PRINCIPLES COURSE

Harry Skoblenick, P. Eng

WCE Master Expert - RSC

Alstom Transport Canada Inc.

Kingston, Ontario

August 26, 2025

RESTRICTED

WRI2025 30th ANNIVERSARY
Plasser American
PEARL MILESTONE SPONSOR
ALSTOM
· mobility by nature ·

Vehicle Suspension and Vehicle / Track Interaction

PRINCIPLES COURSE

August 26-28, 2025

SEATTLE, WA

WRI2025RT

Overview

- Transit Vehicle Suspension
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- Dynamic Modeling – Normal vs Improved
- Conclusion

ALSTOM
· mobility by nature ·

Passenger Vehicles

- Large number of vehicle designs and types.
- Often custom or "one-off" designs, unique to a city or a route within a city.
- Urban and intercity from streetcars to complete trainsets. At-grade, tunnel, and elevated guideways.
- Light to heavy; low speed to very fast (90kph).
- Includes new Low-floor Light Rail Vehicles (LRV) for urban applications.

ALSTOM
· mobility by nature ·

PRINCIPLES COURSE

- **Transit Vehicle Suspension**
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- Dynamic Modeling – Normal vs Improved
- Conclusion

ALSTOM
· mobility by nature ·

Transit Vehicle Suspensions

Passenger vehicles are designed to provide a *comfortable and stable ride by isolating the vehicle body* from track irregularities and ensuring proper wheel-rail contact.

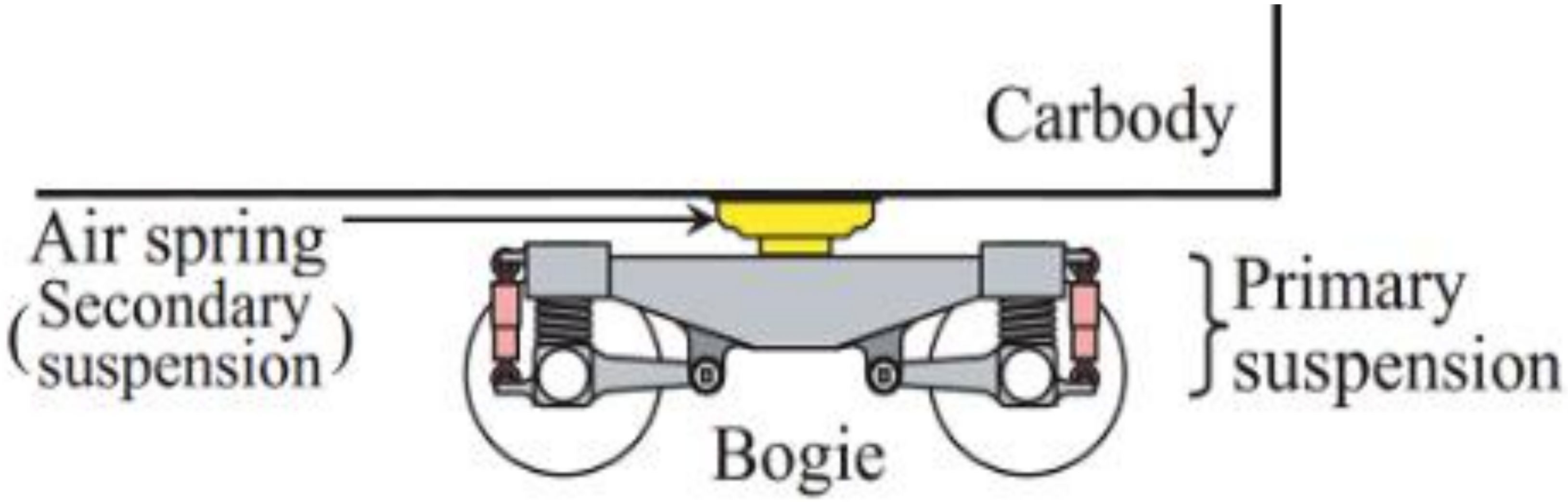
Instability can occur when a combination of bogie design, springing, vehicle and bogie wheelbase, and track condition may cause unstable dynamics – leading to reduced ride quality.

Vehicle Truck Design

Truck (Bogie) serve a number of purposes:

- supporting the body of the rail vehicle.
- running in a **stable** manner on both straight and curved track.
- improving ride quality by absorbing vibrations and minimizing the impact of centrifugal forces when the train runs in curves at high-speed.
- minimizing generation of track surface irregularities and high rail abrasion.

