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ERL MAINTENANCE SUPPORT SDN BHD

(Company No. 498574-T)

E-MAS

Effective Railway Operations; Reliable System Maintenance

ROLLING STOCK DEPARTMENT

IN-HOUSE TECHNICAL INSTRUCTION

ACTION FOR ATTENDING SCRATCHED AXLE

R00.OMR.M91120.BT.0006.B

Release

Released:	Norazman	RST HOD	26.05.16	
Checked:	Mohamad	RST QEMR	26-05-16	
Author:	Mohd Nurul	RST Tech. Exec.	26.05.16	
	Name	**Dept./Position**	**Date**	**Signature**

Amendments or additions to this procedure must be indicated with a vertical black line in the adjacent left margin.

Change Record and Configuration Control

Revision	Date	Modification	Name
B	26-May-16	Updated to new RST Technical Instruction template and updated all the superseded reference documents. The main contents are remain unchanged	Mohd Nurul
A	24-Mar-08	New - to supersede the existing procedure, (DOCS ref. no. R00.OMR.M90001.PJ.0001.A) in order to comply with the current company requirement and overall contains of previous procedure have been revised	Roslan

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1 Purpose

This technical instruction is to describe the action to be taken if scratched axles are identified. This document is established based on Action for Attending Scratched Axles Memo, OMN.OMR.M90001.0001.A, refer to Attachment 1.

2 Scope, Distribution and Access

This technical instruction is applicable all RST personnel who are involve directly or indirectly in managing or attending the scratched axle. The distribution and access shall be available for all RST and could be viewed and retrieved via EDMS and RST Portal [http://express50/ E-MAS_Portal/RST.html]. The hardcopy of this procedure is available in RST foreman room for reference. The full access for editing this document is only granted to RST MGT.

3 Action for Attending Scratched Axle

Once the scratches found or identified on the axle journal the actions as outlined in the sub-sections herewith shall be taken in order to ensure the train safety.

3.1 Ultrasonic Inspection

Once the scratched axle is identified, an additional scheduled ultrasonic inspection to be carried out in accordance with Management of Non-Destructive Test (NDT), R00.OMR.M91121.QP.1001.*.

The inspection shall be conducted on every 300,000 Km intervals. The purpose of this test is to reveal any crack growth from the scratches of the axles. The monitoring and record of the inspection is available in \\Express66\rst\RST Maintenance Monitoring & Records\LM Monitoring & Records\NDT Monitoring & Record\NDT Monitoring & Record.xls.

3.2 Removal of Axles from Service

Irrespective of the length of any cracks detected, the said axle must be removed immediately from service and scrapped accordingly. The scrapped axles must be clearly marked to prevent from further use.

All axle history is recorded in \\Express66\rst\RST Maintenance Monitoring & Records\LM Monitoring & Records\NDT Monitoring & Record\NDT Monitoring & Record.xls.

3.3 Handling of Inner Bearing Ring

All removed inner-bearing rings shall be visually checked for signs of scratches. Scratched inner bearing rings must be discarded.

Light scars that can be removed with fine emery cloth shall be reused, unless they have reached the estimated useful life as mentioned in the manufacturer manual.

All removed bearing units must be oiled and packed with suitable oil paper or PE film to prevent corrosion from setting in.

New inner bearing ring is allowable to be fitted on the scratched axles.

For Dismounting & Mounting Wheel-Set Inner Ring, refer to technical instruction Dismounting & Mounting Wheel-Set Inner Ring, R00.OMR.M91120.BT.0005*.

3.4 Repair of the Scratched Axles

The scratched axle shall be repaired in accordance with Maintenance Manual for Power & Trailer Wheelset – Subsidiary Proposal, G00.OMR.M91120.PG.0006.A, refer to Attachment 2.

Appendices

Appendix 1 - Management of Non-Destructive Test (NDT), [R00.OMR.M91121.QP.1001.*]

Appendix 2 - Dismounting & Mounting Wheel-Set Inner Ring [R00.OMR.M91120.BT.0005.*]

Attachments

Attachment 1 - Memorandum of Action for Attending Scratched Axles [OMN.OMR.M90001.0001.A]

Attachment 2 - Maintenance Manual for Power & Trailer Wheelset – Subsidiary Proposal [G00.OMR.M91120.PG.0006.A]

Attachment 1

ERL Maintenance Support Sdn Bhd

(Company No. 498574-T)

E-MAS
Your Railway Operations & Maintenance Specialist

MEMORANDUM

To: Md Jamil Alias, OMR	Originator:	Ham MW
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Reference Number:
OMN.OMR.M90001.0001.A

Date:
6-Dec-04

☐ Urgent	☐ Review	☐ Comment	☐ Reply	☐ Retain
☒ Action	☐ Info	☐ Note	☐ Call me	☐ Sign & Return

Attachment(s): ☒ None ☐ As listed below

Action for Attending Scratched Axles

Following our e-mail dated 27 October to Mr Merensky of Siemens TS TR, the following action is to be taken with immediate effect:

The scratched axles will remain in service, unless scheduled inspection reveals crack growth from the scratches.

