier.

4.6.2 The fume/dust extraction system shall be designed to permit access, egress and turning operations to be completed without requiring removal, refitting or adjustment of the equipment.

4.6.3 The fume/dust extraction system shall be equipped with noise reduction measures.

4.7 Lubrication

- 4.7.1 An adequate system of lubrication shall be provided which caters for the lubrication of all moving parts and prevents contamination.
- 4.7.2 Lubrication points shall be easily accessible and wherever practicable, grouped.
- 4.7.3 Filters, fillers, drain plugs and gauges shall be readily accessible and shall be easily read.
- 4.7.4 Lubrication shall be included in the maintenance documentation.

4.8 Control System

- 4.8.1 The machining process shall be by CNC operation from a console adjacent to the machining area, whilst having safe and complete visibility of the process while needing minimal manual operator intervention.
- 4.8.2 The control system shall incorporate a means for storing records for each measured or machined wheelset. The stored data shall be available in a format suitable for printing, when transferred to another computer at the CMC.
- 4.8.3 The control system shall include an integral menu driven, user friendly, fault diagnostic system to aid the operator in diagnosing a machine failure or malfunction.
- 4.8.4 A facility to manually override the CNC sequence shall be provided
- 4.8.5 The control system shall be capable of storing and machining different wheel profiles to be stored within the software with the facility to enter new profiles if required.
- 4.8.6 The control console shall display the process information in a concise and logical manner. The information shall be displayed in the English or Danish language.
- 4.8.7 Supplementary local controls shall be provided where control and supervision may be necessary during manual operations.
- 4.8.8 Manual operation shall override automatic operation, with any intervention being recorded/indicated on the main control console, i.e. activation of emergency stop(s).

4.9 Remote Monitoring and Data Collection

- 4.9.1 The machine shall enable the future use of measured wheelset data obtained from a remote measuring station and stored in a remote database against each wheelset, bogie or car asset number for wheelset machining planning purposes.
- 4.9.2 A means of accepting this data shall be provided.
- 4.9.3 The control system shall be equipped with a means to transfer stored data to another computer system at the CMC. Data shall be transferrable both online via an Ethernet network connection and offline via a USB stick or similar. The control system shall have the capability to store all data for the wheelsets fitted to the Metroselskabet fleet.

4.10 Data Content and Backup

- 4.10.1 The wheelset data shall be automatically backed up such that data is not lost in the event of a power failure.
- 4.10.2 The data required to be stored shall as a minimum contain:-
- Date
 - Time

- Vehicle No.
- Axle No.
- Machine Operator
- Reason for tyre turning (input by the operator)
- Profile
- Pre turning measurement data
- Post turning measurement data

4.11 Electrical Requirements

4.11.1 All electrical cabinets shall be fitted with Interlock Isolators.

4.11.2 All electrical equipment shall meet the requirements of the Electro Magnetic Compatibility (EMC) Directive, see Table 2.

4.12 Hydraulic Systems

4.12.1 Hydraulic systems shall be designed, manufactured and installed in accordance with DS DS/EN ISO 4413.

4.12.2 Facilities shall be provided to allow the safe release of hydraulic pressure throughout the system to enable maintenance and repairs to be safely carried out.

4.13 Machine Safety

4.13.1 All aspect of the wheel lathe design shall conform to Machinery Directive and meet the requirements of the Provision and use of Work Equipment Regulations 1998, see Table 2

4.13.2 The underfloor wheelset Lathe shall be designed with the operator's position remote from the cutting area, thus preventing injury from contact with hot swarf.

4.13.3 Warning lights and audible warnings where appropriate, shall be provided to indicate the status of equipment/systems during operation and be visible down both sides of the train.

4.13.4 Emergency stop devices shall be provided throughout the installation.

4.13.5 Adequate labelling, in the Danish/English language, shall be provided to clearly indicate the purpose of components and provide suitable warning of the dangers present. Safety signs shall conform to DS DS/EN ISO 7010 and DS DS/ISO 3864-3, see Table 2.

4.13.6 All labels shall be engraved laminate, mechanically fixed to the machine.

4.13.7 The operator's position shall be provided with adequate lighting to aid operator visibility whilst setting up and operating the machine.

4.14 Machine Interfaces and Wheelset Positioning

4.14.1 The supplier shall provide a Vehicle Positioning System which will allow the rolling stock to be loaded into machining position on the wheelset lathe.