ALSTOM
• mobility by nature •

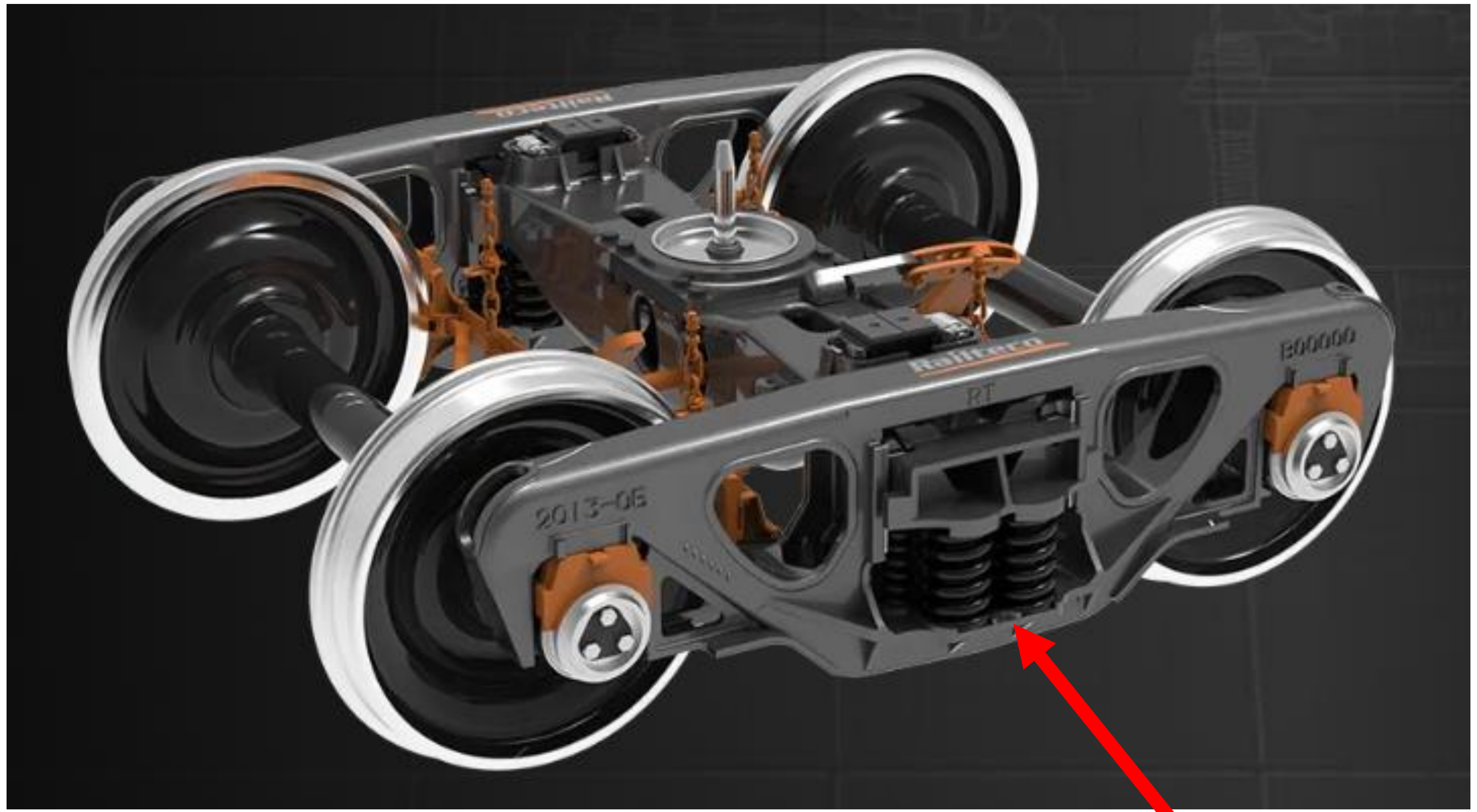


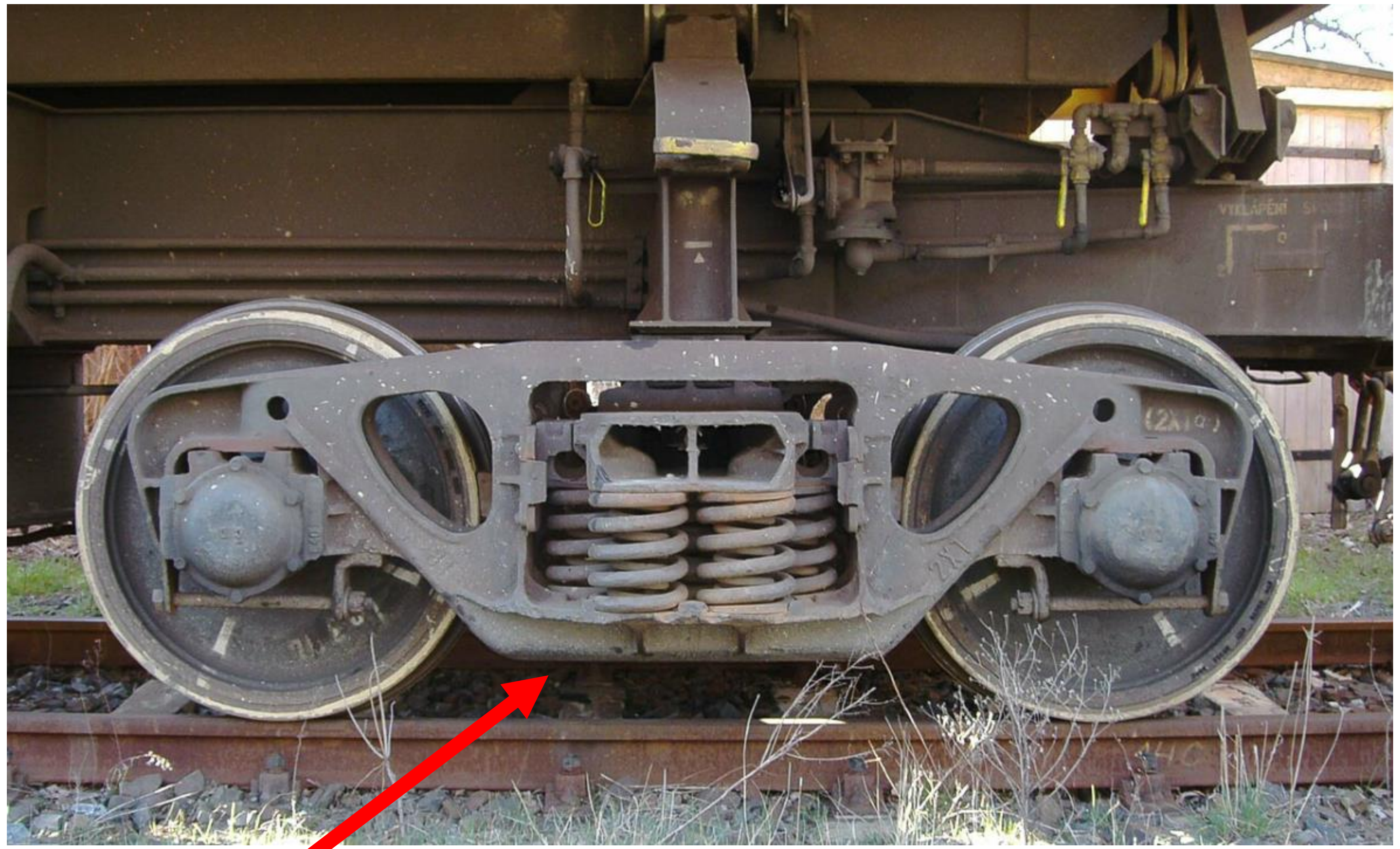
Transit vehicles typically consist of two main ride controls, primary and secondary suspension systems:

- **Primary suspension -** located between the wheelsets and bogie frame, manages higher-frequency vibrations and allows for steering on curves.
- **Secondary suspension -** positioned between the bogie and the car body, handles lower-frequency disturbances, reducing vibrations felt by passengers.

ALSTOM
· mobility by nature ·

Freight Truck Suspension



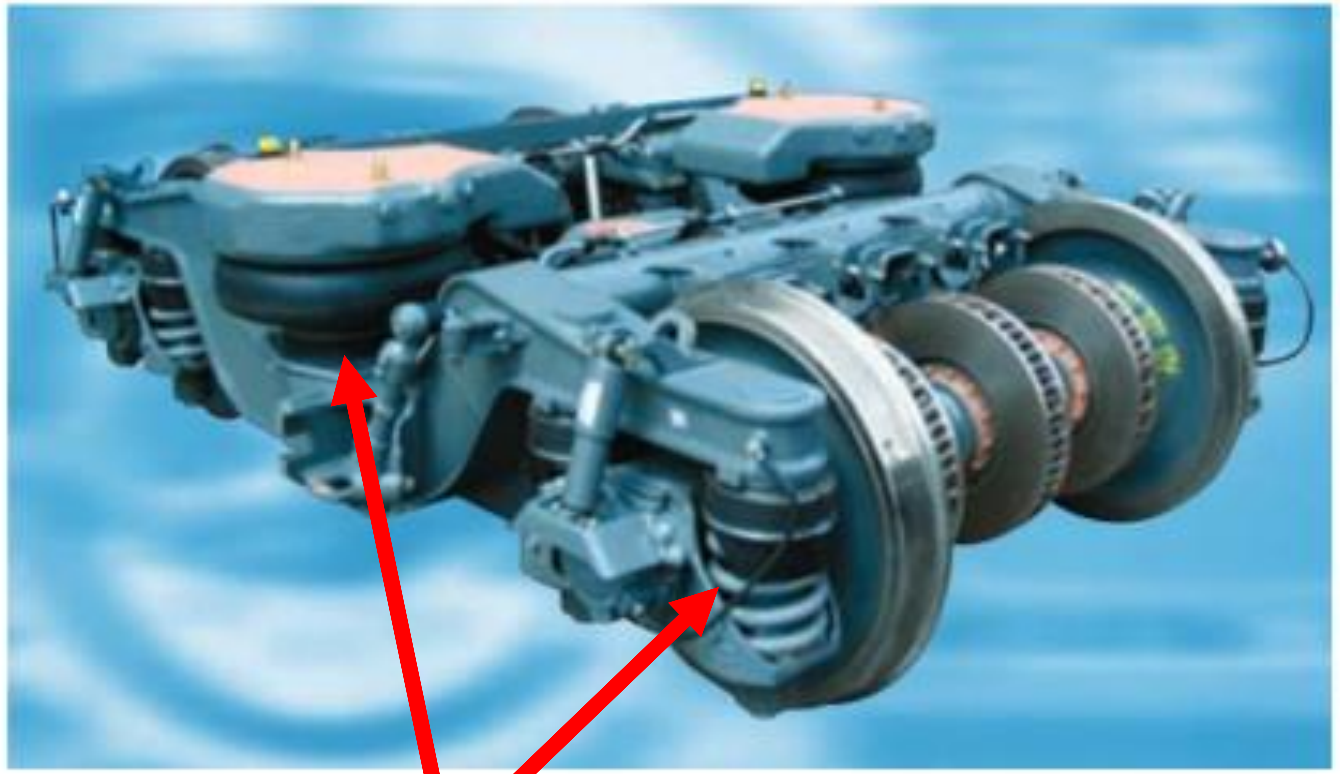


'Stiff' Secondary suspension

PRINCIPLES COURSE

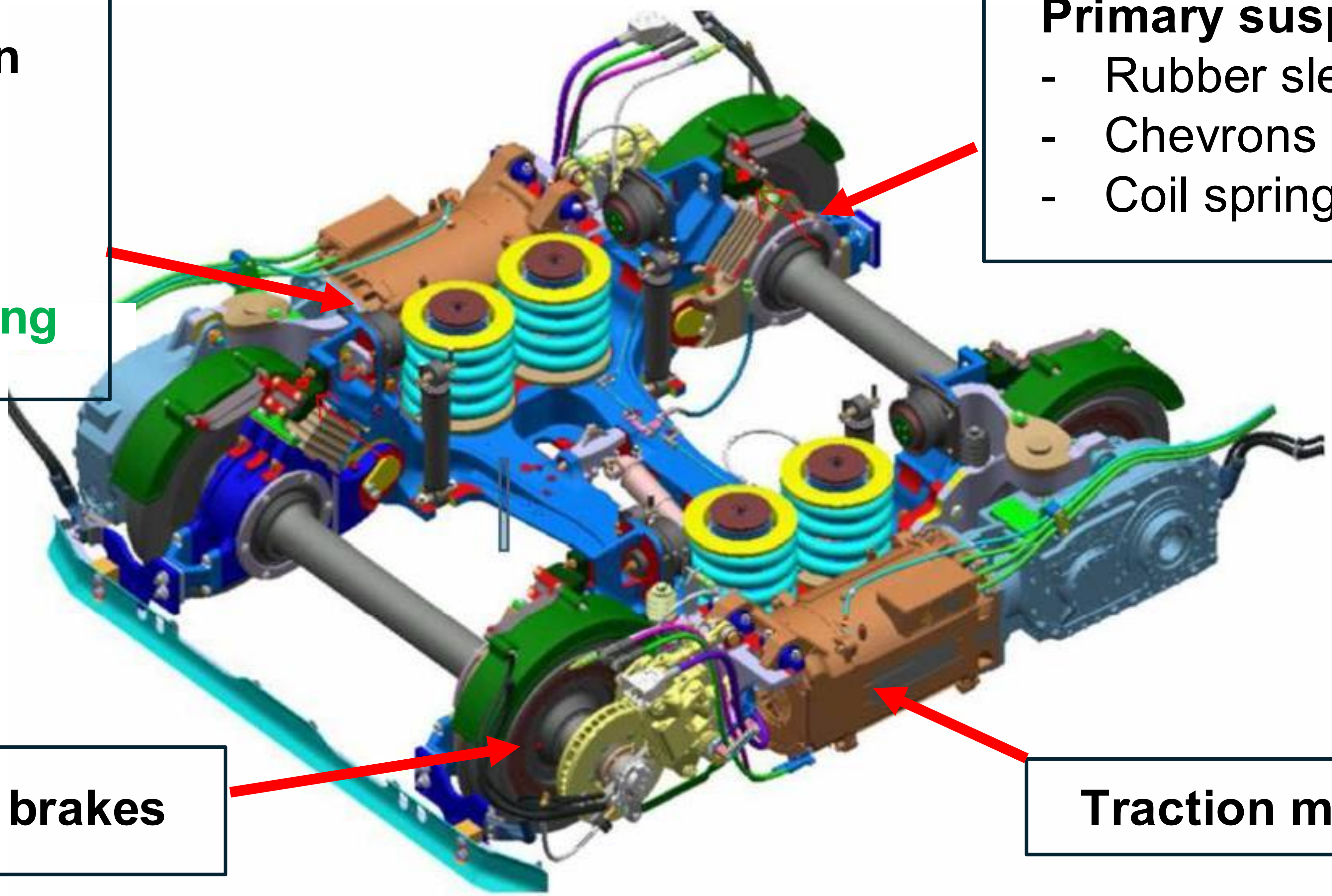
ALSTOM
• mobility by nature •

Transit Vehicle Truck Suspension



Custom Engineered - Primary and Secondary ‘soft’ suspensions

Transit Vehicle Truck Suspension
(Low-floor LRV vehicle)

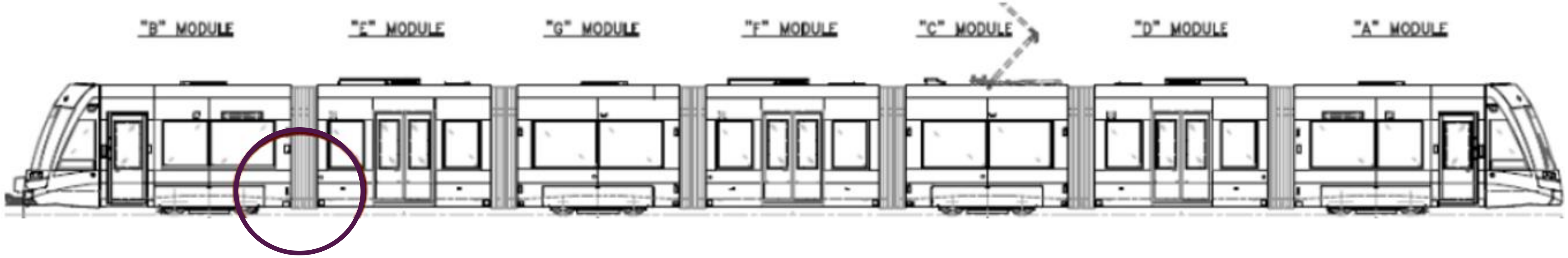


ALSTOM
• mobility by nature •

Low-Floor LRV Vehicle

PRINCIPLES COURSE

Typical LRV vehicles require fewer bogies with articulation joints between cars.



