

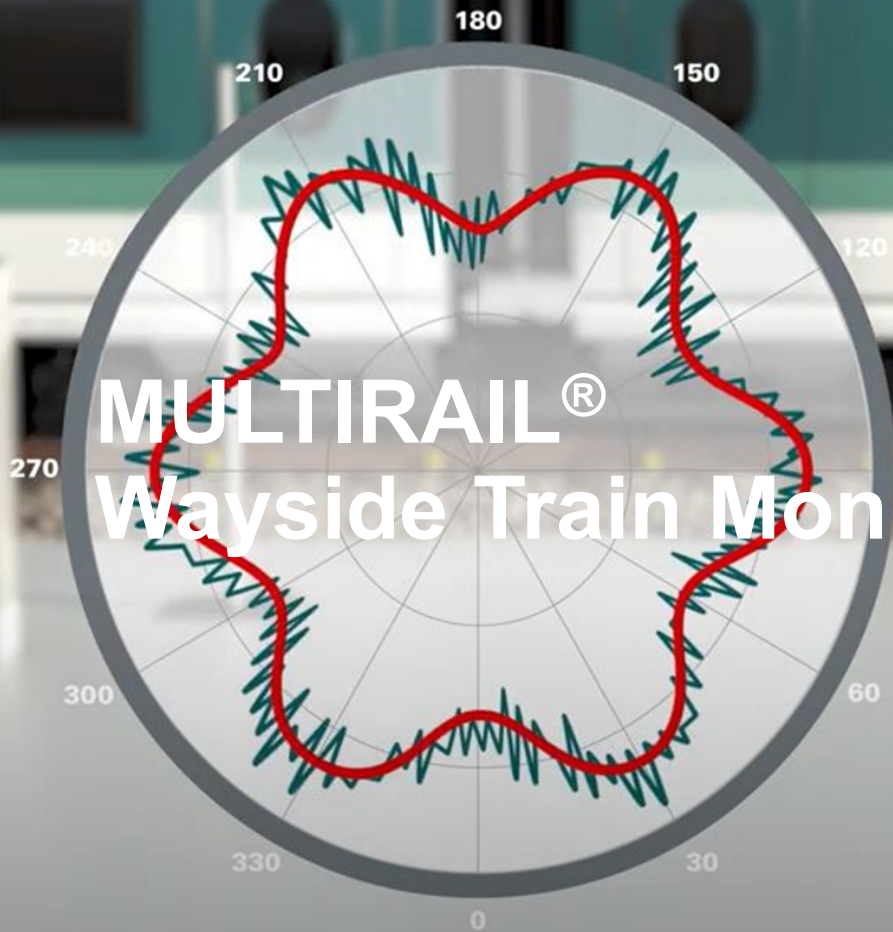
Jose Diaz

Schenck Process

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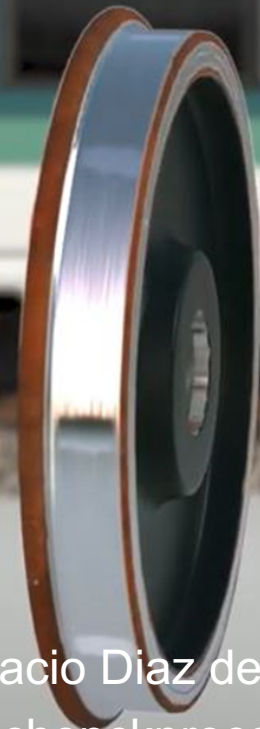
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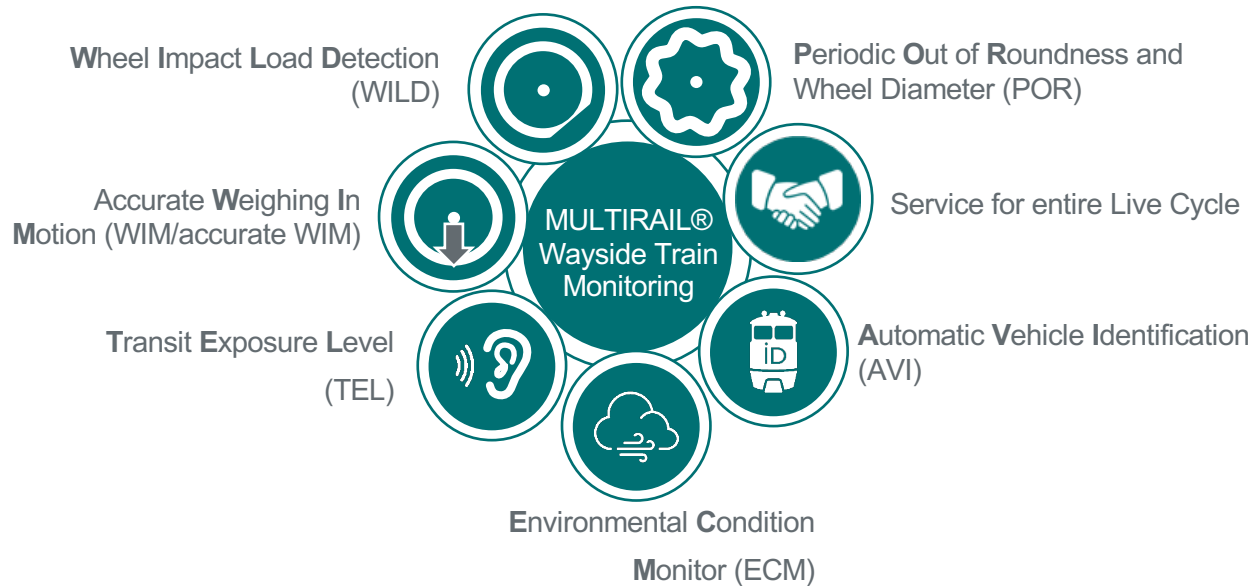