4.14.2 The Vehicle Positioning System is to be controlled from the central control location and at floor level.

4.14.3 An interlock shall be provided in the machine control system such that the shunting vehicle/haulage system cannot be operated, either manually or remotely, unless the bridging rails are in the closed position.

4.14.4 The supplier is to provide a cost for a new wheel lathe dedicated vehicle positioning system in its entirety and, as an option, the cost variation of reusing the existing Windhoff road railer and the radio control of this.

5 Installation requirements

5.1 Acceptance

5.1.1 The machine shall be subject to pre delivery inspection at the supplier's premises prior to delivery to site.

5.1.2 The inspection shall review the supplier's factory dimensional and functional testing necessary at to demonstrate compliance with this specification.

5.1.3 Following commissioning on site, final acceptance of the machine shall be awarded on completion of 100 consecutive trouble free and accurate wheelset machine operations.

5.1.4 Repeat tests shall be completed at this stage, checking the machine against the calibration.

5.1.5 Throughout the trouble free machining period the representatives of the supplier shall be in attendance for the initial 16 wheelsets machined thereafter supplier representative shall be able to attend site within 48 hours.

5.2 Disruption to normal depot running

5.2.1 To prevent disruption to normal depot running during the new wheel lathe implementation phase, the supplier shall provide protection from:-

- Dust
- Noise
- Welding
- Flame Cutting
- Disc grinding and cutting

6 Disposal and decommissioning of existing lathe

6.1.1 The supplier shall decommission and remove the existing wheel lathe from depot location.

6.1.2 The supplier shall be responsible for the disposal of the existing wheel lathe.

6.1.3 The existing wheel lathe will become the property of the supplier once it is has been removed.

7 Design Interfaces

7.1.1 The supplier shall clearly define in the tender the electrical service requirements for the machine in terms of its rated power, voltage, number of phases, starting current, full load current and required location of the main isolator.

7.1.2 The supplier shall be responsible for determining the required pit dimensions and the routing of all service ducts, etc.

7.1.3 Any gradients to be incorporated into the pit floor shall be determined by the machine supplier.

7.1.4 The foundation requirements for all equipment, including all dynamic and static load information imposed by the machine and rolling stock shall be provided by the machine supplier.

7.1.5 The transition point between the machine bridging rails and the wheel lathe building running rails shall be clearly defined by the machine supplier along with any alignment details.

7.1.6 Any other service provision requirements shall be clearly defined by the machine supplier in the tender.

8 Maintainability requirements

8.1 Spare Components

8.1.1 The Lathe supplier shall provide a detailed spare parts list incorporating all components that will be required for routine maintenance, planned service maintenance and long term replacement maintenance.

8.2 Machine Accessories

8.2.1 The supplier is to provide a complete set of all tools necessary for the effective servicing and maintenance of the machinery.

8.2.2 The wheelset lathe shall be supplied with sufficient tool tips to enable the commissioning of the machine and the first twelve months of operation (it is expected that 400-600 axels shall be turned per year).

8.2.3 The supplier is to provide a calibration wheelset, for re-calibration of the machine measuring systems and functions.

9 Training requirements

9.1.1 The supplier is to oversee the first two weeks of operation of the lathe and associated machinery.

9.1.2 During this period, the supplier is to provide training for the lathe operators and the maintenance personnel covering the operation and maintenance of the underfloor wheelset lathe.

9.1.3 Manuals providing detailed information are to be provided to enable operators and maintenance staff to be trained and train future personnel.

10 Documentation requirements

10.1.1 Tables 3 and 4 within this specification list all the documentation that shall be supplied by the Lathe supplier as part of the bid and following contract award. Timescales are provided linked to stages of the project.

10.1.2 All documents shall be supplied in the English language and have a controlled document status indicated on them.

10.1.3 User Manuals shall also be supplied in the Danish language as required by the Machinery Directive.

10.1.4 Unless indicated otherwise in the contract documentation, 3 copies of all drawings/documents shall be provided.

10.1.5 A copy of all drawings/documentation shall also be supplied in electronic .pdf format.

10.1.6 Training documentation shall be provided in an electronic format which will allow Metroselskabet to make minor revisions due to future requirements.

