



OTR Rim Certification, Inc.

Onsite OTR Rim Inspection & Certification™

**OTR Wheel & Rim Certification On-Site
Haulage & Loading 2015 Presentation**

By

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OTR Rim Certification, Inc.
Onsite OTR Rim Inspection & Certification™

OTR Wheel Accident

25 inch 3 pc loader
wheel with
catastrophic
failure /separation
of the Back
section/Flange
from its base



The separated
Back/flange section



Why did this
occur?

Failure to conduct a
comprehensive inspection of
the OTR Wheel Assembly using established
examination criteria

Introduction

www.otrimcert.com

OTR Rim Certification, Inc.
Onsite OTR Rim Inspection & Certification™

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OTR Rim Certification Services

- We provide third party on-site NDT inspection and certification services for OTR wheel and rim components.
- With our program, products, which are fit for service, stay in service. Products deemed repairable and of service value are shipped offsite. Products, which fail inspection, are removed from service and replaced.
- Inspections at site are vital for OTR Wheel and Rim management and cost savings. Overall, reducing the cost to the end user and simplifying logistics.

Safety

- A rim and its components act in the same manner as a pressure vessel. The release of large quantities of energy in an uncontrolled manner poses risk to nearby personnel and property.
- The effects of rim assembly components, where there is metal to metal contact, can create cracking and pitting, leading to failure. Disintegrated pieces of the rim assembly have been thrown considerable distances.
- On a number of occasions, OTR wheels have suffered failures worldwide. To minimize this element of risk, inspections and certifications are considered necessary.

The Inspection Process



Phase One: Cleaning and Staging

- Products are washed prior to inspection to remove dirt, grease and other foreign materials. No sand blasting is required. All valve hardware should be removed.
- An area on site should be designated for inspection.
- Once on site, products will be staged for inspection. If necessary, any additional cleaning and prep work will be preformed.

Phase Two: The Inspection

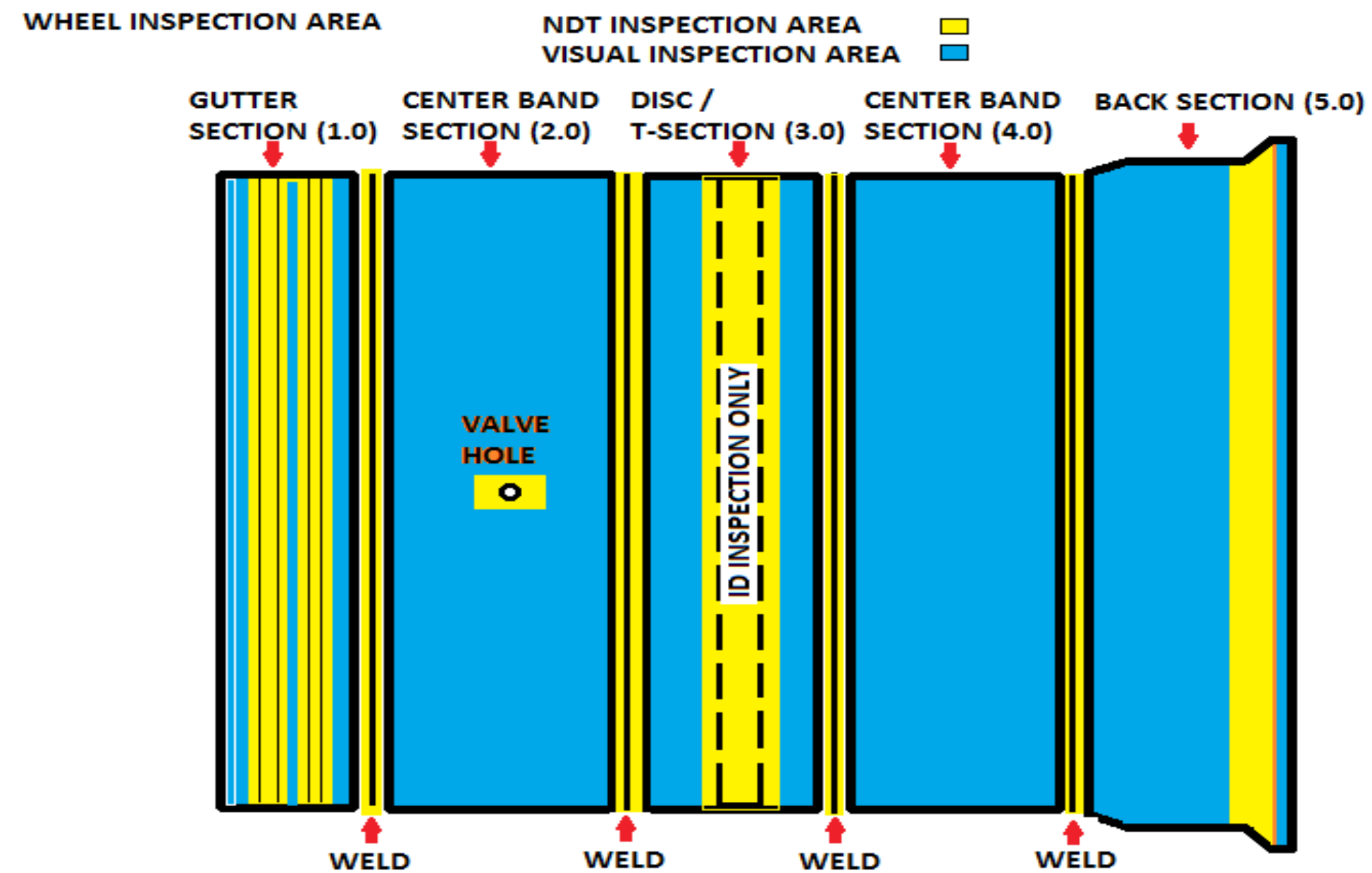
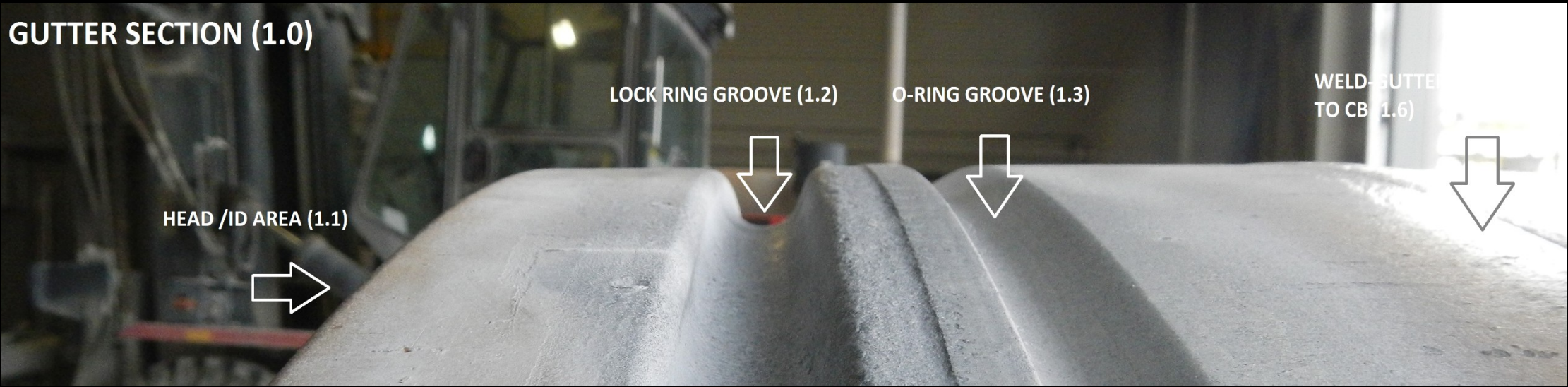