UT Inspection

The usual UT inspection is done on every T4, on top of this, an additional UT procedure to check the crack growth on every scratched axle based on DB standard procedure 907 02 01 is to be implemented at an interval of 300,000km.

The procedure is currently being worked out by Mr Fred Sonderman (as commissioned by E-MAS), once it is completed and the necessary training has been conducted, all trains shall receive the additional UT scan during the next T4 as the initial inspection.

Mr Sonderman shall also identify additional equipment for the additional UT scan. These shall be procured immediately by E-MAS.

Wheel Changing

Wheel Changing shall be continued with whatever appropriate tools for the removal of the inner bearing ring that E-MAS have. They include the Aluminium heating ring, the puller and other approved type of removal method. Inner bearing ring removed from axle shall be inspected for cracks prior to refitting. This can be done using either liquid dye penetrant or magnetic particle inspection. Scratched inner ring with no sign of crack growth shall be re-used until the trains have reached 3million km mileage.

ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Attachment 2

This document describes subsidiary proposals for the original

"Maintenance Manual for Power and Trailer Wheelsets

Diameter 850

DESIRO ET 425 M"

Originally issued by

Bonatrans a.s.

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Issue No. 5
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Issued by Dept. of Technical Director

Contents:

Issued by

Dr. Martin Gumbiowski

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GOO. OMR. MQ1120.PG.0006.A
#131337

1. Removal of Surface Damages

In regular intervals the axles should be visually inspected with respect to damages of the corrosions protection paint, corrosion or notches.

After exceptional events (e.g. any kind of train accident, derailment) power and trailer axles should be inspected immediately. The extent of this inspection should be determined by the authority considering the damage symptoms.

Transport damages caused by a fork lift, inadmissible lifting tools like steel cables etc. are not allowed and are to be removed professionally. Within the repaired area the paint layer is to be renewed according to the maintenance manual.

During the rework of the axle surface care should be taken that no temperatures arise, which lead to material modifications. Due to this fact surface coloring, e.g. blue-coloring, is prohibited.

After the rework will be finished, the repaired area is to be checked with respect to any remaining surface cracks by using the magnetic particle test method (MT). The rework limits are to be defined by the working limit of the axles, which are to be defined by the wheel set manufacturer.

For any type of repair of the axle shaft, the axle is subdivided into 2 parts. Zone 1 is the area within 50 mm in the vicinity of an axle seat, whereas zone 2 is defined as the remaining part of the axle shaft. Any damages in zone 1 are to be removed by using a lathe. During the machining the original contour of the axle re-established. This is valid for the transition radii, permitted form deviations as well as for the surface roughness.
The minimum diameter of the axle shaft has to be taken into account.

Local damages like notches and/or corrosion in zone 2 can be removed by using a mobile grinding device. The maximum depth for the local rework is given by the difference between the actual diameter of the axle shaft and the minimum allowed (design) diameter, but in no case more than 1 mm. In the case that the difference between the actual diameter and the minimum diameter will be less than 1 mm, this value has to be chosen.

Example for the power axle:

Design diameter	165 mm	
Tolerance	+2 mm	
Actual diameter	165.6 mm	
Minimum diameter	164 mm	
Difference	1.6 mm	
Permissible depth of repair	1.0 mm	(see context above)

The grinding operation should be carried out in axial direction. The radius R of the local repair should be greater than 75 mm. No sharp edges should remain between axle shaft and reworked area. The permissible surface roughness is Ra 1.6 µm.

Circumferential damages (e.g. grooves) in zone 2 can be removed by circumferential machining on a lathe. In case of circumferential grooves the maximum depth is the half of the difference between actual diameter and minimum diameter of the axle shaft, but max. 1 mm.

Example for the power axle:

Design diameter	165 mm	
Tolerance	+2 mm	
Actual diameter	165.6 mm	
Minimum diameter	164 mm	
Difference	1.6 mm	
Permissible depth of repair	0.8 mm	(see context above)

In the case of **corrosion protection damages**, paint layer is damaged only, whereas the axle material is not damaged. In order to check the axle surface of such an area a magnification glass (magnification in the range of 4 – 10) should be used.

In order to remove **light corrosion** and/or **loose paint** from the axle surface a Roloc Brittle Disc of 3M can be used, which will shorten the repair time significantly.