Table 3 – Documentation Required At Bid Stage

Document	Timescales
<p>A tender list declaring (from the point of contract award) all moneys required by the supplier stating when required.</p> <p>This tender list must include costs covering:-</p> <ul style="list-style-type: none"> ▪ Removal of the existing lathe and disposal thereof ▪ Supply and installation of the new wheel lathe including all testing and commissioning required ▪ Vehicle movement system operated from lathe pit ▪ Fully inclusive warranty over a period of 24 months ▪ Spare parts which the supplier anticipates will be required over a 12 months operation period after warranty period expires ▪ Training, covering operation and running maintenance to be carried out over a two week period following the delivery and commissioning of the machine <p>The tender list must also state costs for the following options:-</p> <ul style="list-style-type: none"> ▪ The cost reduction of using the existing Windhoff Road Railer in the vehicle positioning system including the Radio control of this feature. ▪ Yearly maintenance for the life of the machine for the first year after commissioning 	Part of the tender document
<p>An outline project / installation project plan incorporating sufficient time for all activities (removal of old machine, civil works (if any), installation of new machine etc.). The project plan shall state the number of working days required for:</p> <ul style="list-style-type: none"> • Decommissioning and removal of the existing lathe • Installation, test and commissioning of the new wheel lathe 	Part of the tender document
<p>Details of lathe interface requirements (see clause 7.1.1 and clause 7.1.6)</p>	Part of the tender document
<p>Details of civil engineering work required to modify the existing lathe pit to accommodate the proposed wheel lathe (notice that the civil works activities will be handled by the Employer).</p> <p>Outline drawing of pit (see clause 3.1.22 and 3.1.23).</p>	Part of the tender document
<p>A list of relevant standards the machine must conform to with a confirmation of compliance.</p>	Part of the tender document
<p>A full description of the machine operation including</p> <ul style="list-style-type: none"> ▪ Screen displays ▪ An explanation of how the machine calculates optimum profile 	Part of the tender document
<p>A list of key performance parameters for the machine including</p> <ul style="list-style-type: none"> ▪ Maximum throughput time per bogie (see clause 3.1.11) ▪ Achievable accuracy (see clause 3.1.9 and 3.1.10) ▪ Information on airborne noise emission (see clause 3.1.20) 	Part of the tender document
<p>A procedure for achieving economical tyre cutting with the proposed lathe</p>	Part of the tender document
<p>A completed Tender Compliance Table (See appendix A).</p>	Part of the tender document

Table 4 – Documentation Required Following Contract Award

Document	Timescales
Pit Dimensional Drawings – fully detailed drawings showing the pit dimensions, civil engineering requirements and positioning of all interfaces	3 months after contract award
General Arrangement Drawings – showing the layout of the machine and all accessories.	3 months after contract award
Updated Project Plan – A detailed programme of work including latest dates for submission of interface information	1 month after contract award
Quality Plan – A plan covering all quality aspects of the machine manufacture, testing, commissioning and final acceptance.	2 month after contract award
Designers Risk Assessment – a risk assessment which identifies all risks associated with the design, manufacture and use of the machine, whether they be to staff, rolling stock or the environment.	2 months after contract award
<p>Operating and Maintenance Manuals – Comprehensive manuals that contain all necessary information relating to:</p> <ul style="list-style-type: none"> • Description of Machine • Safe Use • Operation • Fault Finding • Maintenance • Spare Parts • Supplier Details • Testing and Acceptance • Lubrication 	<p>Draft Manuals – 1 month prior to pre delivery inspection</p> <p>Final Manuals – On delivery of Machine to site</p>
Training Manuals – Manuals providing detailed information to enable customer operators and maintenance staff to be properly trained in the operation and maintenance of the machine	<p>Draft Manuals – 1 month prior to pre delivery inspection</p> <p>Final Manuals – On delivery of Machine to site</p>
Test/Calibration Certificates – Original copies of all testing and calibration certificates for the machine and its components	With O & M Manuals
Spare Parts Lists – List of all recommended spare parts for the machine including supplier details.	3 months after contract award
Paint Specification – The specification shall detail surface preparation and paint finishing procedures.	3 months after contract award
Existing wheel Lathe Removal and Disposal Method Statement – To convey sufficient information to enable the safe isolation, removal and disposal of the existing wheel lathe. Work schedules and any requirements for tools and equipment shall be included.	3 months prior to start on site date.
Updated Installation Method Statement – To convey sufficient information to enable site personnel to offload, install, test and commission the machine correctly and safely. Work schedules and any requirements for tools and equipment shall be included.	3 months prior to start on site date.