Figure 1: Inspection Diagram

NDT inspection method

- ACFM/ alternating current field measurement under ASTM E2261
- Traditional (MPI) magnetic particle inspection under ASTM E1444 to provide a visual medium for documentation
- Both of these methods are electromagnetic and are recognized worldwide
- Criteria for a defect is the same as within appendix B of Australian Standard AS4457.1 on OTR Wheels, Rims and Tires.

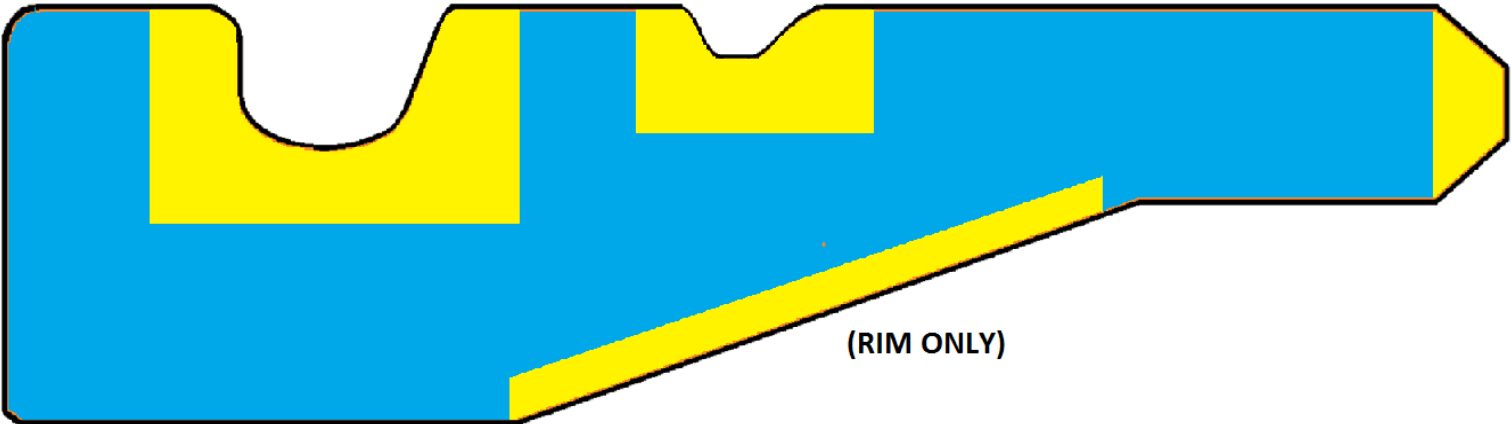
GUTTER SECTION (1.0)



RIM SECTION	REGION	VISUAL	NDT	AREA SHOULD BE VOID OF THE FOLLOWING
GUTTER SECTION (1.0)				
1.1 (OD)	HEAD /ID AREA	X		CRACKED, EXCESSIVE MECHANICAL DAMAGE
1.2 (OD)	LOCK RING GROOVE	X	X	CRACKED, MECHANICAL DAMAGE, +2mm WEAR (HDT)
1.3 (OD)	O-RING GROOVE	X	X	CRACKED, MECHANICAL DAMAGE, CORROSION
1.4 (ID)	MOUNT TAPER (Rim Only)	X	X	MECHANICAL DAMAGE TO TAPER, CRACKED
1.5 (ID)	VALVE PROTECTOR	X	X	CRACKED, BENT OR REMOVED
1.6 (OD & ID)	WELD- GUTTER /CB	X	X	CRACKED, EXCESSIVE CORROSION

Figure 2: Gutter Section Criteria Diagram

**GUTTER SECTION:
INSPECTION AREA**



NDT INSPECTION AREA 
VISUAL INSPECTION AREA 
ROUNDNESS MEASUREMENT AREA 

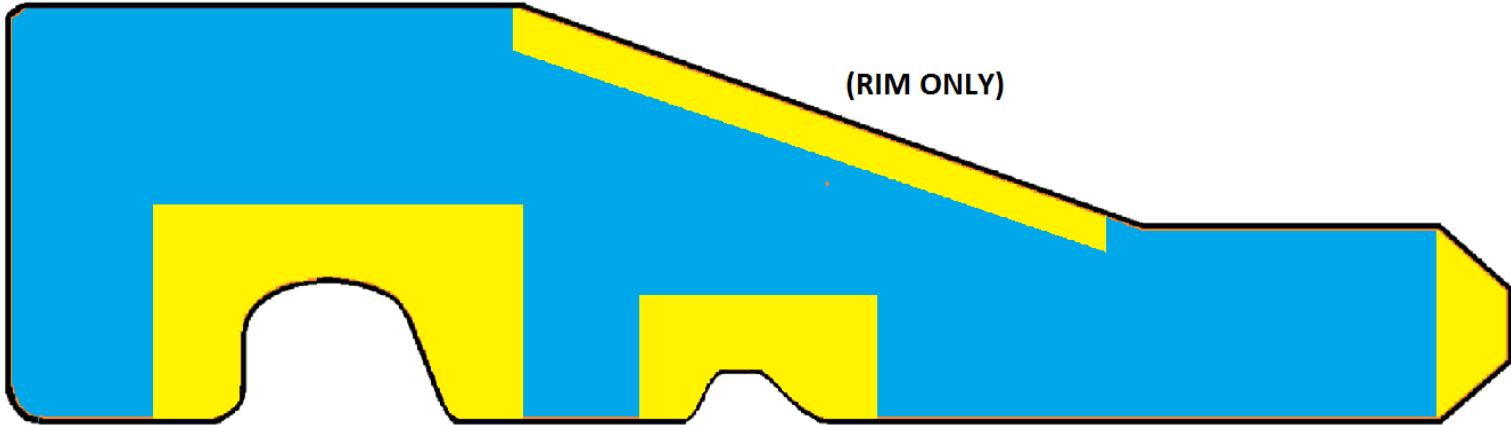


Figure 3: Inspection Diagram- Gutter Section

GUTTER SECTION (1.0)