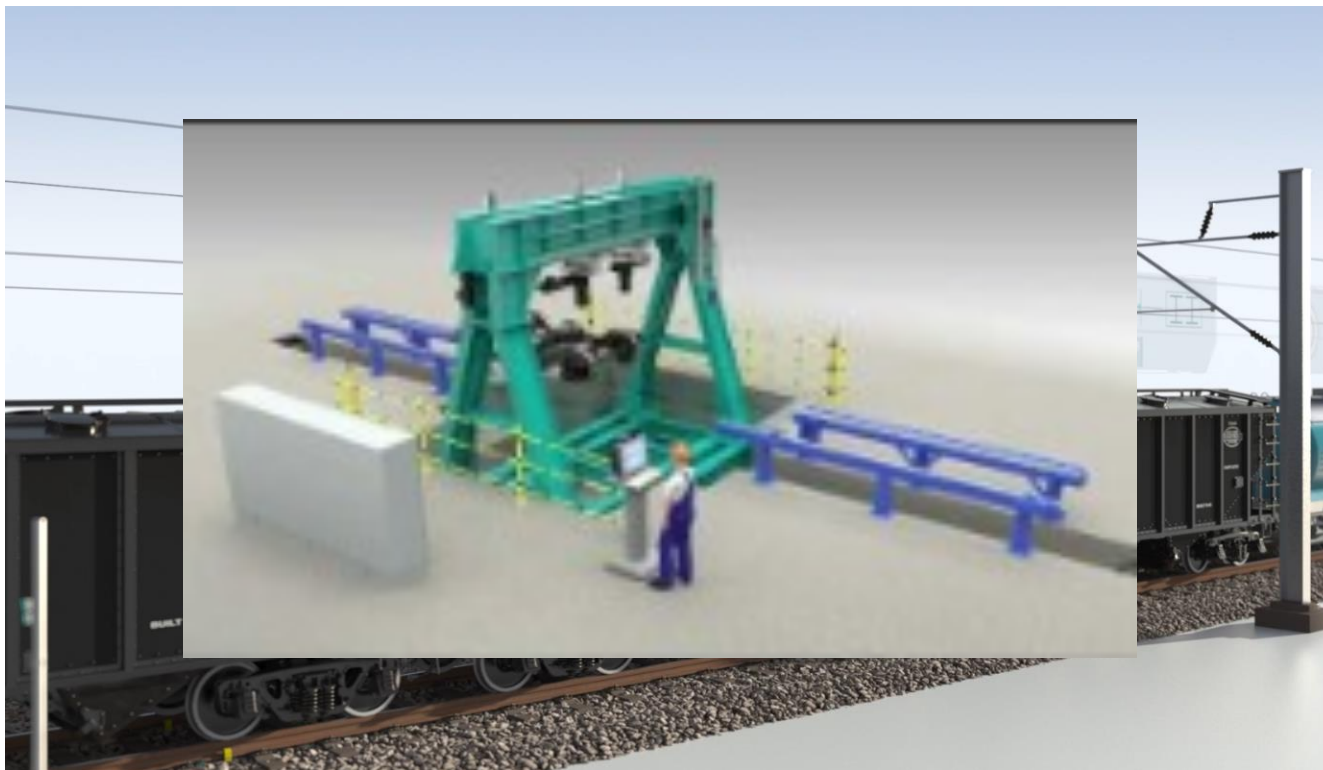
MULTIRAIL®

Wayside Train Monitoring



Jose Ignacio Diaz de V.
j.diaz@schenckprocess.com
Schenck Process Europe GmbH

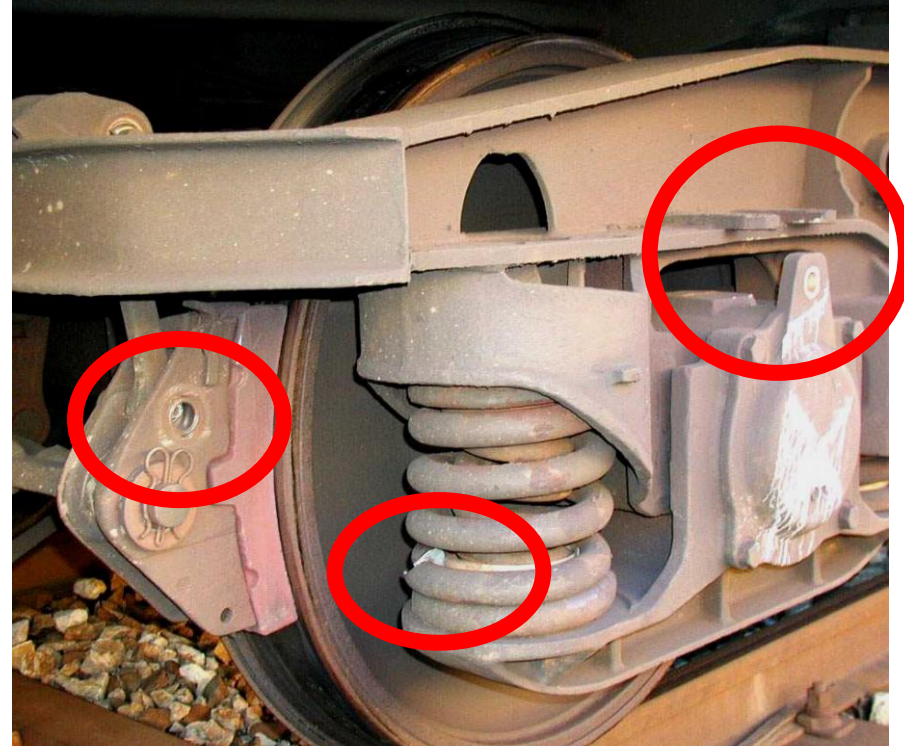




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Player

<https://youtu.be/x1JXens3Pmw?t=299>

Why wayside train monitoring?



damaged wheels cause danger!