Acceptance Testing and Commissioning plans – detailed procedures for the works acceptance and on site testing and commissioning of the machine and its components.	3 months after contract award
As Built Drawings – detailed drawings of the machine incorporating any modifications carried out during the installation and commissioning phase.	1 month after commissioning



Appendix A – Tender Compliance Table

Clause	Description	Supplier Compliant Y/N	Supplier Comments
1.3.1	The lathe supplied is to comply with relevant EU standards. The Machinery Directive and its associated standards are mandatory and take precedence over all others detailed herein.		
1.3.2	It shall be the responsibility of the tenderer to identify all applicable standards, see Tender Compliance Table (Appendix A) and Table 3.		
1.3.3	Two attachments are supplied with this specification showing the location of the existing lathe installation in the Copenhagen Metro CMC (attachments 1 and 2). These documents are known to differ slightly from the installation at the Copenhagen Metro CMC and therefore may be used as a rough guide only. The supplier will be responsible for ensuring that the lathe and supporting equipment supplied will fit and interface with the depot infrastructure. Potential suppliers will be invited to inspect the Copenhagen Metro CMC and take measurements of the pit.		
1.3.4	The supplier will declare if they are compliant to the list of standards in Table 2. This list is not an exhaustive list of necessary requirements. The supplier will be responsible for defining the full scope of standards for compliance.		
1.3.5	The supplier will ensure Danish working environmental rules are followed with regard to the installation of suitable walkways and/or handrails in the area of the lathe.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
1.3.6	A number of drawings are attached for information showing the Metroselskabet passenger vehicle, the motor bogie and the trailer bogie (attachments 3, 4 and 5), the wheel profile currently used and the wheel profile to be used in the future (attachments 6 and 7), track specifications (attachment 8), and the diesel service vehicles and flat beds (attachments 9 to 16). Notice that the wheel lathe also shall be used for re-profiling of the service vehicles in the Metroselskabet fleet.		
2	Scope of work		
2.1	Mandatory Scope		
2.1.1	The new machine shall be installed in the present location of the existing underfloor wheelset lathe.		
2.1.2	The supplier shall provide and fit the new wheel lathe.		
2.1.3	The supplier shall provide details of all civil engineering work and any alteration required to the pit dimensions.		
2.1.4	The supplier will connect the machine to the existing structures and services within the pit.		
2.1.5	The supplier shall propose a method of working which protects the normal day to day maintenance work within the depot from adverse effects of all aspects of the installation.		
2.1.6	The supplier shall decommission, remove and dispose of the existing wheel lathe from the Copenhagen Metroselskabet Depot.		
2.1.7	An all-encompassing project plan geared to minimum lathe down time must be provided.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
2.1.8	The supplier shall deliver training for the Metroselskabet lathe operators and maintenance personnel. This will occur over a two week period following commissioning of the lathe.		
2.1.9	The supplier shall provide a detailed list of required spare parts for the maintenance of the wheel lathe including costs valid for the time of lathe installation.		
2.1.10	The cost of the machine quoted will encompass all spare parts which the supplier anticipates will be required over a 12 months operation period.		
2.1.11	The supplier shall issue a detailed warranty package to cover a period of 24 months all-inclusive warranty.		
2.1.12	Rails are required in front and behind the machine, enabling a vehicle to be easily loaded/unloaded onto the machine. The bridging rails shall conform to UIC 60 rail section.		
2.1.13	Existing handrails for the lathe pit area may be compatible with the installation of the new wheel lathe. If these are to be reused the supplier is to ensure that any new or reused handrails are robust, secure and compatible to the required safety standards.		
2.1.14	Any contracted workforce that is to work in the workshop area must attend a safety induction course held at the Copenhagen Metro Control and Maintenance Centre before commencing any work activities.		
2.2	2.2 Employers Scope		
2.2.1	The Employer will enter into agreement with a civil works contractor that will perform the modifications of the pit, if any modifications are required. The Employer bears the cost for the civil works contractor.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
2.2.2	The Employer will set up a temporary solution for wheel turning during the wheel lathe down time. The Employer will manage all aspects of the temporary solution for wheel turning.		
2.2.3	The final schedule for decommissioning and removal of the existing wheel lathe and installation and commissioning of the new wheel lathe, shall respect the availability of the temporary solution for wheel turning and the availability of the CW contractor.		
3	Performance requirements		
3.1	Mandatory Performance Requirements		