CRACKING, WEAR & MECHANICAL DAMAGE

↓ MAJOR CRACKING AREA

↓ MINOR CRACKING AREA

↓ WEAR & MECHANICAL DAMAGE

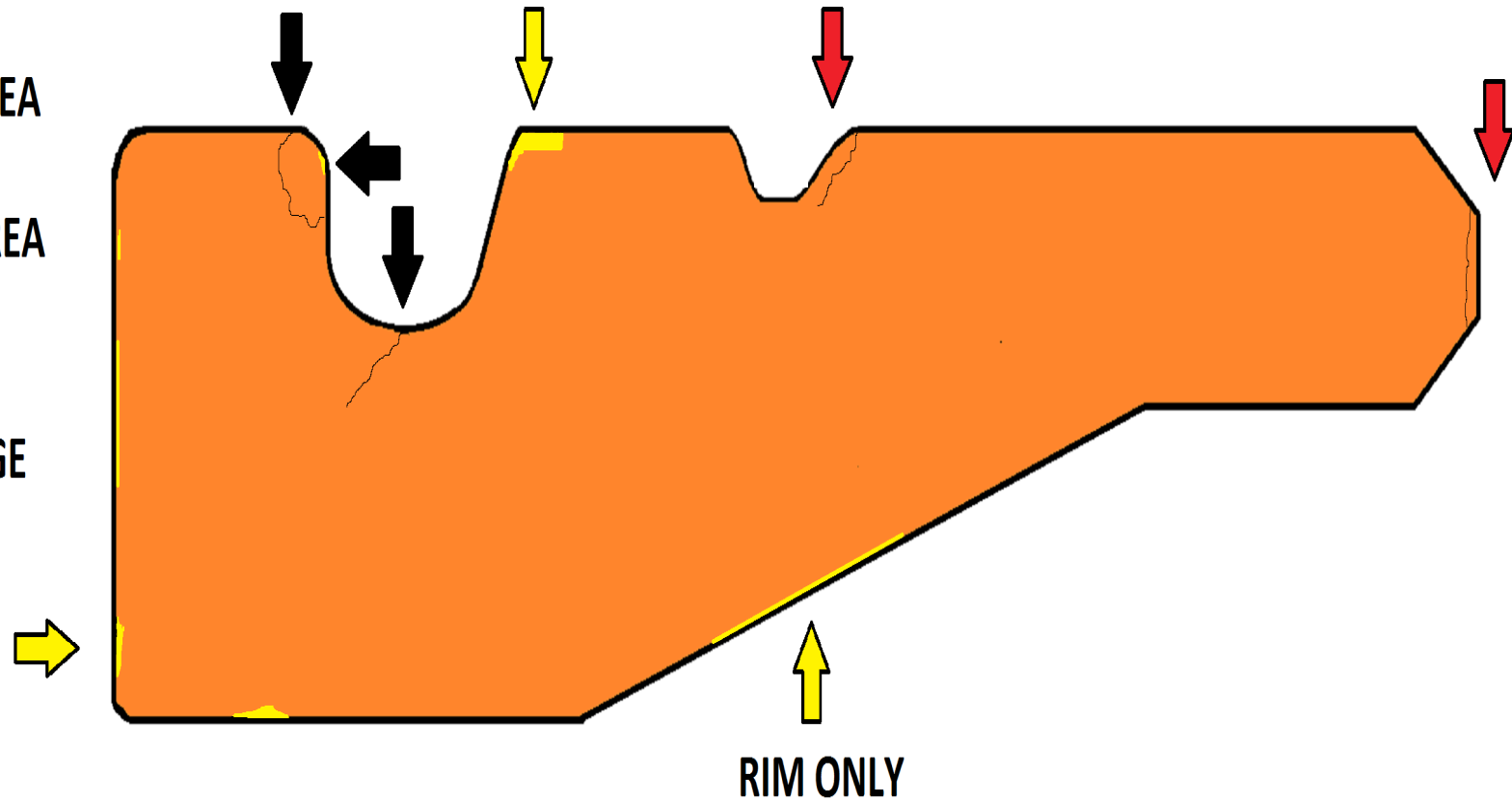


Figure 4: Gutter Section Service Diagram

Gutter Gauge : Wear exam



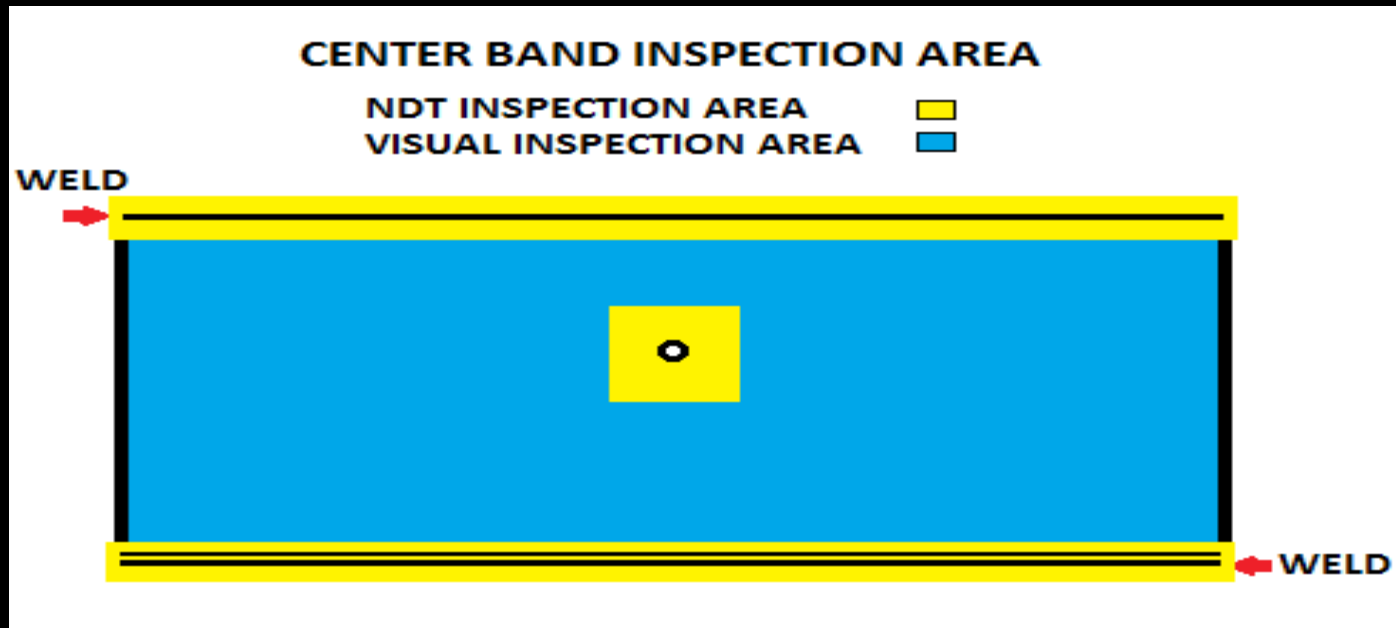
Figure 5: Gutter Gauge

Lock Ring Gutter Crack- 50mm long / 2mm deep



Common to find fatigue cracking in numerous positions around the lock ring groove.