- Transit Vehicle Suspension
- **Track Influence on Stability**
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- Dynamic Modeling – Normal vs Improved
- Conclusion

ALSTOM
· mobility by nature ·

Track Installation – North America Requirements

TCRP
REPORT 155

TRANSIT COOPERATIVE RESEARCH PROGRAM

Sponsored by the Federal Transit Administration

Track Design Handbook for Light Rail Transit

Second Edition

Table 4.2.1 Track construction tolerances

Type of Track	Track Gauge [5]	Guard Rail Gauge [5]	Cross Level [5]	Construction Tolerances: Horizontal Alignment Deviation [1] [5]	Construction Tolerances: Vertical Alignment Deviation [1] [5]	Location Tolerances: Horizontal Alignment Variable [6]	Location Tolerances: Vertical Alignment Variable [6]
Ballasted concrete cross ties (Main Line)	+/- 1/16" [+/-1 mm]	+1/8",-1/16" [+3,-1 mm]	+/- 1/8" [+/- 3 mm]	1/4" [6 mm] [2]	1/4" [6 mm] [3]	1/2" [13 mm]	1/2" [13 mm]
Ballasted timber cross ties (Main Line)	+/- 1/8" [+/-3 mm]						
Ballasted concrete cross ties (Yard)	+/- 1/16" [+/-1 mm]	+1/8",-1/16" [+3,-1 mm]	+/- 3/16" [+/- 5 mm]	3/8" [9 mm]	3/8" [9 mm]	1/2" [13 mm]	1/2" [13 mm]
Ballasted timber cross ties (Yard)	+3/16", -1/16" [+5, -1 mm]						
Direct Fixation	+1/8",-1/16" [+3, -1 mm]	+1/8",-1/16" [+3,-1 mm]	+/- 1/8" [+/- 3 mm]	1/4" [6 mm] [2]	1/4" [6 mm] [3]	1/4" [6 mm]	1/4" [6 mm]
Embedded	+1/8",-1/16" [+3, -1 mm]	+1/8",-1/16" [+3,-1 mm]	+/- 1/8" [+/- 3 mm]	1/4" [6 mm] [2]	1/4" [6 mm] [3] [4]	1/4" [6 mm]	1/4" [6 mm]

(1) Deviation is the allowable construction discrepancy between the standard theoretical designed track and the actual constructed track.

Track Installation – ROC Criteria

(1) Deviation is the allowable construction discrepancy between the standard theoretical designed track and the actual constructed track.

(2) Deviation (horizontal) in station platform areas shall be: zero inches [millimeters] toward platform, 0.125 inches [3 millimeters] away from platform.

(3) Deviation (vertical) in station platform areas shall be: plus 0, minus 0.25 inches [6 millimeters] or in conformity with current ADAAG requirements.

(4) Deviation at top of rail to adjacent embedment surface shall be plus 0.25 inches [6 millimeters] minus 0.

(5) Rate of change variations in gauge, horizontal alignment, vertical alignment, cross level, and track surface shall be limited to 0.125 inches [3 millimeters] per 15 feet [4.6 meters] of track.

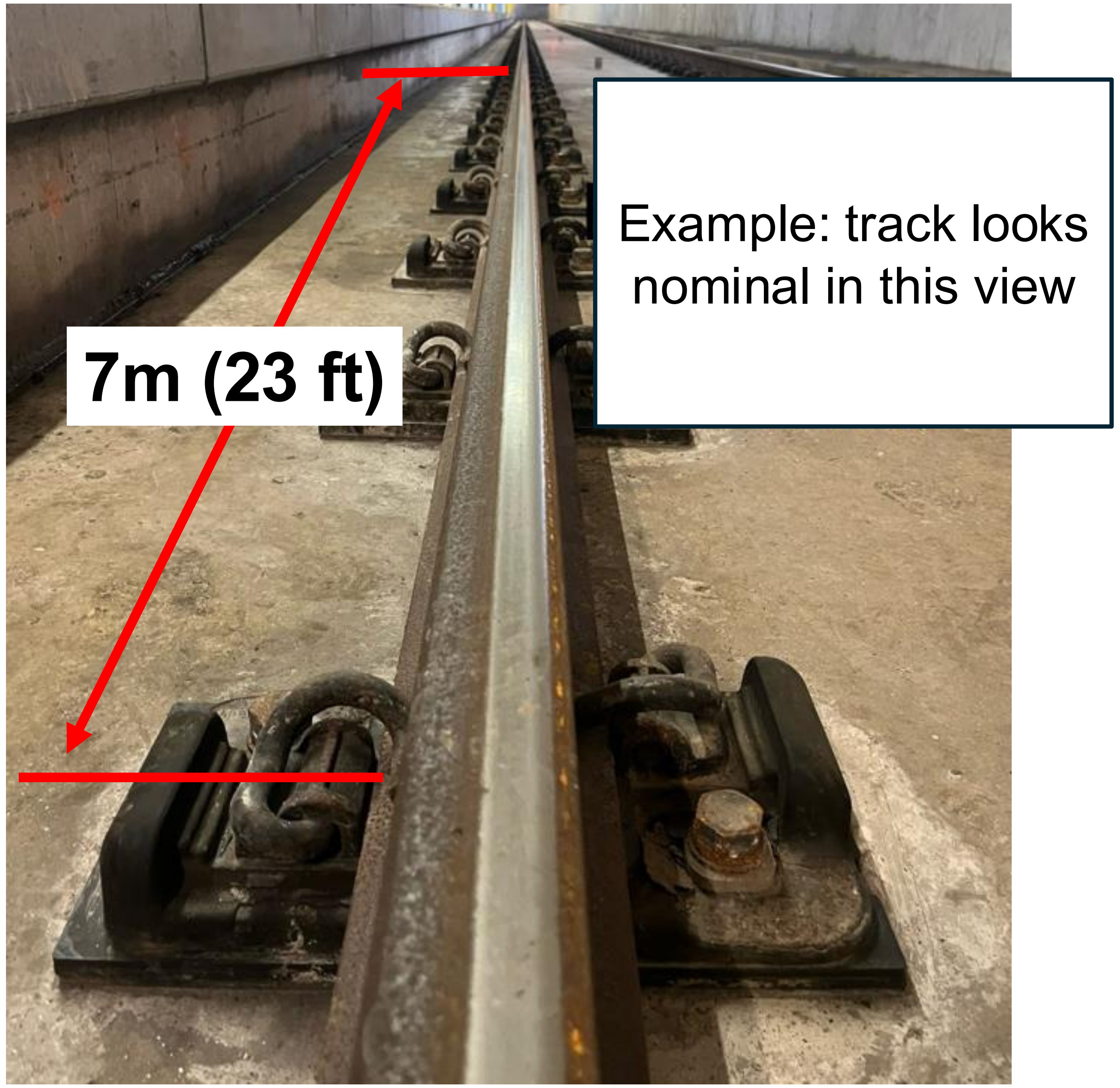
(6) Variable is the allowable construction discrepancy between the theoretical mathematized and the actual as-built locations of the track. Tracks adjacent to fixed structures shall consider the as-built tolerances of the structures.