3.1.1	The proposed underfloor wheel re-profiling machine shall be designed to accurately re-profile wheelsets fitted to the Metroselskabet fleet without the need to remove the wheelset from the vehicle.		
3.1.2	The machine shall also be capable of machining wheelsets mounted in an uncoupled bogie and single wheelsets.		
3.1.3	The machining of brake discs is currently not required. It shall however be possible to use the wheel lathe for machining of brake discs in the future, for example by procuring additional hardware and/or software.		
3.1.4	All wheelsets will be to 1435mm track gauge.		
3.1.5	The Wheel lathe shall be capable of re-profiling both wheels of the same axle simultaneously.		
3.1.6	The machine shall be of rigid construction and capable of withstanding static loads in excess of 180kN per axle.		
3.1.7	The design of the machine shall allow for securing, levelling and alignment of the machine on the required foundations within the pit.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
3.1.8	The supplier shall put in place the correct interfacing arrangements between adjacent rails.		
3.1.9	The supplier will state in the tender the maximum depth of cut which may be practically taken in normal operation.		
3.1.10	The supplier will declare in the tender the accuracy achievable in the following list whilst machining the maximum depth of cut. <ul style="list-style-type: none"> • Roundness (true running error). • Lateral Wobble (face true running). • Profile Geometry permissible variation. • Surface Finish. • Maximum diametrical difference across turned wheels of a wheelset. • Maximum Back to Back permissible variation (Measurement taken following machining on an unloaded wheelset). 		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
3.1.11	<p>The supplier will state the maximum throughput time to machine a bogie of two wheelsets, assuming a single cut under a maximum depth of cut.</p> <ul style="list-style-type: none"> • The process will be measured from the point at which the first axle of the bogie comes to rest in the correct location on the lathe for the machine to engage and safely commence the turning process. • Completion will be measured at the point at which the second wheelset of the same bogie has completed the machining process and the engagement device is released to allow the vehicle to move on to the next bogie. • Safe practices must be observed at all time in the machining process. • The bidder may declare any assumptions they have made in the estimate of this time. • Metroselskabet retain the right to confirm the time declared in the tender. 		
3.1.12	The machine shall be equipped with a suitable range of tool feeds and turning speeds to achieve this.		
3.1.13	The machine shall achieve a minimum of 95% availability taking account of maintenance and repair times only. (Available for a full 95 days out of 100 days of operation). Determined by average annually.		
3.1.14	In the worst case, it will be possible to procure spares and repair the lathe within 10 working days.		
3.1.15	The machine shall have a minimum design life of 15 years. Spare parts shall be available for the lifetime of the machine.		
3.1.16	The Wheel Lathe should be designed for the Metroselskabet bogie and wheelset operation and must be fully adapted in its finished and installed form to achieve this.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
3.1.17	The lathe supplied must incorporate all necessary standard systems, air conditioning, hydraulic power and control systems.		
3.1.18	All lathe equipment must fit inside the pit with the exception of the warning lights, the vehicle movement system, the dust extraction collector and the swarf collector for which elements must be outside the pitted environment.		
3.1.19	The fume/dust extraction system shall be equipped with noise reduction measures.		
3.1.20	<p>With regards to section 1.7.4.2 of the Machinery Directive, the supplier will indicate in the tender, the information they anticipate will be provided to satisfy item u (information on airborne noise emissions) and state if this anticipation is supported by:-</p> <ul style="list-style-type: none"> - Previous measurement of a similar system (similar installation) - Previous measurement of an identical system (similar installation) - Or derived by another means. 		
3.1.21	Equipment which is situated outside the pit must not be positioned in a location which will interfere with depot operation.		
3.1.22	The space envelope taken by all equipment must be shown on an outline drawing supplied with the tender.		
3.1.23	This drawing must clearly show the clearance available around equipment in the pit to allow sufficient room for both maintenance and operation.		
3.1.24	The lathe will be designed to apply economic cutting of wheels. The supplier will submit a procedure for achieving economical tyre cutting with the proposed lathe.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
3.1.25	In case of lathe failures that cannot be repaired by local technicians, the supplier shall be able to provide onsite support at Metroselskabets depot within 48 hours. If the failure occurs immediately before a weekend or a bank holiday period, the support shall be onsite the first weekday morning. Onsite support shall be available for the life of the machine. Onsite support activities can be charged according to expenditure (i.e. the cost of the onsite support activities is not a part of the tender).		