Figure 6: Lock Ring Groove Crack



RIM SECTION	REGION	VISUAL	NDT	AREA SHOULD BE VOID OF THE FOLLOWING
CENTER BAND (2.0/ 4.0)				
2.1/4.1 (OD)	RIM SURFACE	X		CRACKED, EXCESSIVE CORROSION
2.2/4.2 (OD&ID)	VALVE HOLES CT BORE/ ¹ / ₂ & ³ / ₄ NPT	X	X	CRACKED, BROKEN BRASS, THREAD DAMAGE
2.3/4.3 (OD&ID)	CB WELD 1 / T-SECT.	X	X	CRACKED, EXCESSIVE CORROSION
2.4/4.4 (OD&ID)	CB WELD 2 / T-SECT.	X	X	CRACKED, EXCESSIVE CORROSION

Figure 7: Center Band Section Criteria Diagram

Center band corrosion- under the Bead Band



Figure 8: CB Corrosion Sample

Maintenance of the NPT valves

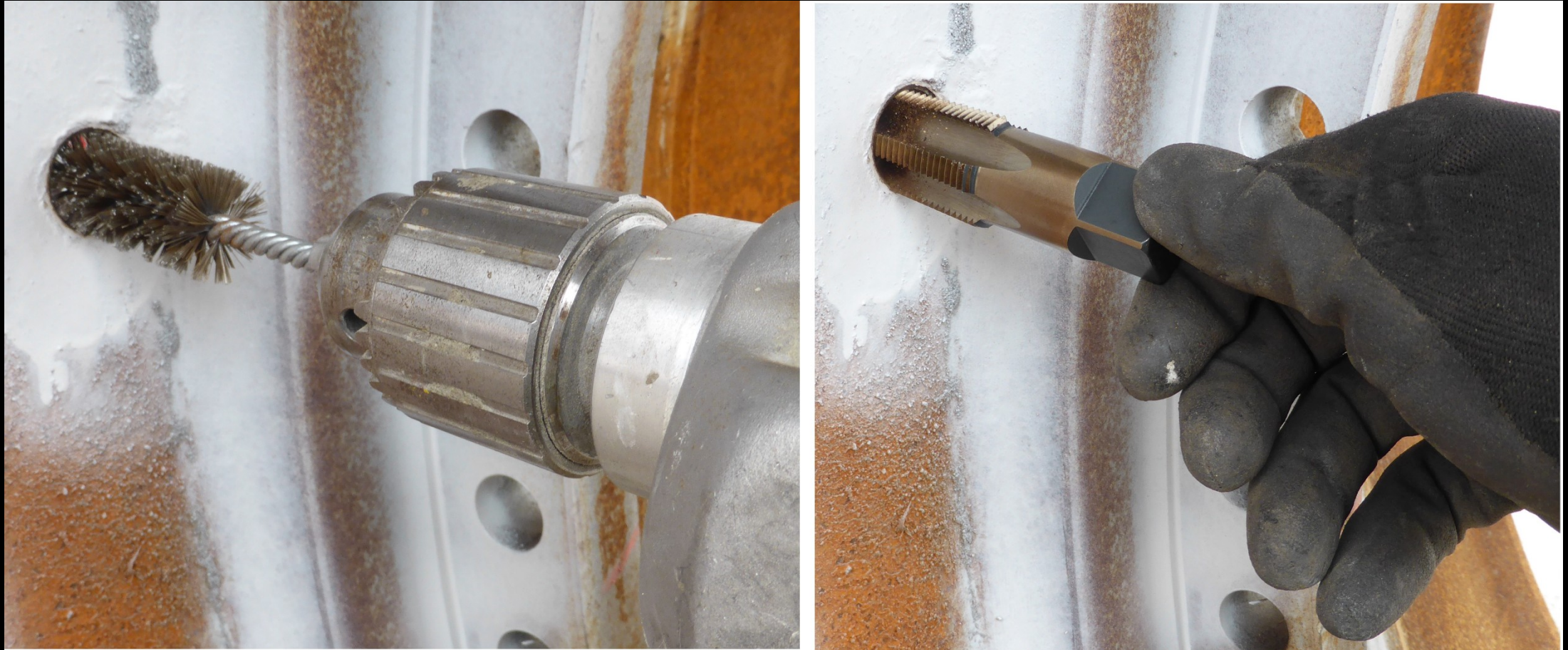
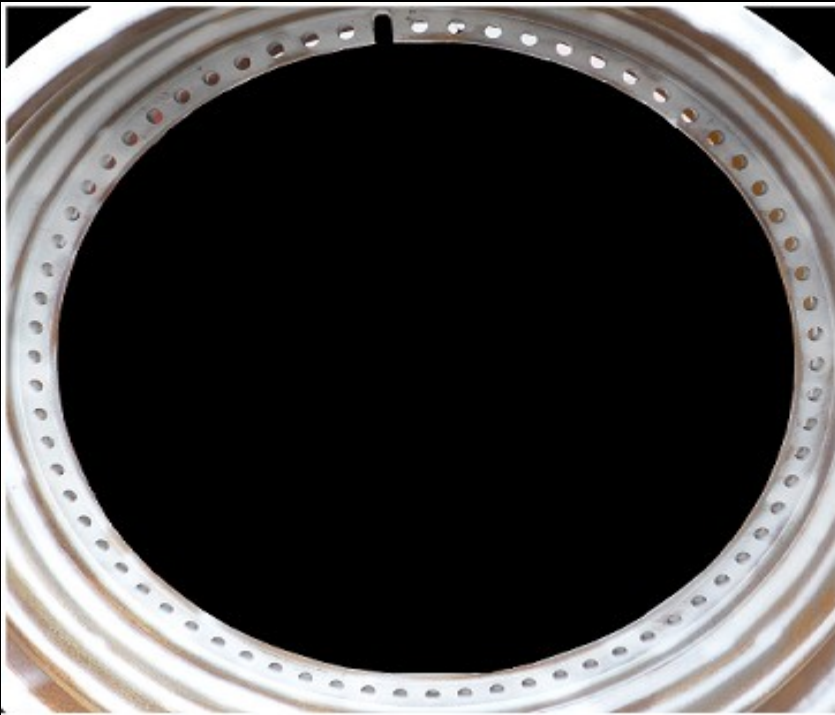
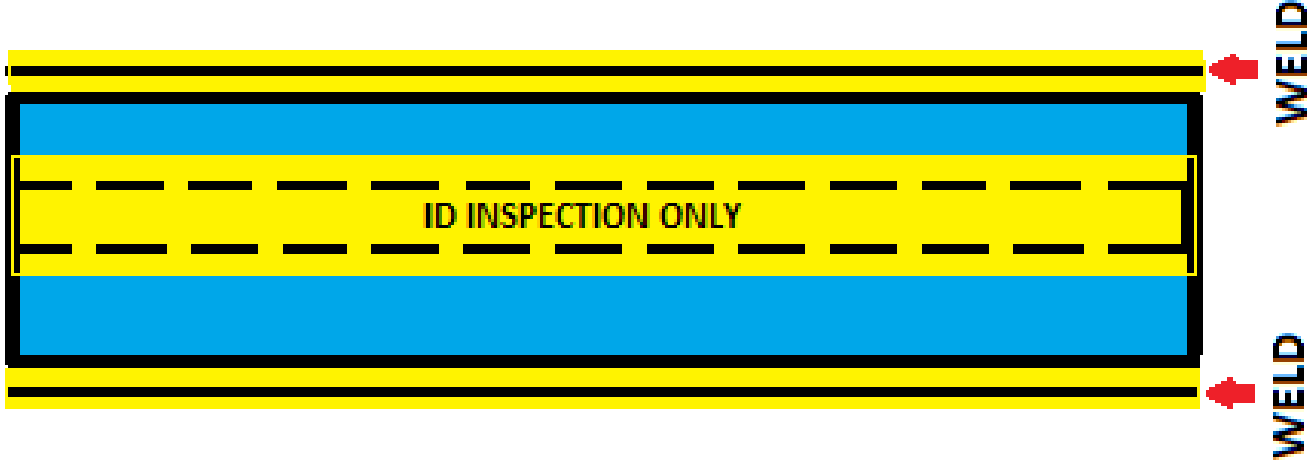