ALSTOM
· mobility by nature ·

DF Rail Fasteners

PRINCIPLES COURSE

Rail Fasteners @ 750mm spacing



ALSTOM · mobility by nature ·

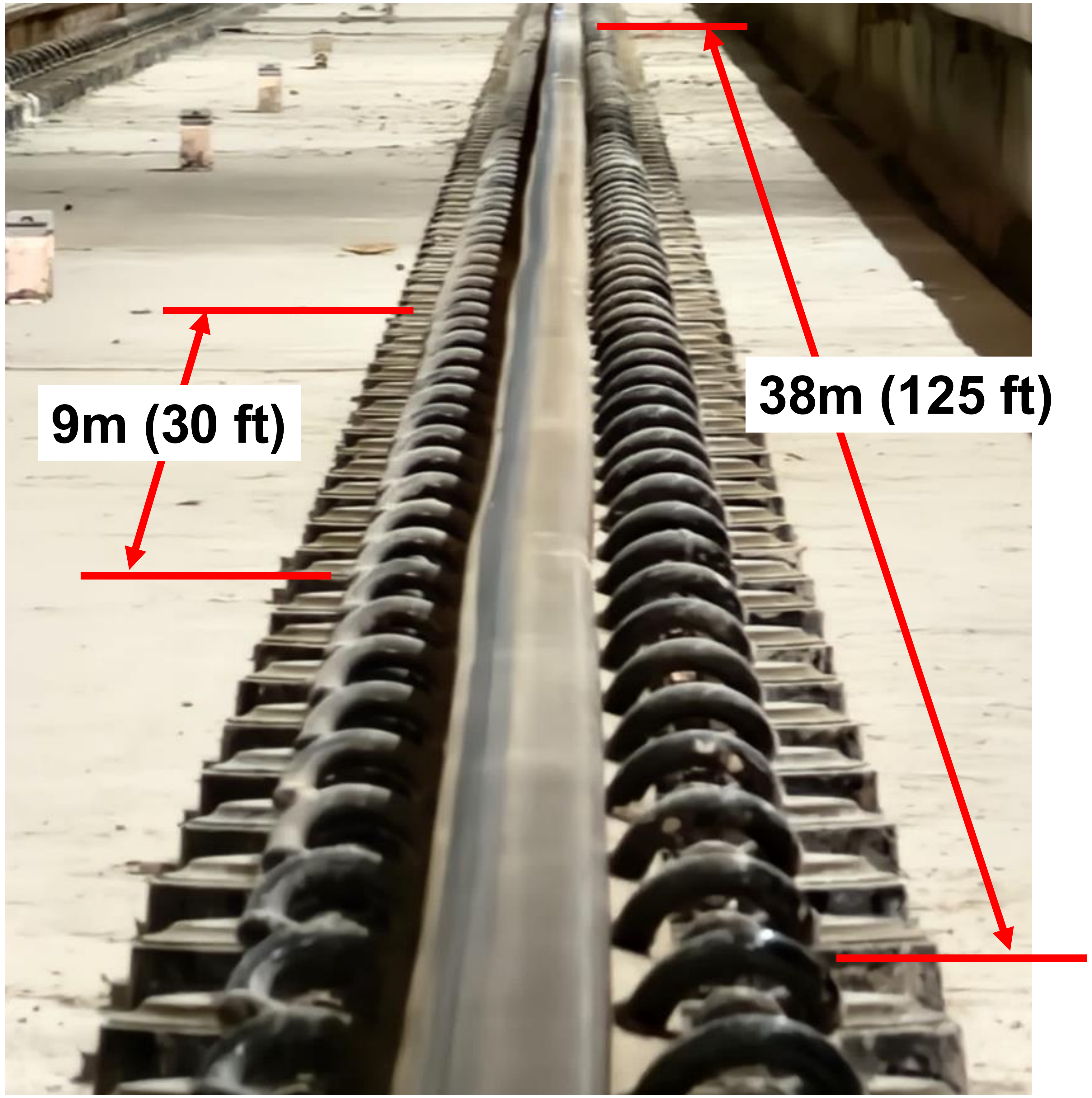
Case Study

TCRP ROC Criteria - Horizontal Deviation:
3mm / 4.6m change limit (1/2 wave)

Shown - Rail Fasteners @ 750mm spacing

Shown - Embedded Track wave @ 3mm / 9m (30 ft) pitch often 150-200m length.

At 35kph, Horizontal cyclic input frequency to bogie @ >1.1 Hz impacting ride quality



PRINCIPLES COURSE

PRINCIPLES COURSE

ALSTOM · mobility by nature ·

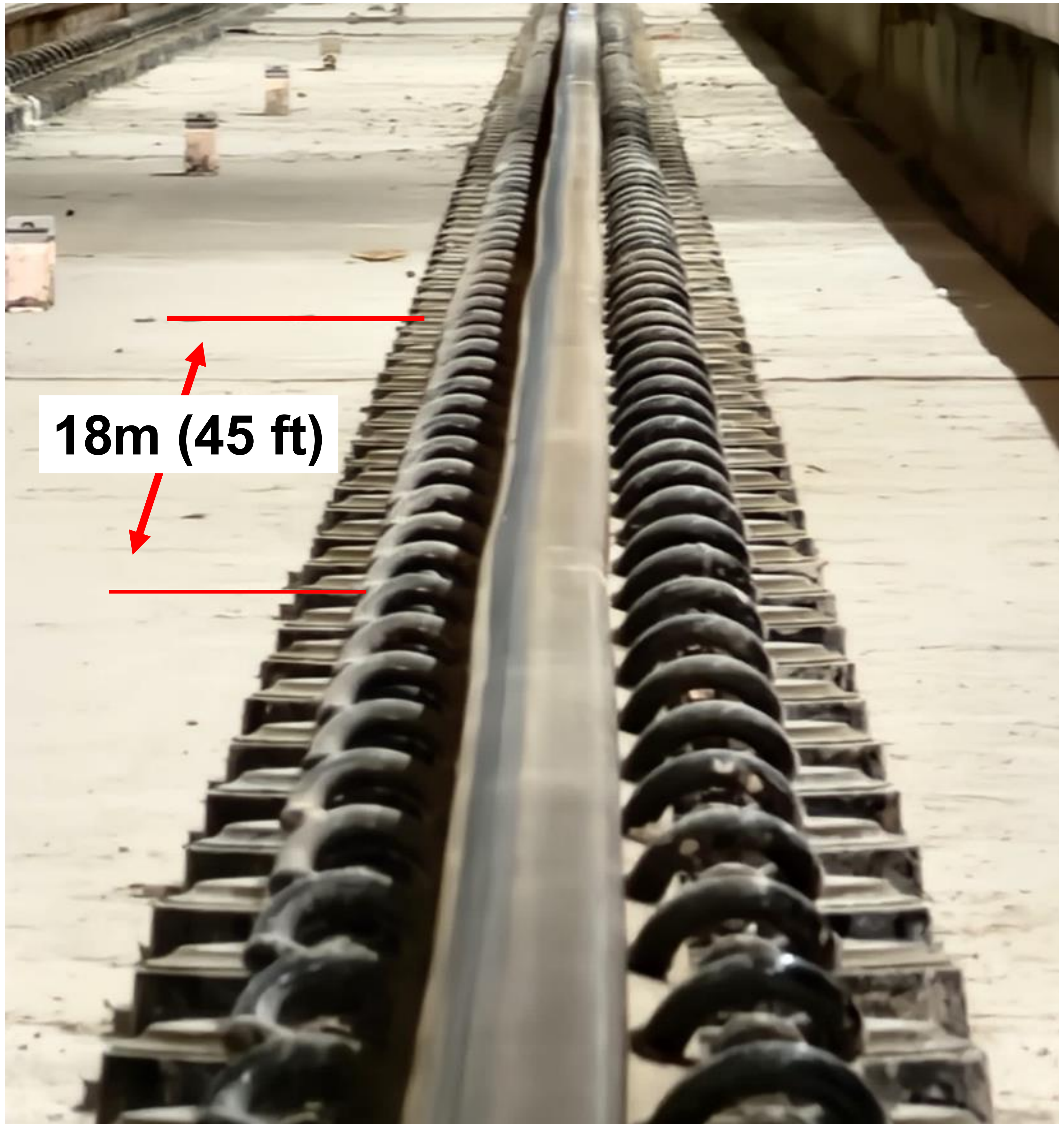
Case Study

Class A ROC Criteria – Horizontal Deviation:
3mm / 9m change limit (1/2 wave)

Example - Embedded Track wave @ 3mm / 18m (45 ft) pitch often 150-200m length.