4	Functional Requirements		
4.1	Drive Rollers		
4.1.1	Drive rollers shall be provided which shall be capable of lifting and lowering wheelsets from the bridging rails, centring it to the machine and also rotating it for the machining operation.		
4.1.2	The drive rollers shall bear onto the wheel rim tread and incorporate an "anti-slip" facility		
4.1.3	The drive rollers shall be surface hardened and designed to be adjustable, to enable profile irregularities to be accommodated without loss of transmission, torque or profile accuracy.		
4.1.4	It shall be possible to remove the drive rollers for replacement/re-profiling without the need for special tools unless provided.		
4.1.5	An interlock system shall be provided to prevent the bridging rails from being opened or closed unless the wheelset is fully supported by the drive rollers.		
4.1.6	The design of the machine in all of its aspects must be to fail safe in any circumstance.		
4.2	Axle Box Centring and Hold Down		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.2.1	Wheelsets shall be supported and rotated about their axle bearings and the machine shall be capable of restraining them during turning and measuring cycles by means of a powered hold down device.		
4.2.2	The hold down device shall be capable of exerting sufficient force such that the maximum depth of cut can be safely taken without causing detriment to the vehicle or wheelsets.		
4.2.3	The machine shall be provided with axial support rollers to guide and stabilise the wheel set(s) in the axial direction, and to support the wheel set(s) against both axial and lateral forces which are imparted during the cutting operation.		
4.3	Gauging		
4.3.1	The machine shall be capable of gauging both wheel profiles on both wheels simultaneously.		
4.3.2	The profile gauge should measure the wheel tread, back to back, tread gauge, radial run out, wheel wobble, flange height and flange thickness and record the difference between the optimum and actual worn profiles.		
4.3.3	The measurements shall be taken both pre and post machining and provision shall be made to display and print out the measured dimensions along with the optimum and actual profiles.		
4.3.4	A system for diameter error compensation shall be provided to enable the diameter measurement of damaged/flatted wheels.		
4.3.5	The profile gauging system along with the Computer Numerically Controlled (CNC) system shall be capable of automatically establishing the minimum amount of material to be removed to restore the wheelset(s) to the correct profile and a common diameter.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.4	Tool Slides and Tool Posts		
4.4.1	The cutting tool(s) shall be indexable and be capable of being replaced quickly and easily if broken, without requiring the removal of the wheelset(s).		
4.4.2	It shall be possible to return the tool post to its pre-selected operating cycle without having to be reset.		
4.5	Processing and Conveying Swarf		
4.5.1	Provision shall be made to cut/crush the swarf into manageable sized pieces.		
4.5.2	The swarf crusher(s) shall be completely interfaced with the machine.		
4.5.3	The starting procedure for the crusher(s) shall be staged with the commencement of the conveyor such that "balling" does not occur.		
4.5.4	The crusher(s) shall incorporate a reverse motion which shall allow solid objects to be cleared and discharged with the crushed swarf.		
4.5.5	The actual control of the crusher(s) (stop, start, reverse) shall be selectable at the operating position.		
4.5.6	The crusher(s) shall be interlocked with the conveyor system and guards such that the conveyors are running and safety guard system closed before the crusher(s) can be started. Stopping of the conveyor and opening of the safety guard shall also stop the crusher(s).		
4.5.7	The swarf shall be conveyed from the pit area and discharged into a skip adjacent to the lathe pit.		
4.5.8	All moving parts of the crusher and conveyor shall be suitably enclosed to prevent operator injury. A swarf guidance system requiring no manual intervention shall be provided.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.5.9	The conveyor controls located at the operator position shall be provided by the machine supplier and shall as a minimum consist of stop and start buttons and a light to indicate that the conveyor is running.		
4.5.10	Machine parts, i.e. hoses, cables etc. shall be suitably protected from the effects of swarf.		
4.5.11	Operator swarf guards shall be provided. The swarf guards shall be interlocked with the machine controls such that opening/removal of the swarf guards shall interrupt the machine cycle.		
4.5.12	It will be acceptable to use the existing bins for swarf collection. The tenderer shall state in Appendix A if the existing bins are reused and confirm that the reused bins are fully compatible with the proposed system (suitable height and dimension).		
4.6	Fume/Dust Extraction		
4.6.1	A self-contained dust/fume extraction system to extract airborne pollutants generated by the machining process and discharging them to atmosphere via filtration shall be provided by the machine supplier.		