Figure 9: NPT valve hole Maintenance



DISC/ T-SECTION INSPECTION AREA

NDT INSPECTION AREA ■
 VISUAL INSPECTION AREA ■



RIM SECTION	REGION	VISUAL	NDT	AREA SHOULD BE VOID OF THE FOLLOWING
DISC/T-SECTION (3.0)	(WHEEL ONLY)			
3.1 (ID)	ID WELDS	X	X	CRACKED
3.2 (ID)	STUD HOLES	X	X	CRACKED, DEFORMATION

Figure 10: Disc Area Criteria Diagram

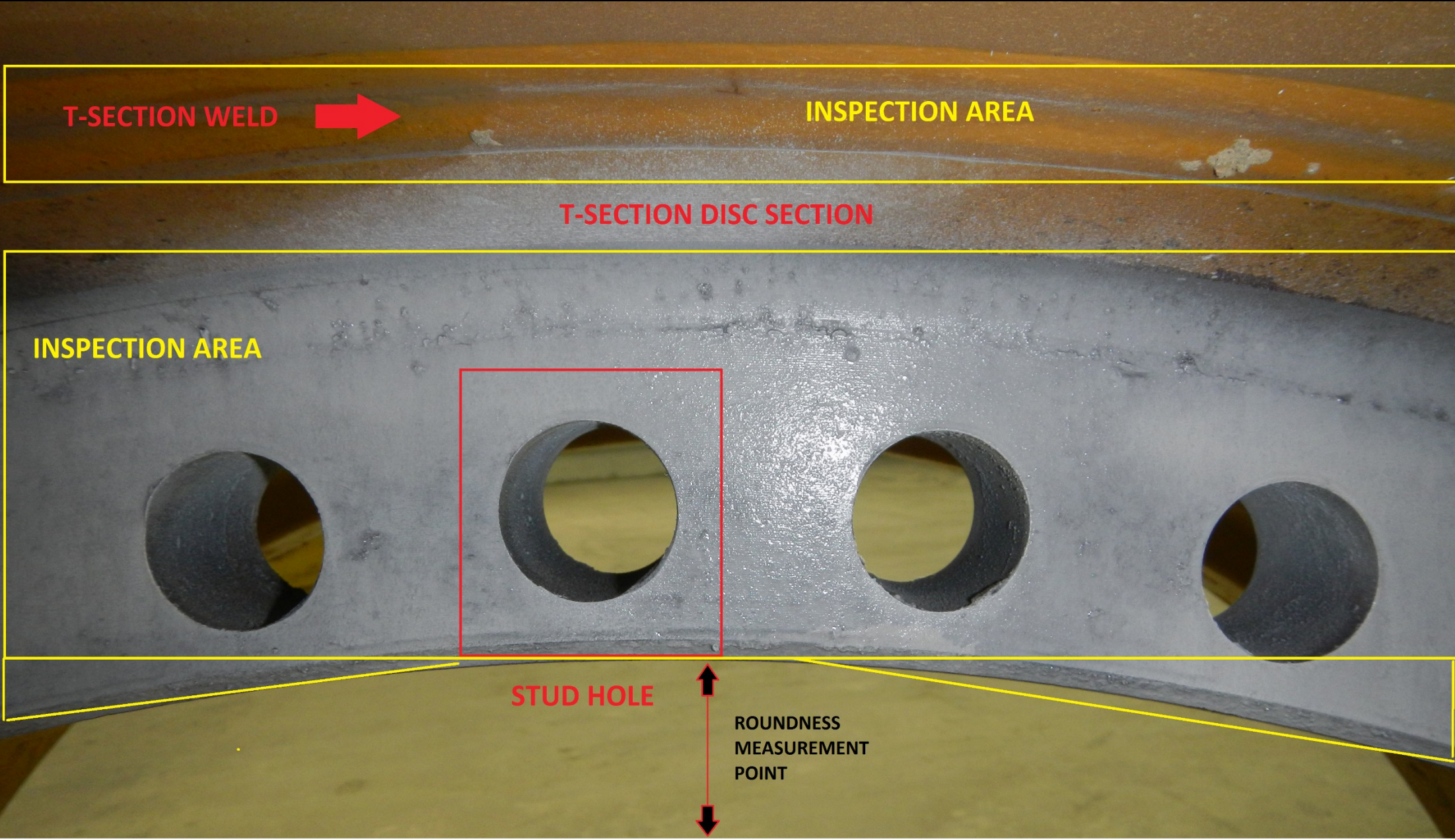


Figure 11: Disc Area Inspection Diagram

BACK SECTION (5.0)

