

Specification

T0443

Manual grinding of rail

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1 Purpose

The purpose of this document is to define the process and requirements of undertaking manual grinding and re-profiling of plain rail, expansion switches and points and crossings on LU track assets. This document also specifies the method for carrying out manual grinding and measurement of works that have been carried out.

2 Scope

- 2.1 Manual grinding of rails covered by this document involves the utilisation of hand held grinding equipment and manual fully supported rail-mounted, petrol, diesel or electric, grinding machines.
- 2.2 This document applies to all track in running lines, depots and sidings.
- 2.3 This document applies to all rails in plain line and P&C, including expansion and adjustment switches and crossings. Where grinding is to be carried out in association with the provisions of standard S1176, reference is made to that standard.
- 2.4 This document excludes the rail grinding associated with the following, which are covered by the specifications quoted:
 - a) manual metal arc rail repairs in plain line, switches and crossings (T0436);
 - b) aluminothermic welding (T0432);
 - c) flash butt welding (T0431);
 - d) conductor rail welding (T0433);
 - e) train-borne grinding (T0439).

3 Requirements

3.1 Person in Charge of grinding

All grinding shall be supervised by the Grinding Supervisory Manager (GSM) who on completion of the works shall complete the appropriate forms and documentation and identify any follow up works that may need to be completed.

3.2 Grinding of P&C and plain line – general

- 3.2.1 Manual grinding of stocks and switches, crossings, plain line including expansion switches is aimed primarily at the treatment of rolling contact fatigue (RCF) and to reinstate rail profile in switches and crossings following initial installation during the establishment of work hardened surfaces. It may also be used to remove rail lipping on the gauge face or field side, and to create a snipe cut on switch blades where this has not been provided at the time of manufacture.
- 3.2.2 Manual grinding can be used successfully over short isolated lengths of plain rail, depending on the severity of the RCF and the shift length available for the grinding

operations. Locations requiring more than one shift to complete shall be split into manageable shorter lengths and the most severe area tackled first.

3.2.3 The removal of rail lipping over extended lengths may be justifiable depending on the severity of the lipping and thereby the relative costs for grinding or re-railing.

3.2.4 Longer lengths of rail affected by RCF are generally ground using a train-borne grinder, which is not covered within this document.

3.3 Overall process

3.3.1 Identification of rail defects

Rail defects that require repair using grinding may be identified in various ways:

- a) routine PM4 inspection;
- b) routine PM3 inspection;
- c) identified by patroller and verified by ultrasonic rail testing;
- d) routine ultrasonic and magnetic flux interference rail testing;
- e) inspection & repair to reduce the risk of derailment at switches (S1176);
- f) Cast crossing and cast vee inspections (S1175).

3.3.2 Preliminary site survey

All sites requiring manual grinding shall be visited by a Grinding Verifier and other competent person(s) to:

- a) establish suitability and extent of assets to be manually re-profiled;
- b) identify any assets that require repair prior to the grinding works;
- c) assess any risks to be mitigated before allowing hot works to take place;
- d) decide the amount and type of resources required to complete the task in an economic and timely manner.

3.3.3 Completion of manual grinding works

The scoping and delivery of all manual grinding works shall be managed by the Grinding Verifier utilising only LU's approved grinding teams, equipment, gauges and materials. The completion of accurate records pertaining to the scope of the work, actual work completed and identification of any further follow up works are essential.

3.4 Methodology

3.4.1 Preliminary site survey

Prior to any grinding works taking place the site shall be visited and the area surveyed and assessed by the Grinding Verifier.

3.4.2 Maximo/Ellipse Work Order process

3.4.2.1 Switches

PM4 Inspector	Measures the wear on the stock and switches and records this on the report form for action as appropriate. If wear/damage is noted the PM4 inspector requests a more detailed S1176 inspection. A child work order is created in Maximo/Ellipse to initiate an S1176 inspection.
S1176 Inspector	Carries out a detailed switch inspection. Identifies any repairs or follow up process for remedial action. Inspection work order closed with inspection form attached and a child work order created for remedial action if required.
Grinding Verifier	Inspects the site to be treated, to determine and verify the extent of grinding required and the number of shifts required to complete the repair.
Grinding Supervisory Manager	Supervises the grinding works. Carries out an inspection on completion of work to ensure that the works are in compliance with standards, and confirms to the T002/3 hand-back that the track is in a safe condition and fit for traffic. Work order closed with all relevant manual grinding forms and final S1176 inspection report attached.
Grinding Verifier	Carries out a post works inspection within the dictated timescales referenced within S1176 to confirm that the grinding works are completed in accordance with the requirements of this document and that the appropriate rail profiles have been achieved.