Demands from the market

Increasing travelling speed

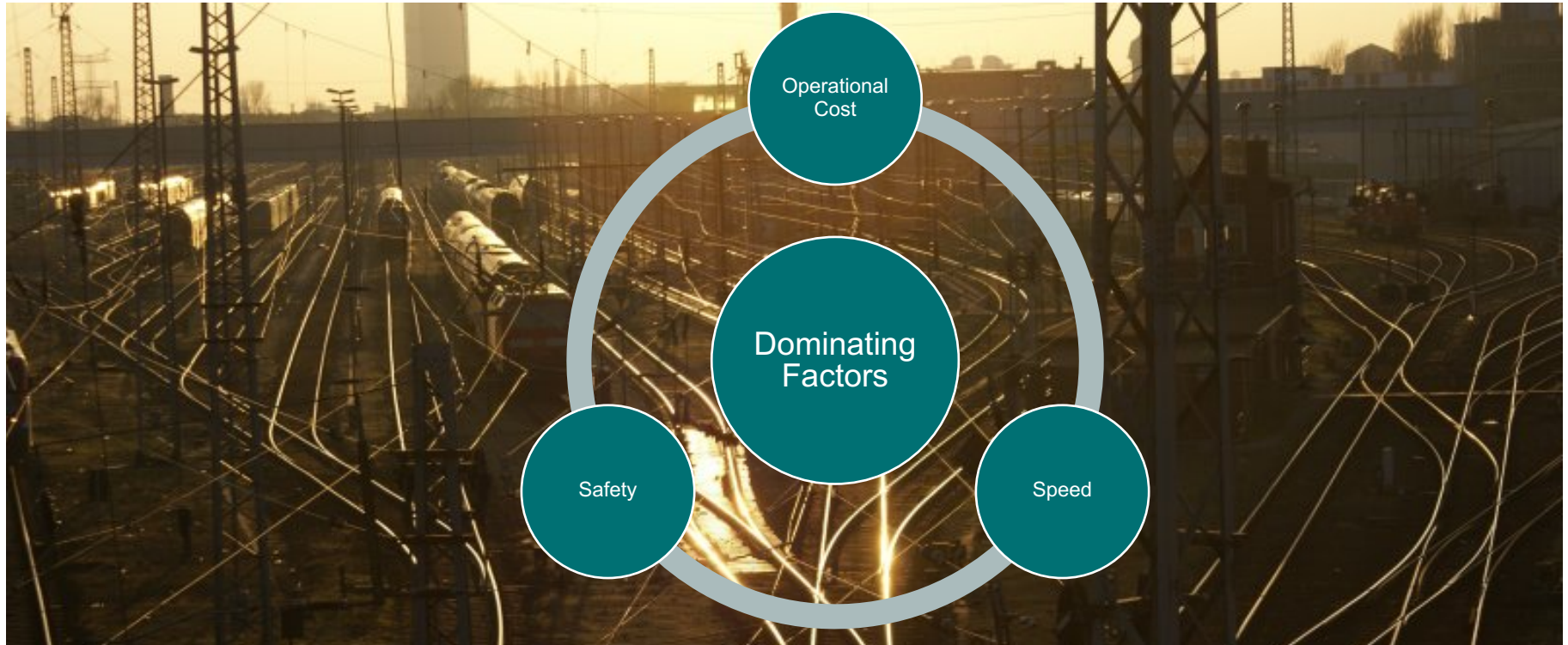


Require a continuous monitoring of the traffic

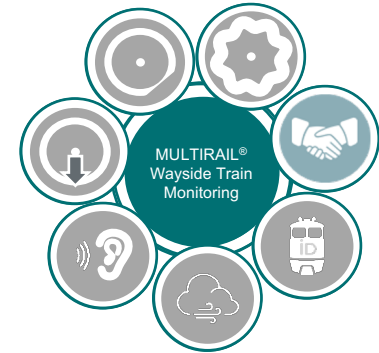


Require a preventive condition-oriented maintenance





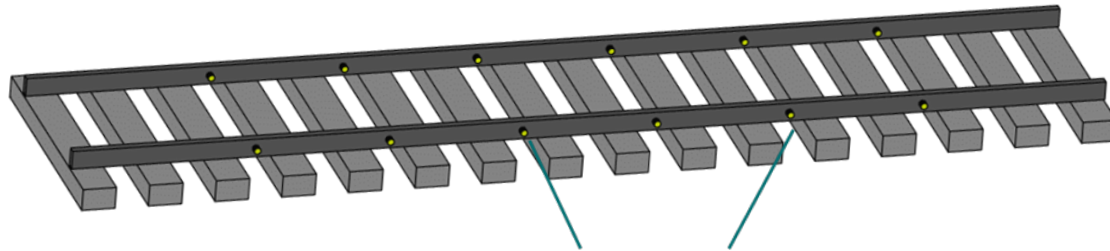
- MULTIRAIL Wayside Train Monitoring basic functionality for all modules:
 - Track site outdoor cabinet
 - Data recording
 - Data analysis
 - Alarming
 - Data export



MULTIRAIL® Wayside Train Monitoring

Module WIM - Weighing In Motion

- Dynamic weighing at line speed
 - Wheel and wheelset loads
 - Vehicle masses
 - Overload detection
 - Load distribution check
 - Accuracy 3%
-