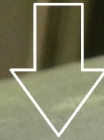
WELD- CB TO BACK SECTION (5.1)



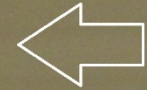
TIRE BEAD AREA (5.2)
(KNURLING)



TAPER (5.3)
FLANGE AREA



BACK FACE / ID AREA (5.4)



RIM SECTION	REGION	VISUAL	NDT	AREA SHOULD BE VOID OF THE FOLLOWING
BACK SECTION (5.0)				
5.1 (OD&ID)	WELD - CB TO BACK	X	X	CRACKED, EXCESSIVE CORROSION
5.2 (OD)	TIRE BEAD AREA	X		MECHANICAL DAMAGE, +3mm WEAR
5.3 (OD)	LIP / TAPER	X	X	CRACKED, COMPRESSION, EXCESSIVE GALLING
5.4 (OD&ID)	BACK FACE / ID AREA	X		CRACKED, EXCESSIVE MECHANICAL DAMAGE

Figure 12: Back Section Criteria Diagram

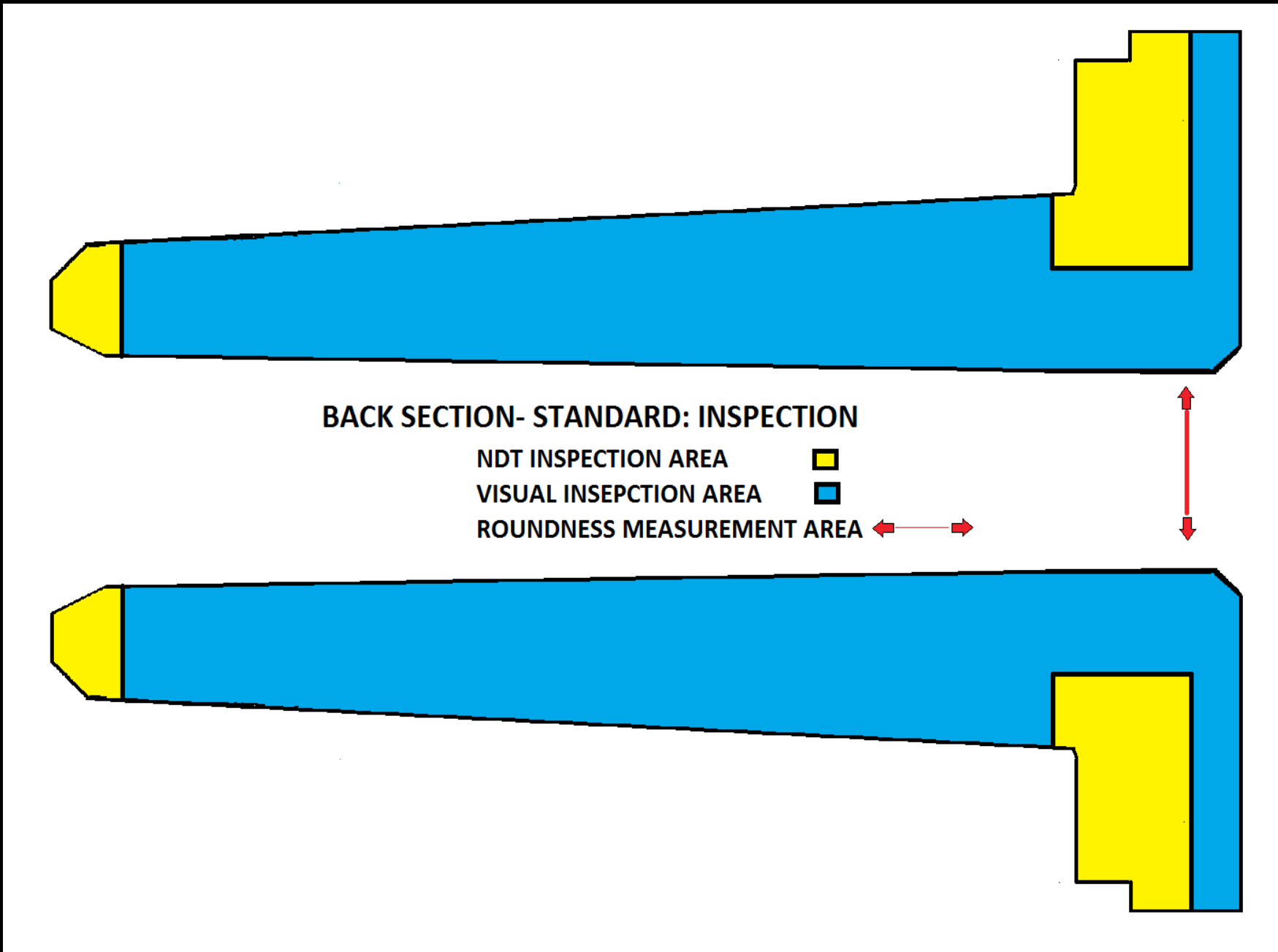


Figure 13: Standard Back Section Inspection Diagram

STANDARD BACK SECTION & SIDE RING DESIGN
 (SIDE RING & BACK SECTION ASSEMBLE AT 90 DEGREES)
SERVICE DIAGRAM

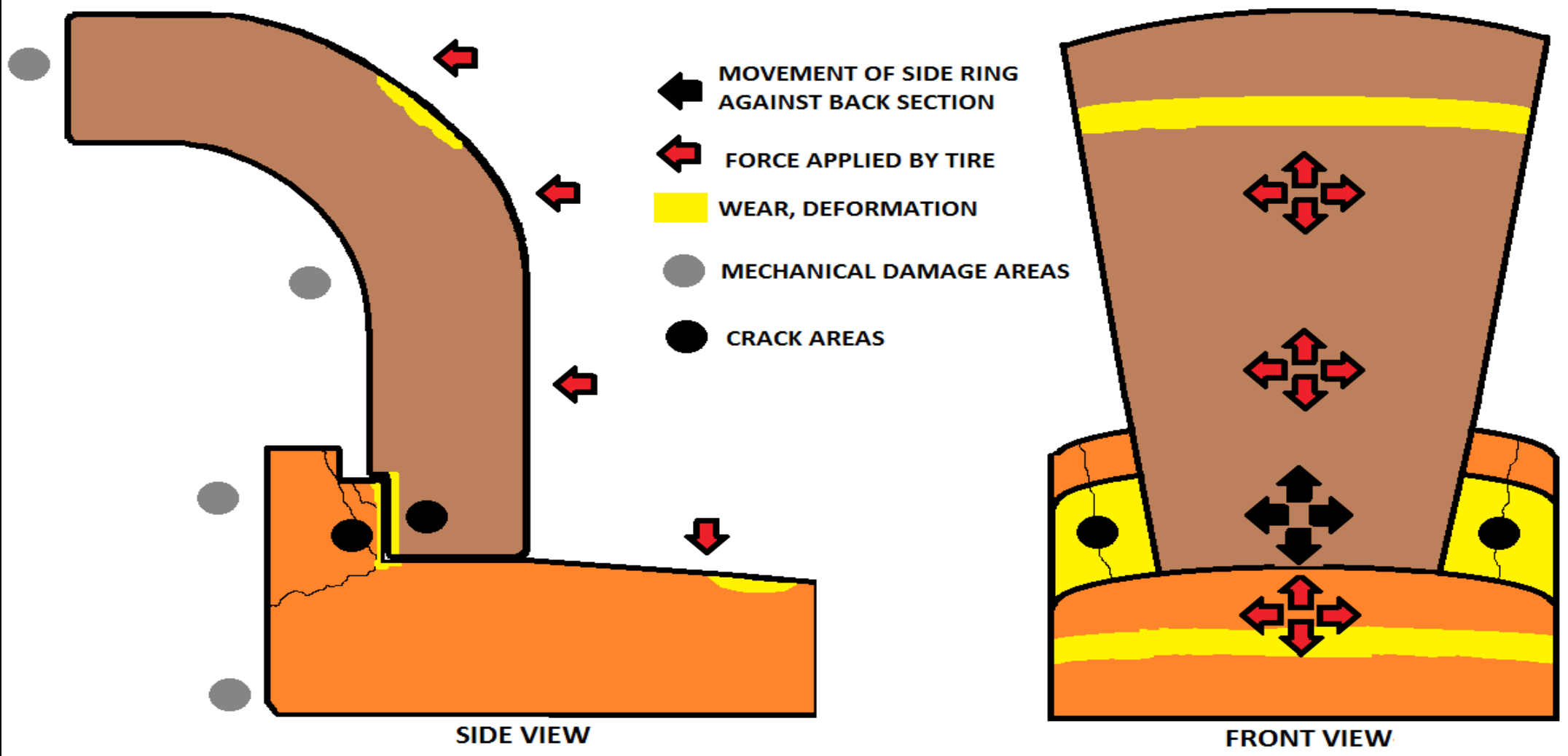


Figure 14: Service Diagram- Standard Back & Side ring

BACK SECTION-TAPER: INSPECTION

- NDT INSPECTION AREA ■
- VISUAL INSPECTION AREA ■
- ROUNDNESS MEASUREMENT AREA ↔

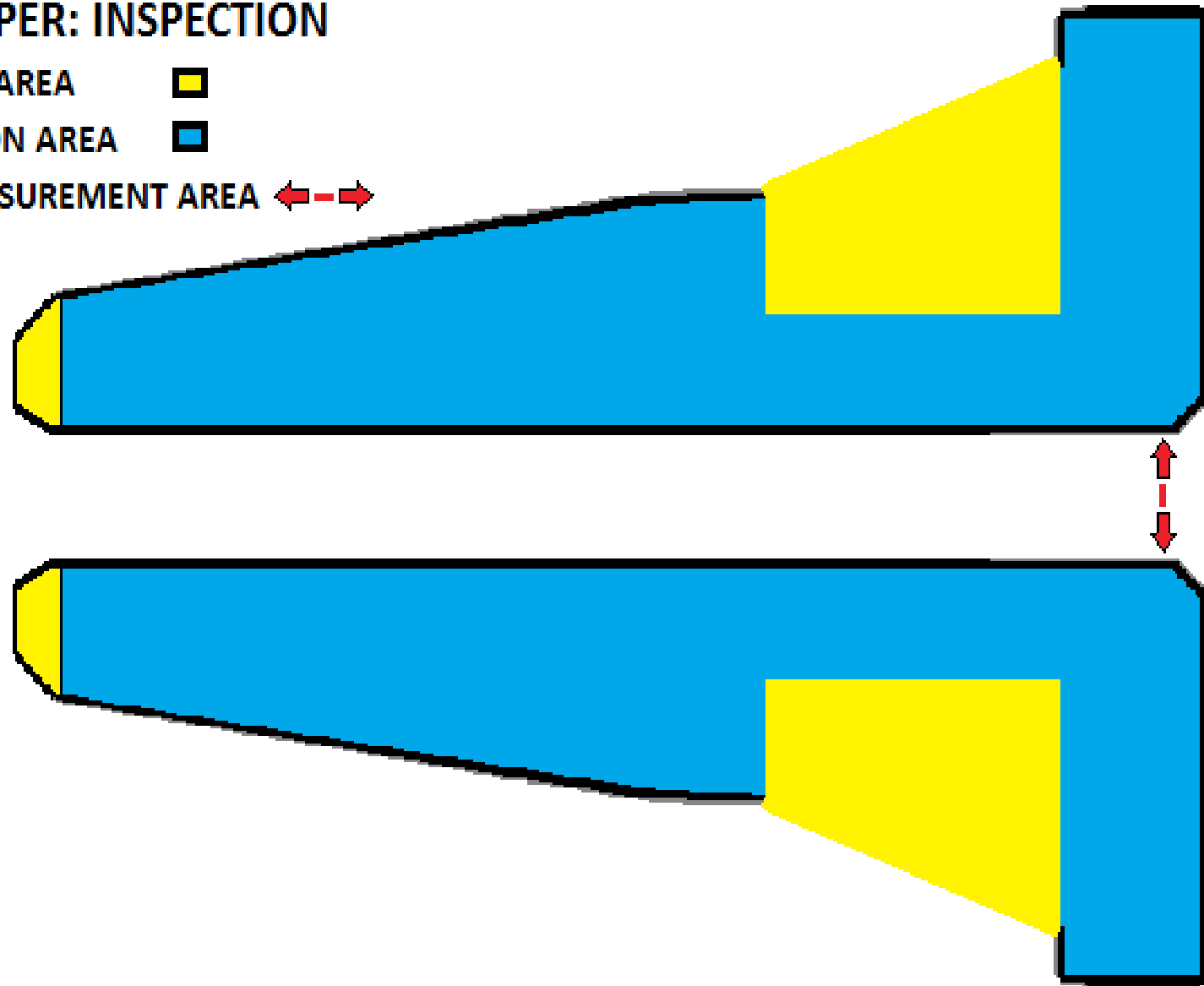