At 35kph, Horizontal cyclic input frequency to bogie @ >0.55Hz

Improved ride quality

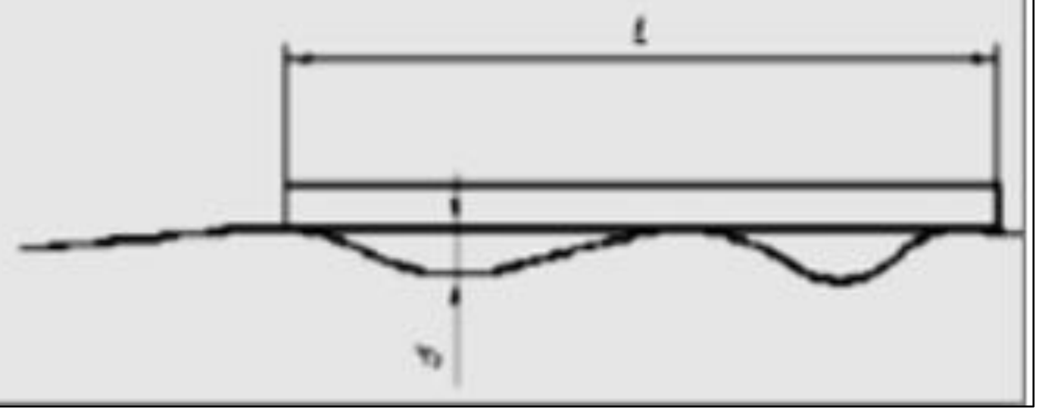


ALSTOM · mobility by nature ·

Track Straightness – Improves ROC

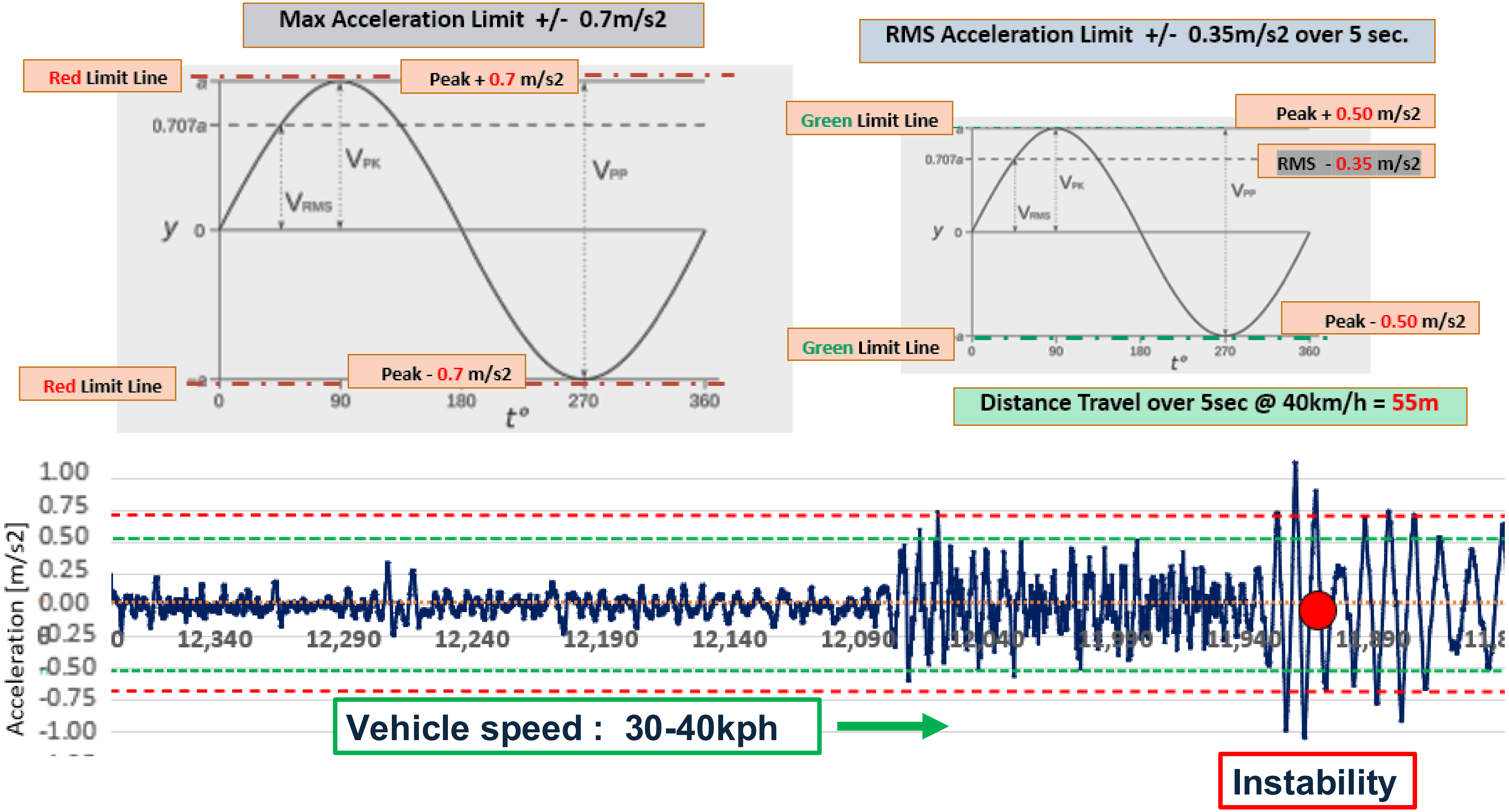
When specifying 115RE rails for new track installations consider **Class A** requirements for rail straightness (**3mm/10m ROC**) vs TCRP standard **Class B** with **3mm/4.6m** ROC.

		Class B		Class A	
		d	*L*	*d*	*L*
Vertical flatness	V	≤ 0,4 mm	3 m [c]	≤ 0,3 mm	3 m [c]
		and		and	
		≤ 0,3 mm	1 m [c]	≤ 0,2 mm	1 m [c]
Horizontal flatness	H	≤ 0,6 mm	1,5 m [c]	≤ 0,45 mm	1,5 m [c]



ALSTOM
· mobility by nature ·

Case Study – Poor Ride Quality

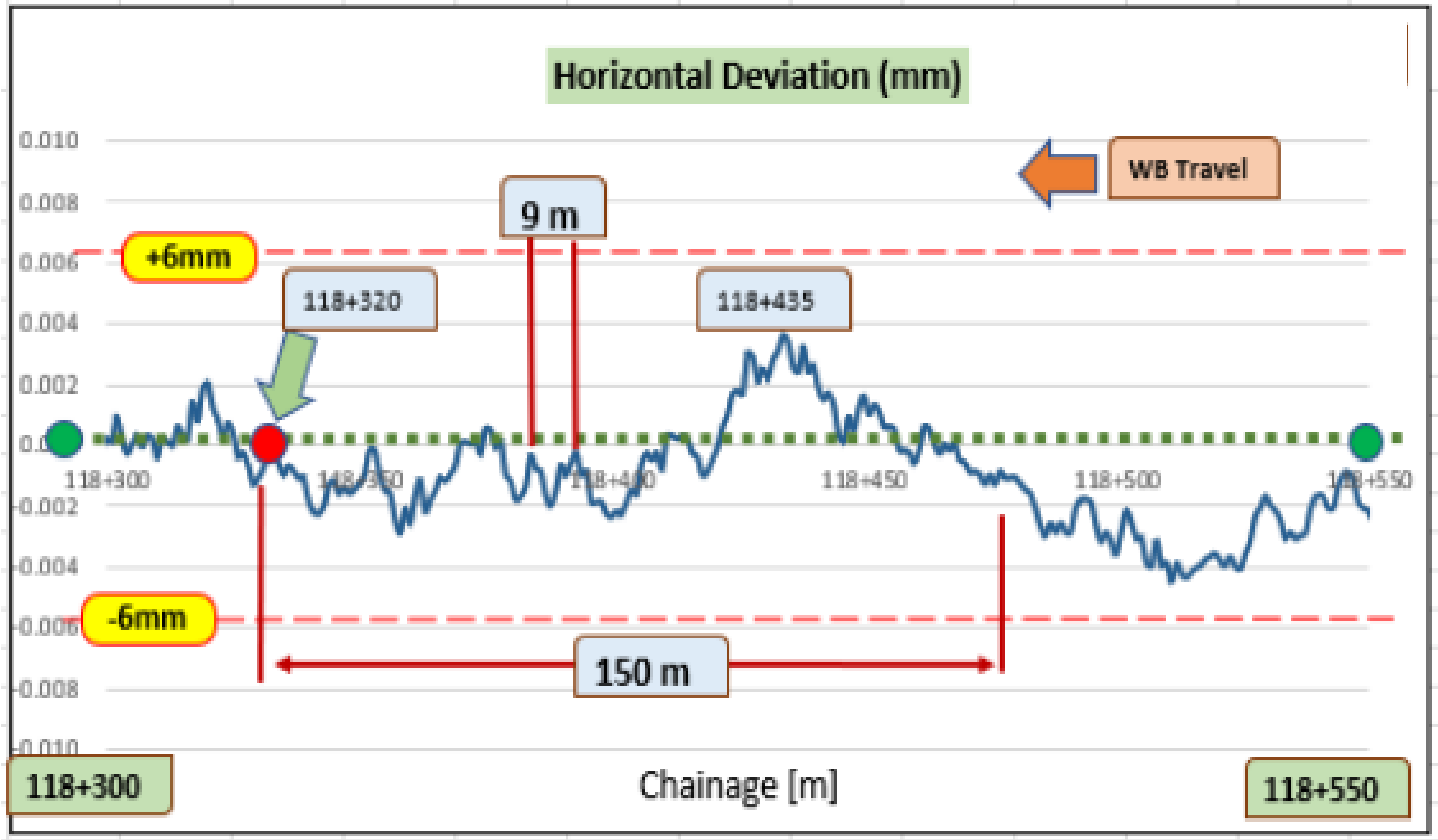


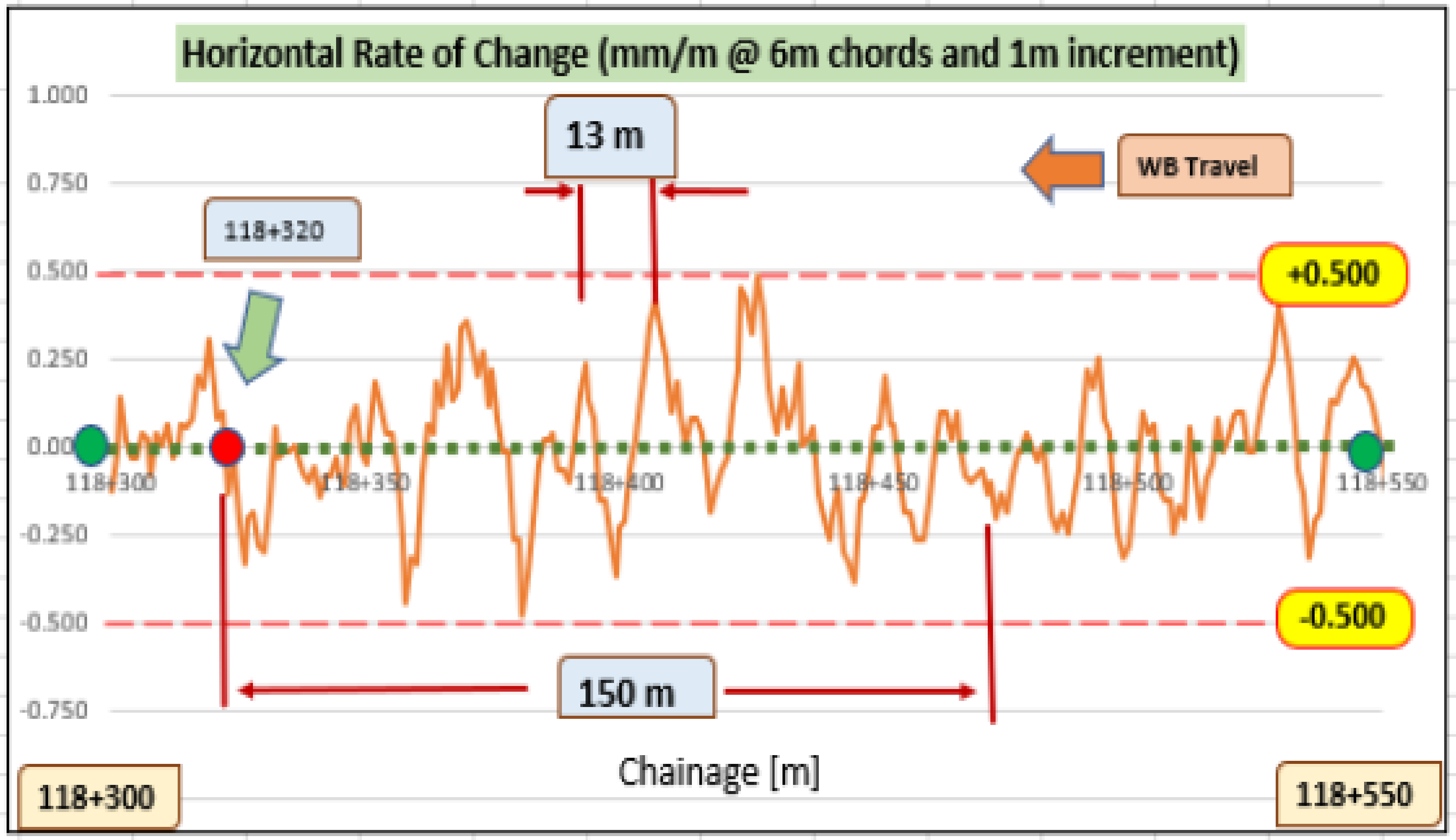
Measuring Track Survey Data – Gauge, Vertical, and Horizontal Deviations