- Installation without foundation or additional sleepers
 - No rail gaps or rail cut required



Sensor pressed into the rail

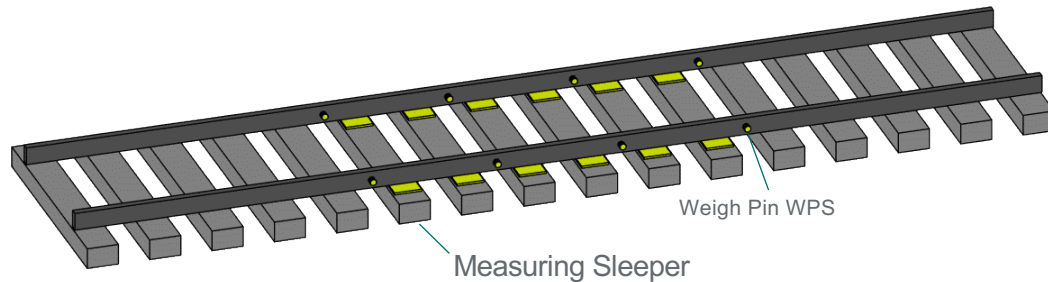


MULTIRAIL® Wayside Train Monitoring

Module accurate WIM - Accurate Weighing In Motion

In Addition to Module “WIM”:

- accurate vehicle mass featuring MULTIRAIL weighing sleepers
- equipped with high-precision strain-gauge measuring sensors. Designed to transmit all forces and moments at line speed
- Train Weight 1%



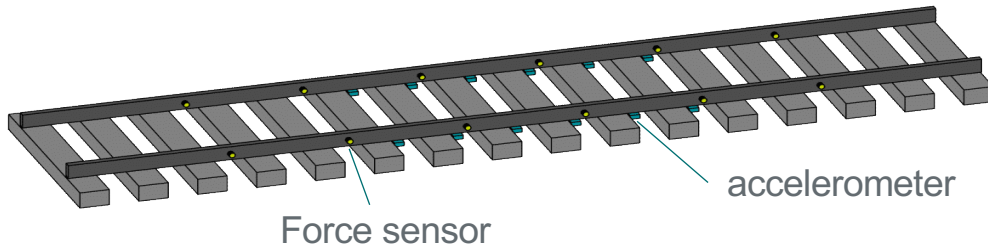
MULTIRAIL® Wayside Train Monitoring

Module WILD – Wheel Impact Load Detection

- Detects out of round wheels
 - Single Point Defects (Flats)
 - Periodic out of rounds