Figure 15: Taper Back Section Inspection Diagram

TAPER/ WEDGE BACK SECTION & SIDE RING DESIGN SERVICE DIAGRAM

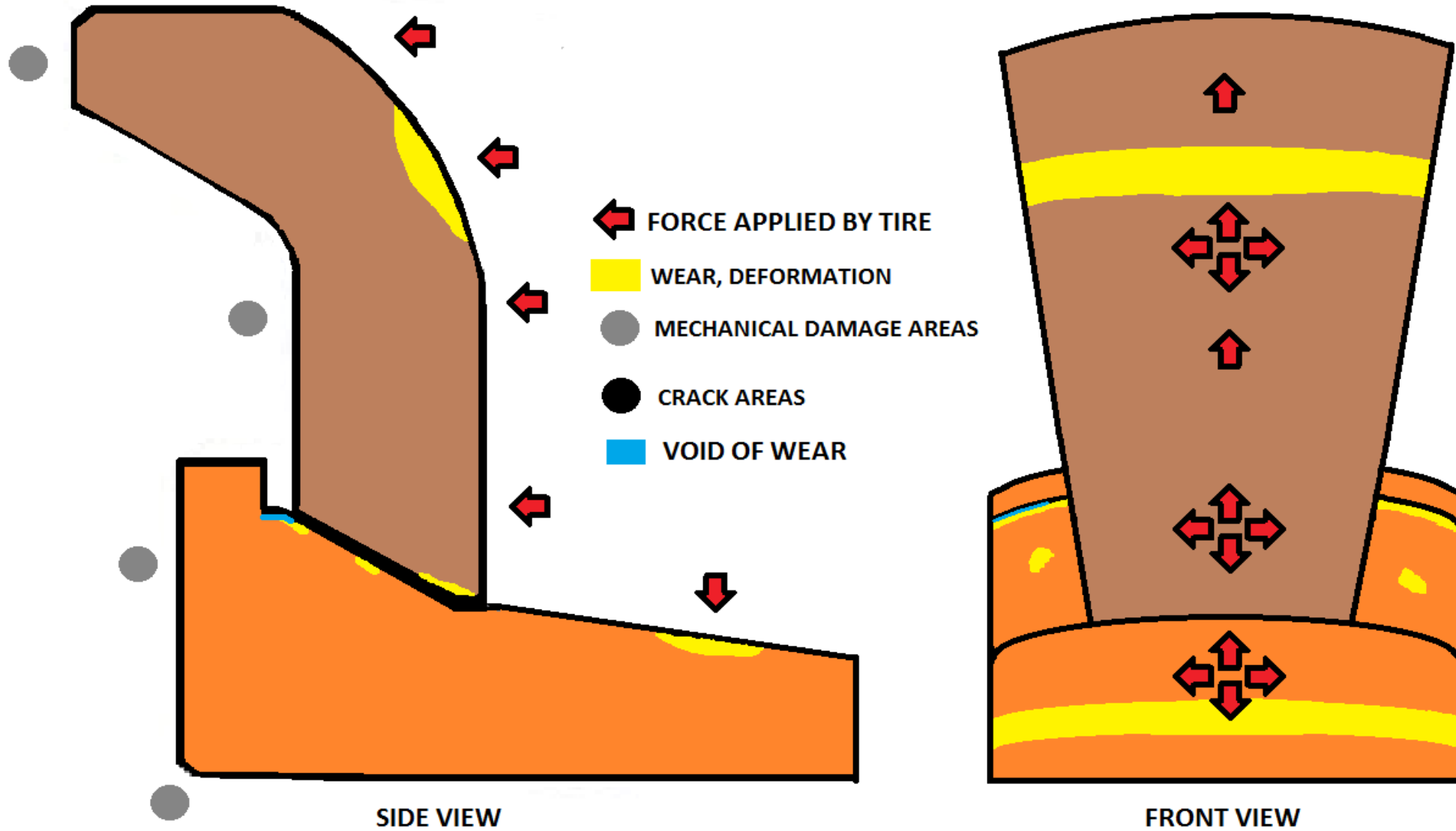


Figure 16: Service Diagram- Taper Design Back & Side ring



Figure 17: Crack in lip of Standard Back section

Phase Three: Marking & Report



Ref:

OTR RIM CERTIFICATION INSPECTION REPORT

Visual, Electromagnetic & Circumferential Roundness Inspection

Client		Rim Size		BR#	
Contact		Rim Manufacturer		Rim Hours	
Client PO No.		Rim MF Date		Date	
Equipment Manufacturer		Rim Serial No.		Inspector	
Equipment Model		Rim Model No.		CGSB #	

RIM SECTION	SECTION LOCALITY	CLOCK POSITION	VISUAL WEAR	DISCONTINUITY	COURSE OF ACTION
GUTTER SECTION (1.0)					
1.1	HEAD / ID AREA				
1.2	LOCK RING GROOVE				
1.3	O-RING GROOVE				
1.4	MOUNT TAPER <i>(RIM ONLY)</i>				
1.5	VALVE PROTECTOR				
1.6	WELD- GUTTER TO CB				
CENTER BAND (2.0 / 4.0)					
2.1 / 4.1	RIM SURFACE				
2.2 / 4.2	CT BORE / ½ NPT & ¼ NPT				
2.3 / 4.3	CB WELD 1 / T-SECTION				
2.4 / 4.4	CB WELD 2 / T-SECTION				