GEDO survey tool identifies each rail head position to within +/-1mm accuracy

ALSTOM · mobility by nature ·

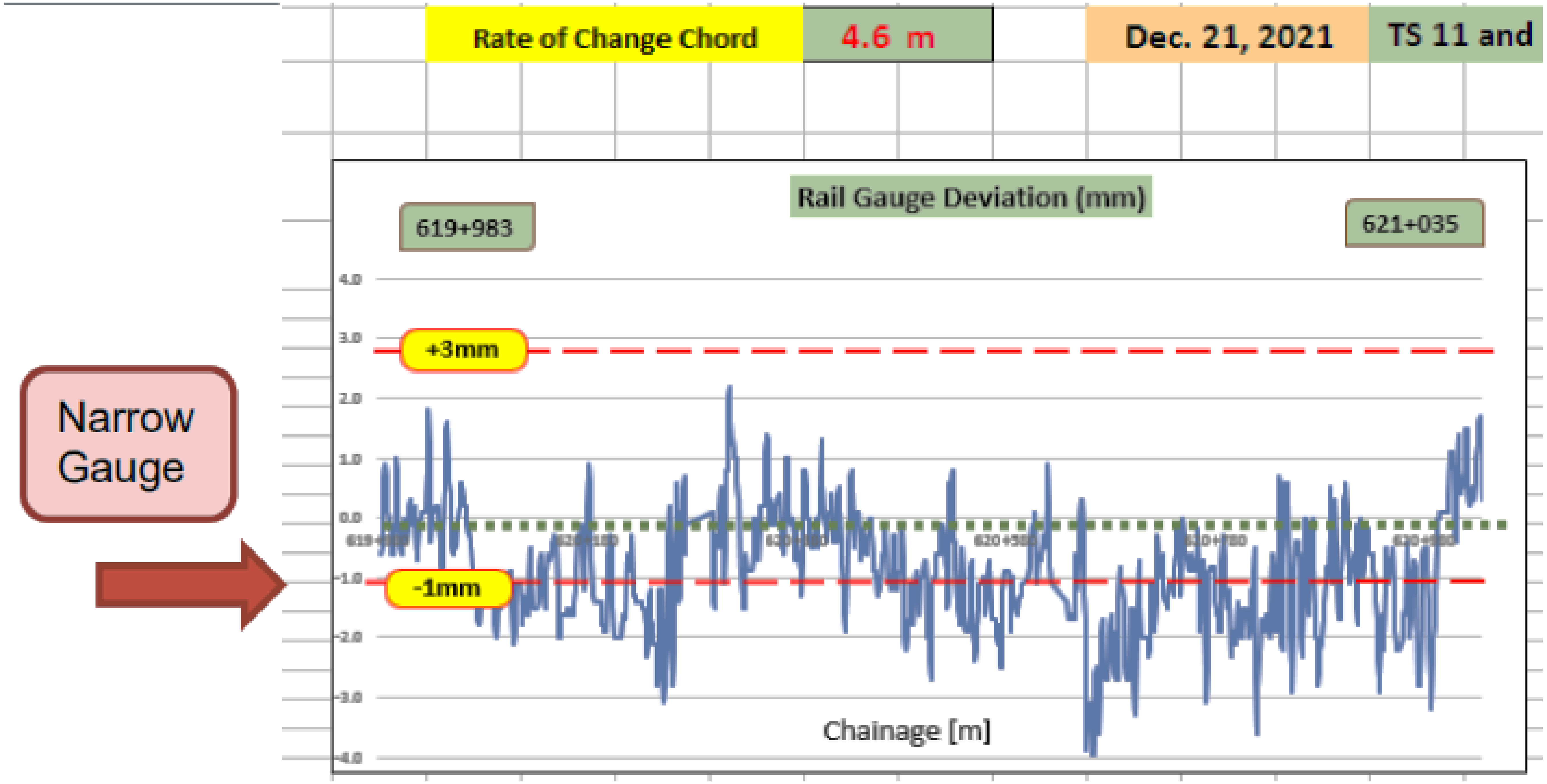
Case Study – Analysis of Horizontal Deviations and *ROC* towards identifying and correcting ride quality