→ wheel peak forces to alarm for damaged wheels

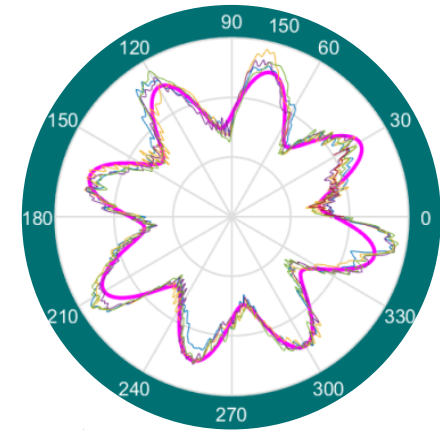
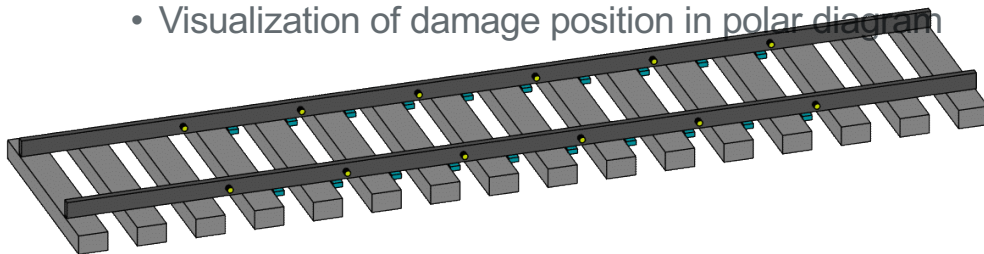
→ No additional track work involved



MULTIRAIL® Wayside Train Monitoring

Module POR - Periodic Out of Roundness and Wheel Diameter

- Measurement of wheel diameter
 - Accuracy 1 mm (for coarse wheels)
- Wheel damages and classification:
 - Wheel flats and their positions to each other (angle)
 - Eccentricity
 - Ovality
 - Polygonization
- Visualization of damage position in polar diagram



Module POR

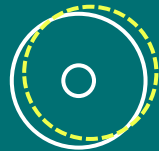
Module WILD

Out of Rounds
Deviation from the ideal round wheel

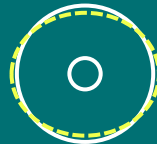
Periodic Out of Rounds

Single Point Defects

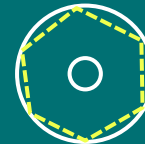
Eccentricity
(1. Order)



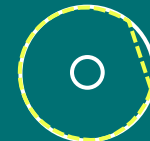
Ovality
(2. Order)



Polygonization
(≥ 3. Order)



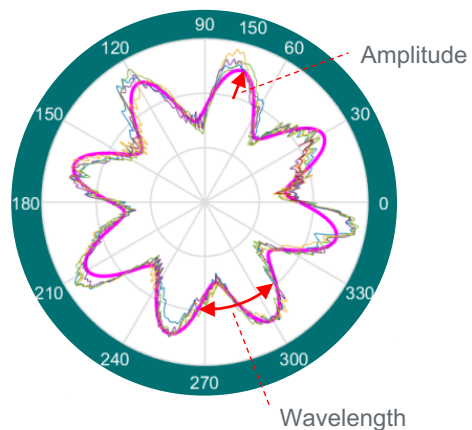
Wheel flat



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Periodic Out of Round

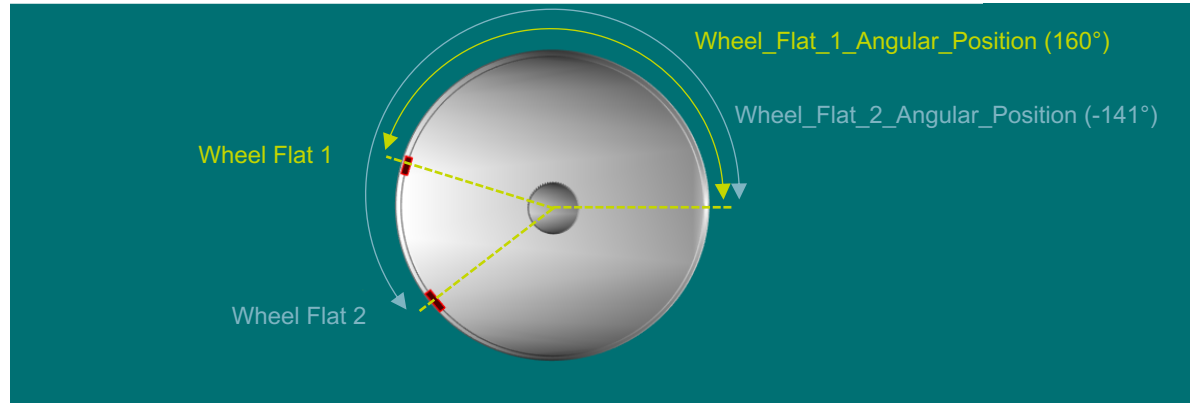
Example:



Variable	Value	Modul
Circumference	2845.6 mm	POR
Circumference_Calc_Quality	86 %	POR
Diameter	906.2 mm	POR
Order_1	8	POR
Wavelength_1	355.7 mm	WILD
Amplitude_1	25.2 kN	WILD
Frequency_1	79.3 Hz	WILD

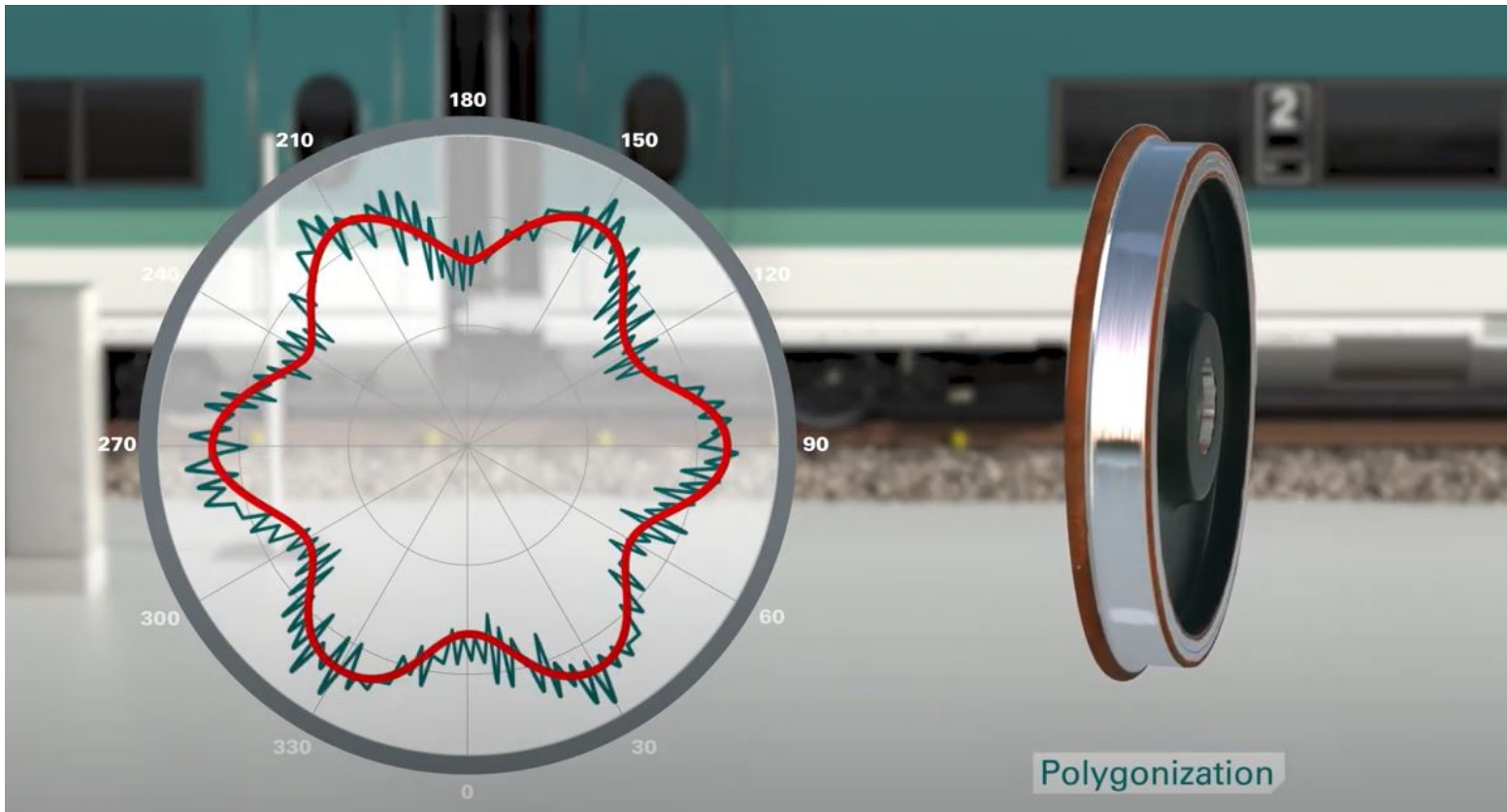
Example wheel with 2 wheel flats:

The angular position of wheel flat over the circumference:



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Animation on YouTube



External
Player

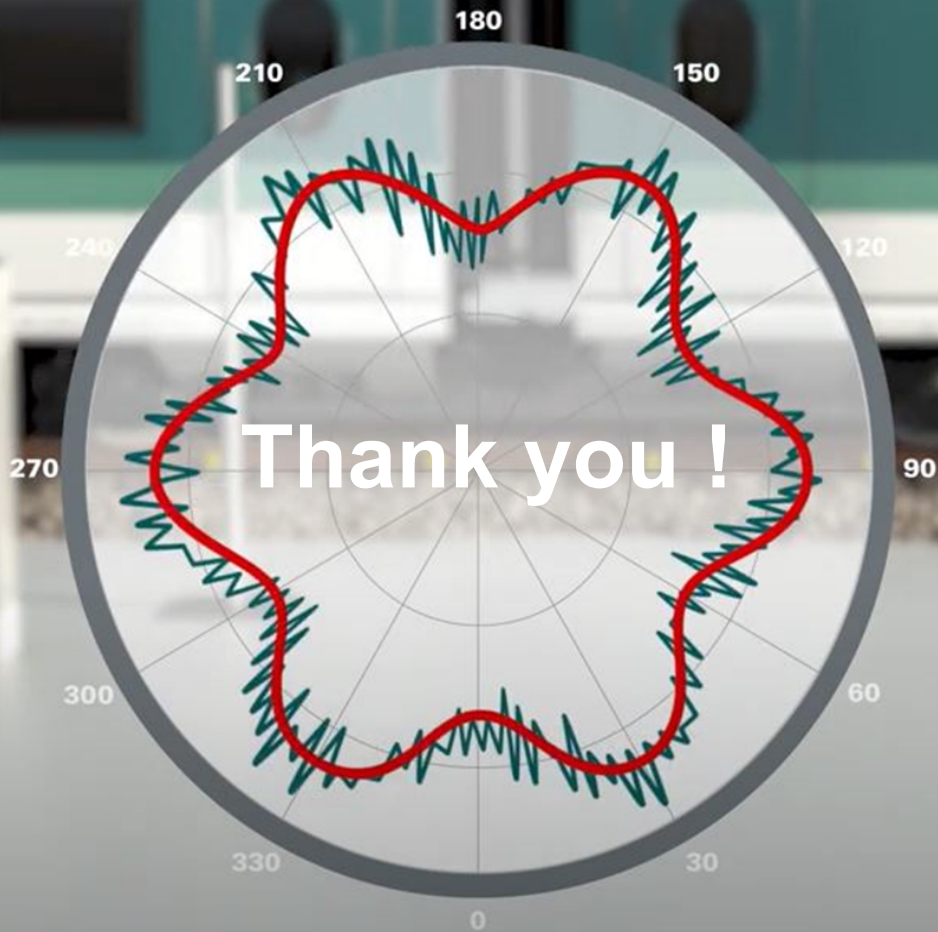
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Module AVI - Automatic Vehicle Identification



- Assignment of measurement data to wagon number.
Vehicle identification e.g. via
 - RFID tags and reader
 - OCR video identification system or
 - interface to existing vehicle data base





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j.diaz@schenckprocess.com
Schenck Process Europe GmbH