DISC / T-SECTION (3.0)					
<i>(WHEEL ONLY)</i>					
3.1	ID WELDS				
3.2	STUD HOLES				
BACK SECTION (5.0)					
5.1	WELD - CB TO BACK SECT.				
5.2	TIRE BEAD AREA				
5.3	LIP / TAPER				
5.4	BACK FACE / ID AREA				
PARTS (6.0)					
<i>(IF REQUIRED)</i>					
6.1	SIDE RING X 2				
6.2	BEAD BAND				
6.3	LOCK RING				
ROUNDNESS					
	GUTTER				
	DISC				
	BACK				

Notes:

Final resolution:

Certification of Product: Y / N

Inspector Signature:

Inspection Cost: \$

Figure 18: OTR Rim Certification Inspection Report

When should inspections occur?

**NDT Inspection
Intervals**

**OEM - STANDARD
ASSEMBLY DESIGN**

**TAPER/ WEDGE
ASSEMBLY DESIGN**

**Initial / warranty
review**

Rims 15 - 20,000 hours

Rims 20 - 25,000 hours

**Initial / warranty
review**

Wheels 20,000 hours

Wheels 25 – 30,000 hours

Intervals cycles

Every 10-15,000 hours

Every 10-15,000 hours

Conclusion

- Onsite NDT inspections by a third party
- Safety & Quality Assessments

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Thank you