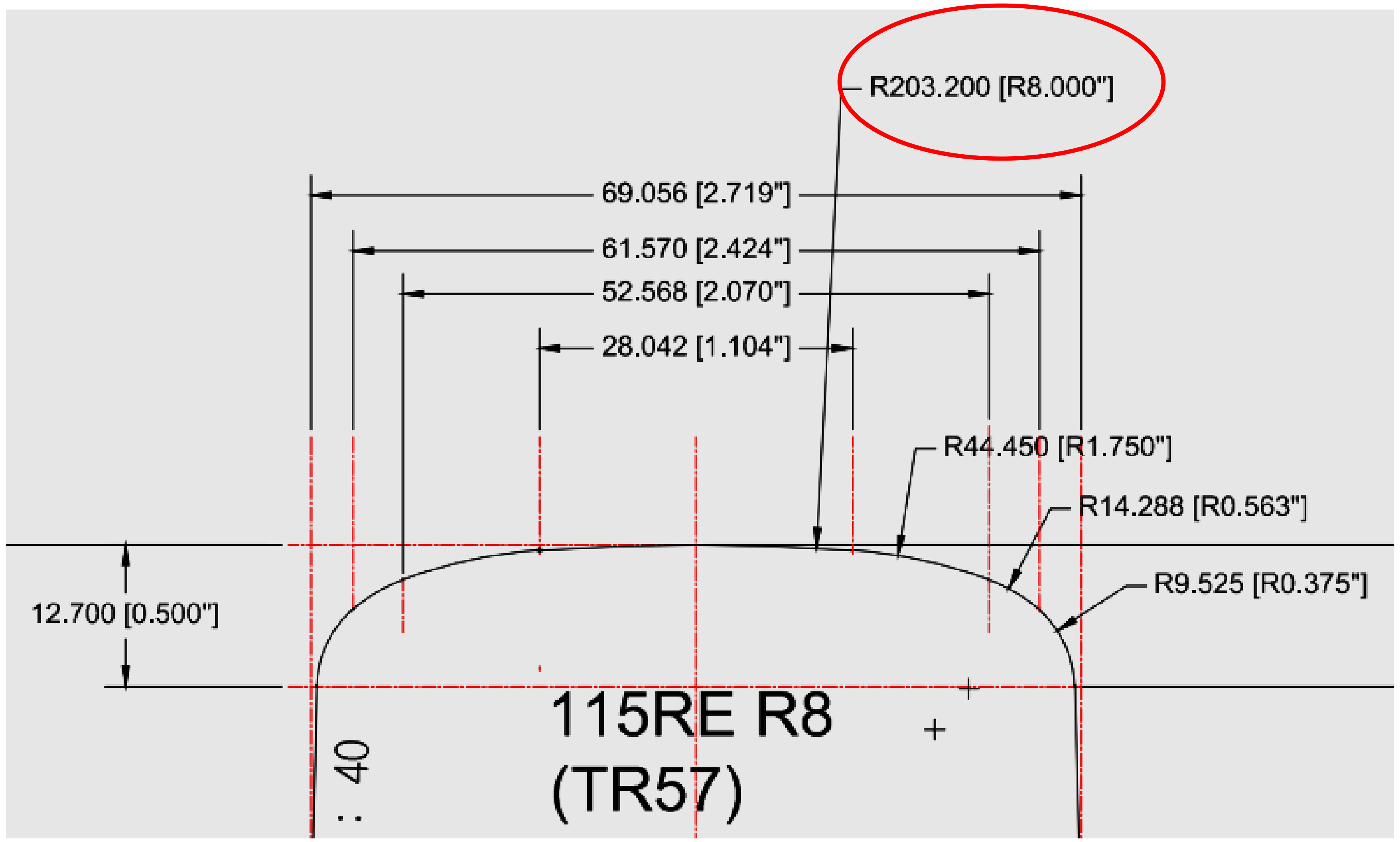
PRINCIPLES COURSE

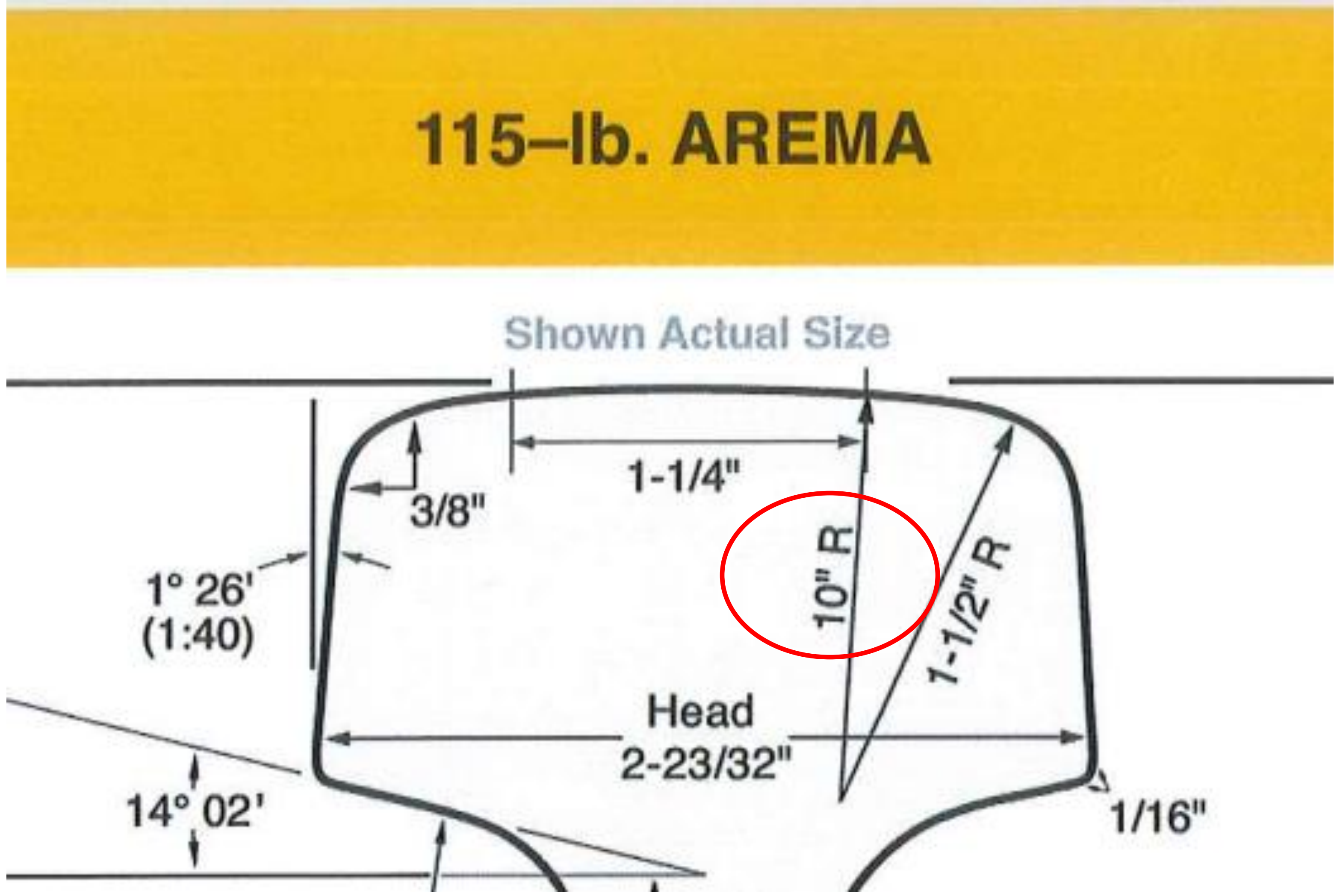
Case Study – Analysis for locating and correcting Narrow Gauge problems



ALSTOM · mobility by nature ·

Rail Head Profile – 115RE 8” or 10” radius





Due to improved stability, Transit wheel profiles optimized for 8” head radius

Rail head has flatter profile for freight wheels

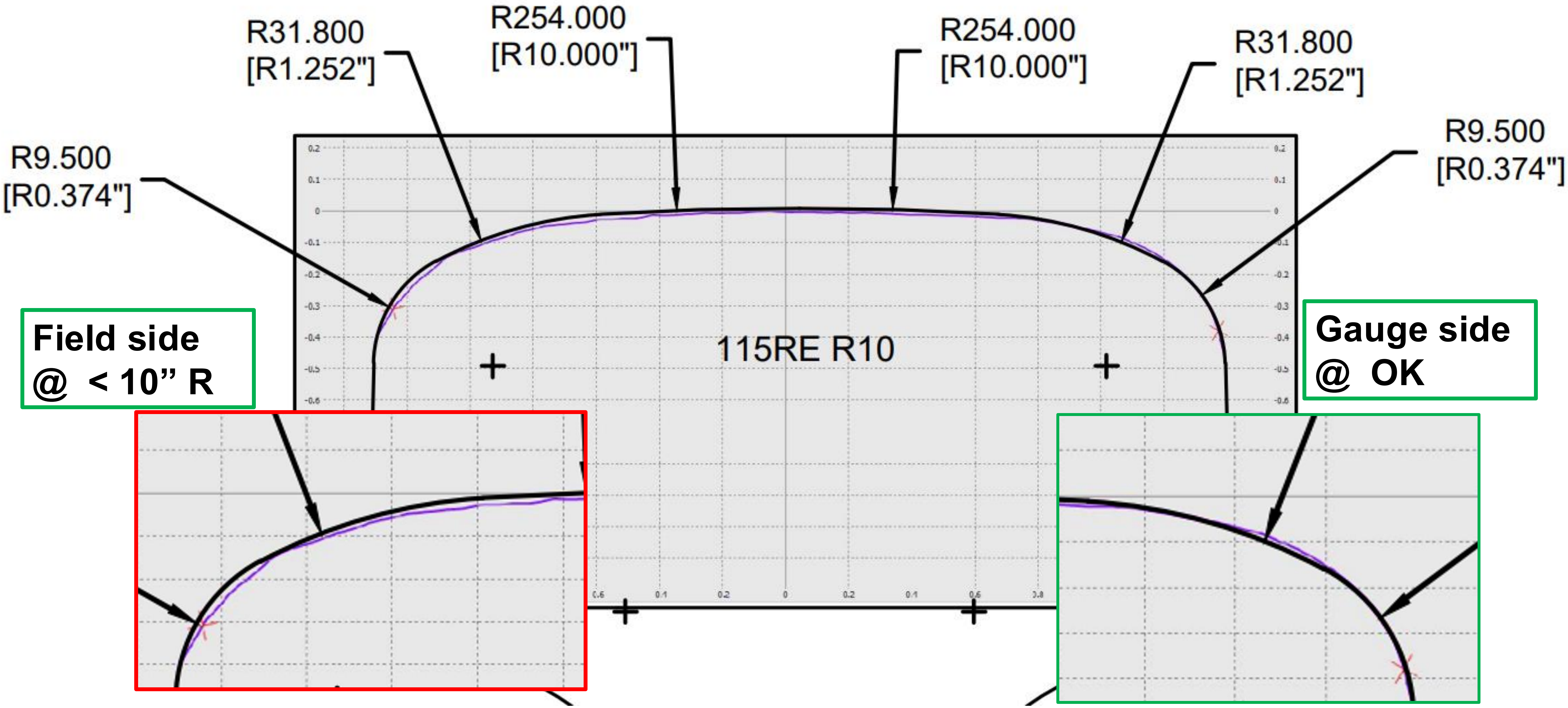
ALSTOM
• mobility by nature •

Case Study - Measuring 115RE Rail Head Profile with MiniProf Tool (*no cant*)

PRINCIPLES COURSE

ALSTOM
• mobility by nature •

Comparative Analysis with 115RE 10" Rail Head Profile

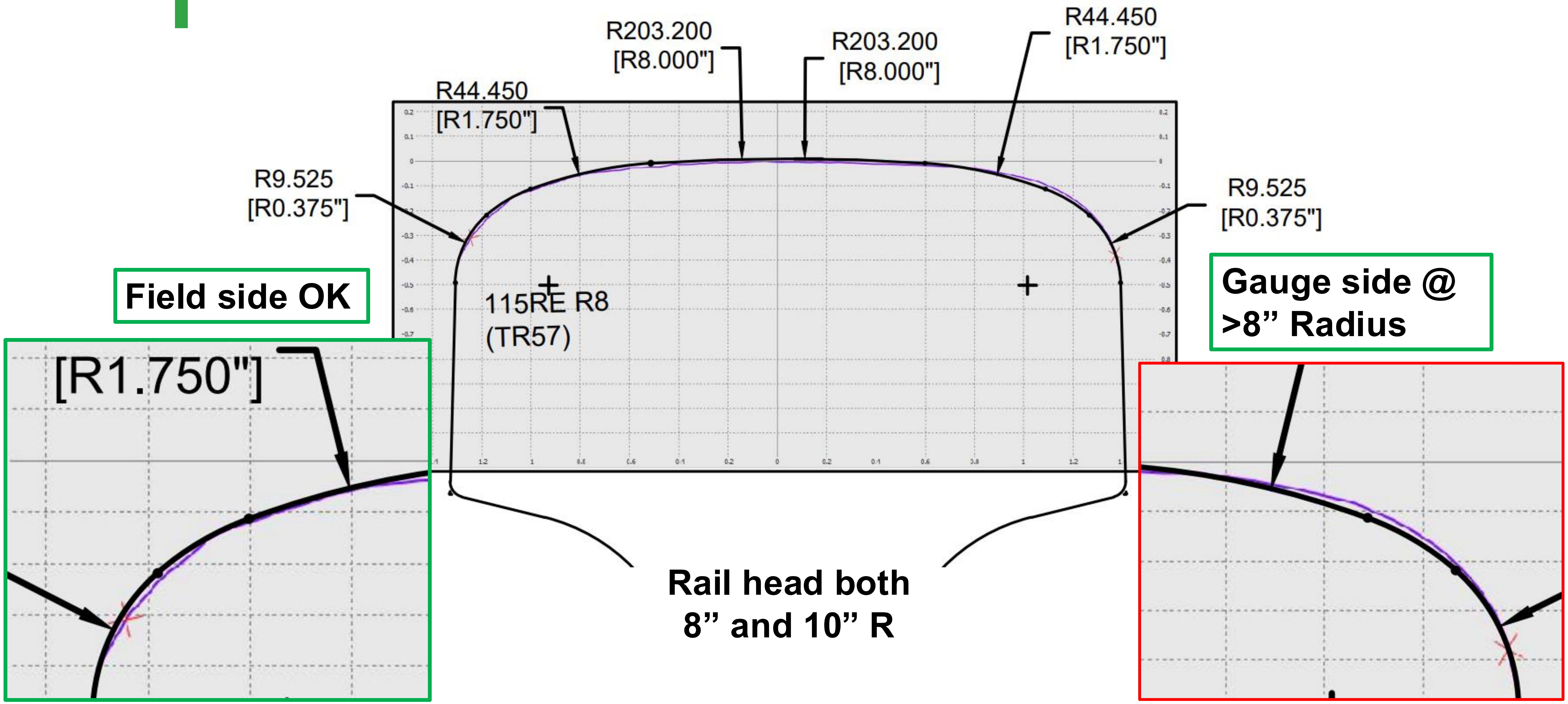


Field side @ < 10" R

Gauge side @ OK

ALSTOM · mobility by nature ·

Comparative Analysis with 115RE 8" Rail Head Profile



PRINCIPLES COURSE

ALSTOM
· mobility by nature ·

PRINCIPLES COURSE

AREMA Tolerance - 115RE Rail Head

Table 4-2-2. Section Tolerances

Description	Tolerance, Inches			
	Rail		Trackwork Rail	
	Plus	Minus	Plus	Minus
Height of rail (measured within one foot from end)	0.030	0.015	0.030	0.015
Width of rail head (measured within one foot from end)	0.025	0.025	0.015	0.015
Thickness of web	0.040	0.020	0.040	0.020
Fishing template standout	0.060	0.000	0.030	0.000
Asymmetry of head with respect to base	0.050	0.050	0.030	0.030
Width of base	0.040	0.040	0.030	0.030
Flange height	0.025	0.015	0.015	0.015