Figure 1: Definition of repair zones

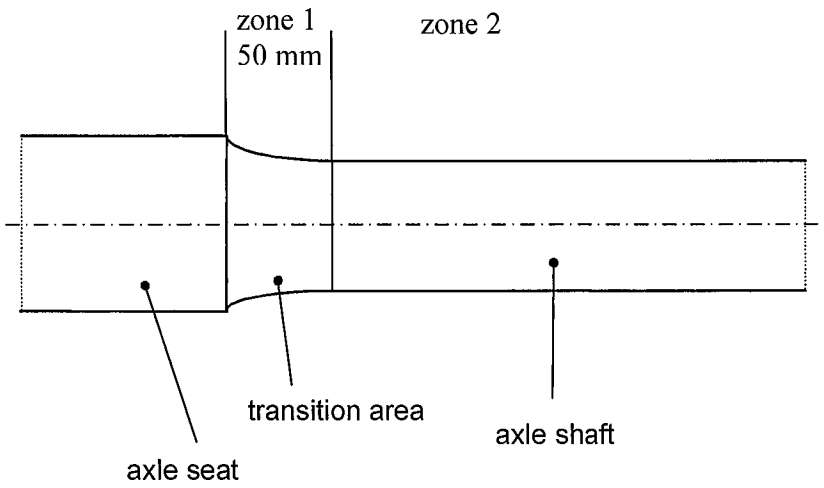
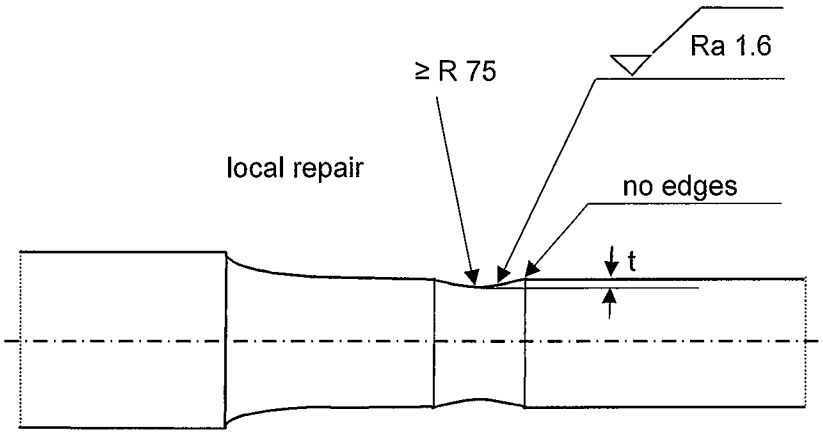


Figure 2: Summary of repair activities



t = maximum depth

2. Dimensional Limits of the Axle

Table 1: Run out limit of the axle

Run out of the axle shaft	delivery state / mm	maximum value for axles in service / mm
power axle drawing No. D11-2-00553	0.5	0.8
trailer axle drawing No. D11-2-00552	0.5	1.0

Minimum diameters of axle seats and axle shafts are to be calculated by the wheel set manufacturer.

3. Protection against Corrosion

1. Repair of the axle in service

- Alkyd-resin single layer paint, dry layer thickness ≥ 60 µm
In case that a paint brush will be used for manual work, it will be necessary to paint the area twice so that the minimum layer thickness will be reached. It will also be necessary to paint in axial direction of the axle in order to prevent the repaired area from UT indications, which could otherwise be caused by the paint.

- Oil wax (Tectyl or similar products can be used) in case of metallic shiny areas at fresh axles damages and/or loose paint for a temporary protection. This protection type should be used when there will be not enough time for paint repair.
As oil wax protectors Tectyl 846 could be used. Tectyl 132 will be usable for longer time periods also, but increases the risk of UT indications during in service measurements.

2. New paint layer, wheel set preferably dismounted, e.g. wheel exchange

a) corrosion protection according to Bonatrans manual
b) single layer paint as defined under topic 1, but containing a dry layer thickness of ≥ 100 µm instead of 60 µm. In this case the paint should be sprayed onto the axle surface.

3. Surface preparation

before paint will be applied the axle surface should be cleaned. Due to the high average overall temperature of about 30° C an organic solvent might by ineffective due to the normally high vapor pressure of the agent. Instead an aqueous cleanser should be used. In order to protect the surface against corrosion after cleaning, a neutral or alkaline (pH 9-12) cleaning agent should be used. Before using any type of cleaner it should be ensured by investigation that all usual impurities will be completely removed. After cleaning the surface should be rinsed by using preferably desalted water. Cleaning agent and desalted water should be heated to 35 – 50 °C.
In order to remove any type of humidity direct before starting the painting procedure, the surface should be cleaned by using a lint-free cloth and acetone.
The time interval between cleaning and painting should not be greater than 3 hours.

4. Additional Remarks to the Maintenance Intervals for the Axle

Table 2: Definition of maintenance intervals according to chapter 6 of Bonatrans manual

Mileage / Tkm	Time period	Designation of the maintenance interval
50	2 months	S1
150	4 months	S2
300	12 months	R1
600	24 months	R2
1200	48 months	MR
wheel exchange	depending on fatigue state	WE

Table 3: Maintenance activities for the axle (in addition to the Bonatrans manual)

Component	Interval						Activity
	S1	S2	R1	R2	MR	WE	
Wheel Set (axle in service)	X	X	X	X	X	X	Visual inspection and maintenance of the corrosion protection system of the axle. In the case that care of the paint system is not possible due to the lack of time maintenance should be carried out in the next time interval
Axle						X	Ultra sonic testing (UT), latest at wheel exchange. In the case of UT indications the interval has to be shortened.
						X	Visual Inspection of surface damages at bearing seats, press seats etc. and machining if necessary
						X	Magnetic testing (MT) of machined surfaces.
						X	Measurement of the radial run out of

							the axle, diameter and cylinder form of the bearing seats
						X	Visual inspection of the centre bores. In case of necessary machining operation on the axle it could be necessary to re-center the bore