3.4.2.2 Crossings

PM4 Inspector/ Ultrasonic Operator	Identifies any defects that require manual grinding within the crossing area and records this on the report form for action as appropriate. A child work order is created in Maximo/Ellipse to initiate a follow up inspection to be carried out by the Grinding Verifier.
Grinding Verifier	Inspects the site to be treated and carries out a detailed inspection of the affected area, identifies any repairs or follow up process for remedial action, to determine and verify the extent of grinding required and the number of shifts required to complete the repair.

Grinding Supervisory Manager	Supervises the grinding works. Carries out an inspection on completion of work to ensure that the works are in compliance with standards, and confirms to the T002/3 hand-back that the track is in a safe condition and fit for traffic. Work order closed with all relevant manual grinding forms attached.
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Grinding Verifier	Carries out a post works inspection within 7 working days to confirm that the grinding works are completed in accordance with the requirements of this document and that the appropriate rail profiles have been achieved.
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3.4.2.3 Plain Line & Expansion Switches, Including Plain Rails in P&C

Patrolman, PM3 Inspector, Ultrasonic Operator	Identifies any defects that require manual grinding at a location and records this on the report form for action as appropriate. A child work order is created in Maximo/Ellipse to initiate a follow up inspection to be carried out by the Grinding Verifier.
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Grinding Verifier	Inspects the site to be treated and carries out a detailed inspection of the affected area, identifies any repairs or follow up process for remedial action, to determine and verify the extent of grinding required and the number of shifts required to complete the repair.
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Grinding Supervisory Manager	Supervises the grinding works. Carries out an inspection on completion of work to ensure that the works are in compliance with standards, and confirms to the T002/3 hand-back that the track is in a safe condition and fit for traffic. Work order closed with all relevant manual grinding forms attached.
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Grinding Verifier	Carries out a post works inspection within 7 working days to confirm that the grinding works are completed in accordance with the requirements of this document and that the appropriate rail profiles have been achieved.
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3.4.3 Survey Information

The survey shall establish the extent of the work required both in terms of grinding and any maintenance work required in order to make grinding more effective. The following shall be identified during the site visit to determine what preparatory work, if any, needs to be completed and if grinding can actually be carried out:

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- a) general track condition: - top and line, any loose fastenings, defective/worn components, ballast condition, sleeper support, grease to be removed and protection of plastic dry slides if present;
- b) track gauge;
- c) 2m and 10m twist;
- d) rail depth;
- e) profile of the rail head and extent of any rail head side wear;
- f) wear of switches (if applicable);
- g) severity of cracks in the rail (to determine whether grinding can actually take place);
- h) whether or not lipping is present (lipping will need to be removed before NDT can take place);
- i) the extent of grinding works required and the estimated time it will take to complete the works, ensuring that work planned for each shift can be safely completed and enable the line to be opened for traffic;
- j) any site features that require additional track or signal support.

3.4.4 Grinding limits

The Grinding Verifier shall confirm that the site is suitable for rail grinding and establish the following:

- a) existing track gauge and the effect of removing any rail lipping;
- b) side wear readings throughout the site and the effect any grinding will have on track gauge;
- c) any 2m and 10m twist and the effect that rail head grinding may have on the dynamic twist values;
- d) existing rail depth and maximum depth of rail permitted to be removed by grinding;

Note: Rail grinding is not permitted within 9m of any fish-plated joints where the rail head loss reading due to side wear is 9 or lower (NR4 side wear gauge & rail depth gauge)

3.4.5 Grinding works

Grinding of plain line, expansion switches and points and crossings shall be carried out as detailed below:

- a) Remove all rail lipping from the area which is to be treated and undertake non-destructive testing to determine the crack size and their location. Note that for