4.6.2	The fume/dust extraction system shall be designed to permit access, egress and turning operations to be completed without requiring removal, refitting or adjustment of the equipment.		
4.6.3	The fume/dust extraction system shall be equipped with noise reduction measures.		
4.7	Lubrication		
4.7.1	An adequate system of lubrication shall be provided which caters for the lubrication of all moving parts and prevents contamination.		
4.7.2	Lubrication points shall be easily accessible and wherever practicable, grouped.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.7.3	Filters, fillers, drain plugs and gauges shall be readily accessible and shall be easily read.		
4.7.4	Lubrication shall be included in the maintenance documentation.		
4.8	Control System		
4.8.1	The machining process shall be by CNC operation from a console adjacent to the machining area, whilst having safe and complete visibility of the process while needing minimal manual operator intervention.		
4.8.2	The control system shall incorporate a means for storing records for each measured or machined wheelset. The stored data shall be available in a format suitable for printing, when transferred to another computer at the CMC.		
4.8.3	The control system shall include an integral menu driven, user friendly, fault diagnostic system to aid the operator in diagnosing a machine failure or malfunction.		
4.8.4	A facility to manually override the CNC sequence shall be provided		
4.8.5	The control system shall be capable of storing and machining different wheel profiles to be stored within the software with the facility to enter new profiles if required.		
4.8.6	The control console shall display the process information in a concise and logical manner. The information shall be displayed in the English or Danish language.		
4.8.7	Supplementary local controls shall be provided where control and supervision may be necessary during manual operations.		
4.8.8	Manual operation shall override automatic operation, with any intervention being recorded/indicated on the main control console, i.e. activation of emergency stop(s).		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.9	Remote Monitoring and Data Collection		
4.9.1	The machine shall enable the future use of measured wheelset data obtained from a remote measuring station and stored in a remote database against each wheelset, bogie or car asset number for wheelset machining planning purposes.		
4.9.2	A means of accepting this data shall be provided.		
4.9.3	The control system shall be equipped with a means to transfer stored data to another computer system at the CMC. Data shall be transferrable both online via an Ethernet network connection and offline via a USB stick or similar. The control system shall have the capability to store all data for the wheelsets fitted to the Metroselskabet fleet.		
4.10	Data Content and Backup		
4.10.1	The wheelset data shall be automatically backed up such that data is not lost in the event of a power failure.		
4.10.2	The data required to be stored shall as a minimum contain:- <ul style="list-style-type: none"> • Date • Time • Vehicle No. • Axle No. • Machine Operator • Reason for tyre turning (input by the operator) • Profile • Pre turning measurement data • Post turning measurement data 		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.11	Electrical Requirements		
4.11.1	All electrical cabinets shall be fitted with Interlock Isolators.		
4.11.2	All electrical equipment shall meet the requirements of the Electro Magnetic Compatibility (EMC) Directive, see Table 2.		
4.12	Hydraulic Systems		
4.12.1	Hydraulic systems shall be designed, manufactured and installed in accordance with DS DS/EN ISO 4413.		
4.12.2	Facilities shall be provided to allow the safe release of hydraulic pressure throughout the system to enable maintenance and repairs to be safely carried out.		
4.13	Machine Safety		
4.13.1	All aspect of the wheel lathe design shall conform to Machinery Directive and meet the requirements of the Provision and use of Work Equipment Regulations 1998, see Table 2.		
4.13.2	The underfloor wheelset Lathe shall be designed with the operator's position remote from the cutting area, thus preventing injury from contact with hot swarf.		
4.13.3	Warning lights and audible warnings where appropriate, shall be provided to indicate the status of equipment/systems during operation and be visible down both sides of the train.		
4.13.4	Emergency stop devices shall be provided throughout the installation.		
4.13.5	Adequate labelling, in the Danish/English language, shall be provided to clearly indicate the purpose of components and provide suitable warning of the dangers present. Safety signs shall conform to DS DS/EN ISO 7010 and DS DS/ISO 3864-3, see Table 2.		
4.13.6	All labels shall be engraved laminate, mechanically fixed to the machine.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
4.13.7	The operator's position shall be provided with adequate lighting to aid operator visibility whilst setting up and operating the machine.		
4.14	Machine Interfaces and Wheelset Positioning		
4.14.1	The supplier shall provide a Vehicle Positioning System which will allow the rolling stock to be loaded into machining position on the wheelset lathe.		
4.14.2	The Vehicle Positioning System is to be controlled from the central control location and at floor level.		
4.14.3	An interlock shall be provided in the machine control system such that the shunting vehicle/haulage system cannot be operated, either manually or remotely, unless the bridging rails are in the closed position.		
4.14.4	The supplier is to provide a cost for a new wheel lathe dedicated vehicle positioning system in its entirety and, as an option, the cost variation of reusing the existing Windhoff road railer and the radio control of this.		
5	Installation requirements		
5.1	Acceptance		
5.1.1	The machine shall be subject to pre delivery inspection at the supplier's premises prior to delivery to site.		
5.1.2	The inspection shall review the supplier's factory dimensional and functional testing necessary at to demonstrate compliance with this specification.		
5.1.3	Following commissioning on site, final acceptance of the machine shall be awarded on completion of 100 consecutive trouble free and accurate wheelset machine operations.		
5.1.4	Repeat tests shall be completed at this stage, checking the machine against the calibration.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
5.1.5	Throughout the trouble free machining period the representatives of the supplier shall be in attendance for the initial 16 wheelsets machined thereafter supplier representative shall be able to attend site within 48 hours.		
5.2	Disruption to normal depot running		
5.2.1	To prevent disruption to normal depot running during the new wheel lathe implementation phase, the supplier shall provide protection from:- <ul style="list-style-type: none"> - Dust - Noise - Welding - Flame Cutting - Disc grinding and cutting 		
6	Disposal and decommissioning of existing lathe		
6.1.1	The supplier shall decommission and remove the existing wheel lathe from depot location.		
6.1.2	The supplier shall be responsible for the disposal of the existing wheel lathe.		
6.1.3	The existing wheel lathe will become the property of the supplier once it is has been removed.		
7	Design Interfaces		
7.1.1	The supplier shall clearly define in the tender the electrical service requirements for the machine in terms of its rated power, voltage, number of phases, starting current, full load current and required location of the main isolator.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
7.1.2	The supplier shall be responsible for determining the required pit dimensions and the routing of all service ducts, etc.		
7.1.3	Any gradients to be incorporated into the pit floor shall be determined by the machine supplier.		
7.1.4	The foundation requirements for all equipment, including all dynamic and static load information imposed by the machine and rolling stock shall be provided by the machine supplier.		
7.1.5	The transition point between the machine bridging rails and the wheel lathe building running rails shall be clearly defined by the machine supplier along with any alignment details.		
7.1.6	Any other service provision requirements shall be clearly defined by the machine supplier in the tender.		
8	Maintainability requirements		
8.1	Spare Components		
8.1.1	The Lathe supplier shall provide a detailed spare parts list incorporating all components that will be required for routine maintenance, planned service maintenance and long term replacement maintenance.		
8.2	Machine Accessories		
8.2.1	The supplier is to provide a complete set of all tools necessary for the effective servicing and maintenance of the machinery.		
8.2.2	The wheelset lathe shall be supplied with sufficient tool tips to enable the commissioning of the machine and the first twelve months of operation (it is expected that 400-600 axels shall be turned per year).		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
8.2.3	The supplier is to provide a calibration wheelset, for re-calibration of the machine measuring systems and functions.		
9	Training requirements		
9.1.1	The supplier is to oversee the first two weeks of operation of the lathe and associated machinery.		
9.1.2	During this period, the supplier is to provide training for the lathe operators and the maintenance personnel covering the operation and maintenance of the underfloor wheelset lathe.		
9.1.3	Manuals providing detailed information are to be provided to enable operators and maintenance staff to be trained and train future personnel.		
10	Documentation requirements		
10.1.1	Tables 3 and 4 within this specification list all the documentation that shall be supplied by the Lathe supplier as part of the bid and following contract award. Timescales are provided linked to stages of the project.		
10.1.2	All documents shall be supplied in the English language and have a controlled document status indicated on them.		
10.1.3	User Manuals shall also be supplied in the Danish language as required by the Machinery Directive.		
10.1.4	Unless indicated otherwise in the contract documentation, 3 copies of all drawings/documents shall be provided.		
10.1.5	A copy of all drawings/documentation shall also be supplied in electronic .pdf format.		

Clause	Description	Supplier Compliant Y/N	Supplier Comments
10.1.6	Training documentation shall be provided in an electronic format which will allow Metroselskabet to make minor revisions due to future requirements.		