Note 1: Base concavity shall not exceed 0.010 inch. Convexity is not permitted.
Note 2: No variation will be allowed in dimensions affecting the fit of the joint bars, except that the fishing template may stand out not to exceed 0.060 inch laterally.
Note 3: All four corners of the rail base shall have the radii according to the drawing ±1/32 inch. Any disputes shall be analyzed on an Optical Comparator.
Note 4: The section of the rails to be used in AREMA trackwork shall conform to the design specified by the purchaser subject to the tolerances listed under trackwork rail above.
Note 5: Head radius to be within (±) 2 inches per Figure 4-2-40.
Note 6: On up to 5% of the order, the height of the rail plus tolerance can be between 0.030 and 0.040 inches, if the purchaser's authorized representative and the manufacturer agree. This exception does not apply to trackwork rail.

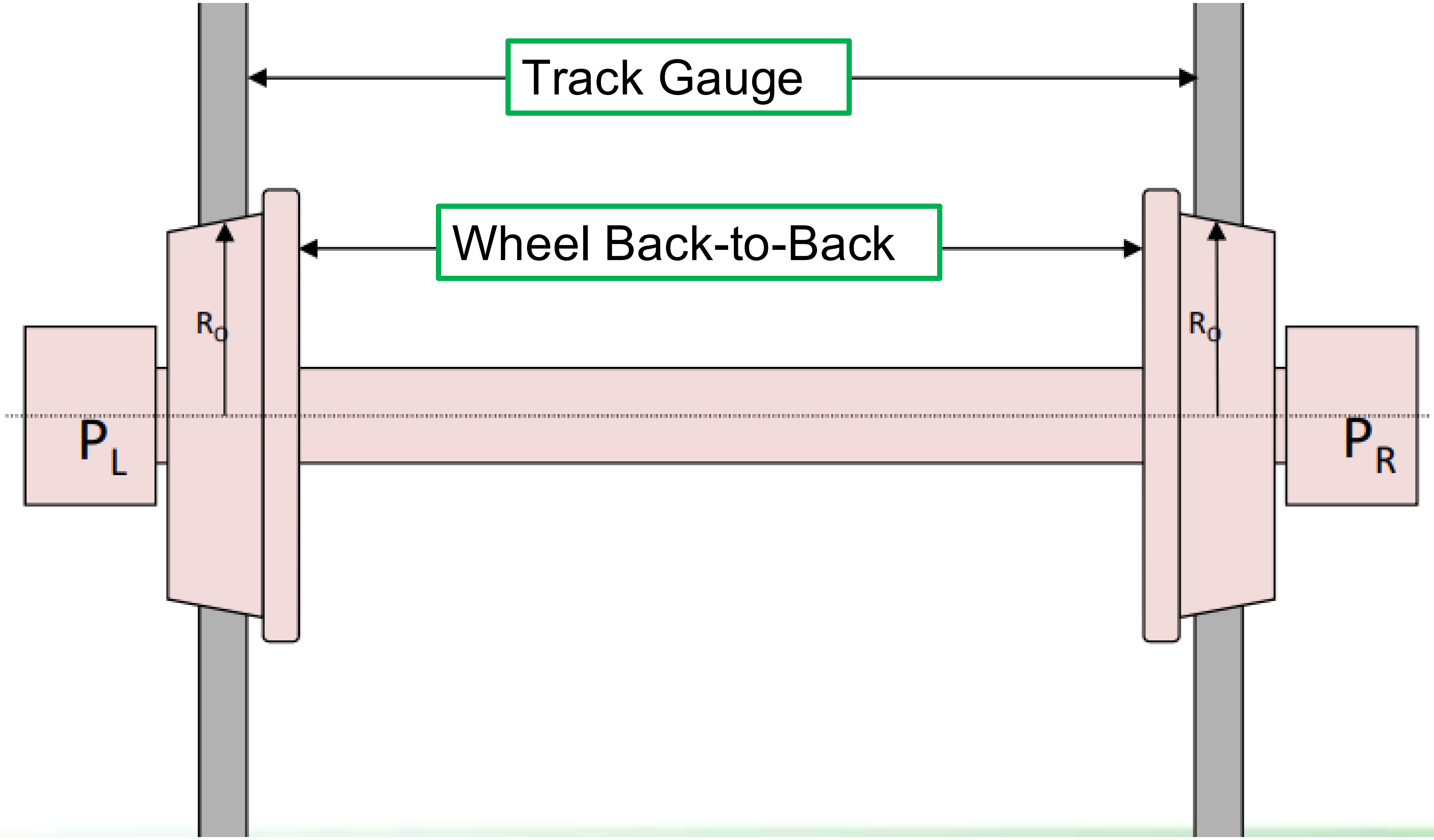
ALSTOM
• mobility by nature •

PRINCIPLES COURSE

- Transit Vehicle Suspension
- Track Influence on Stability
- **Wheel-to-Rail Interface Criteria**
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- Dynamic Modeling – Normal vs Improved
- Conclusion

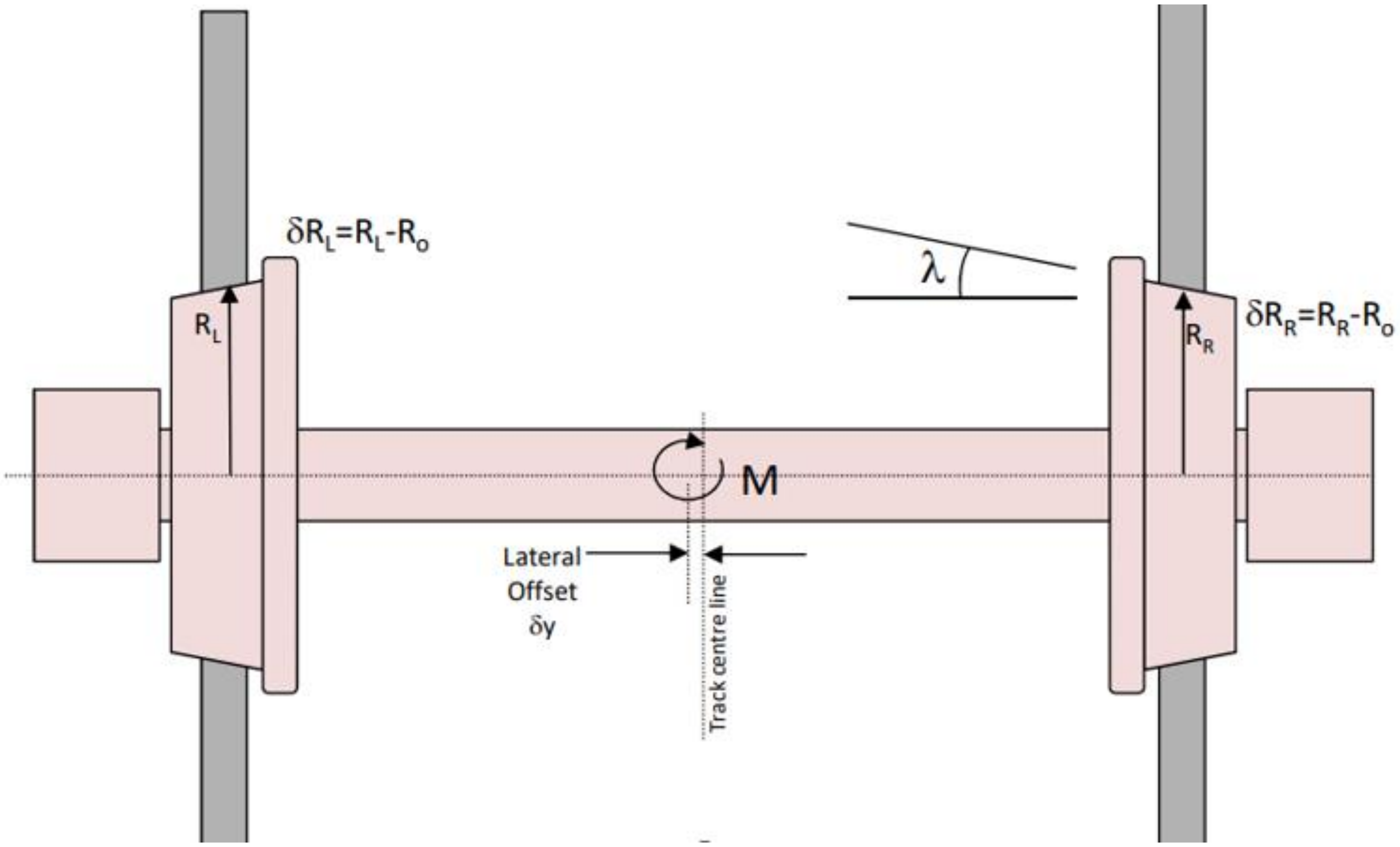
ALSTOM
· mobility by nature ·

Vehicle Steering - Tangent track



ALSTOM · mobility by nature ·

Vehicle Steering - Tangent track

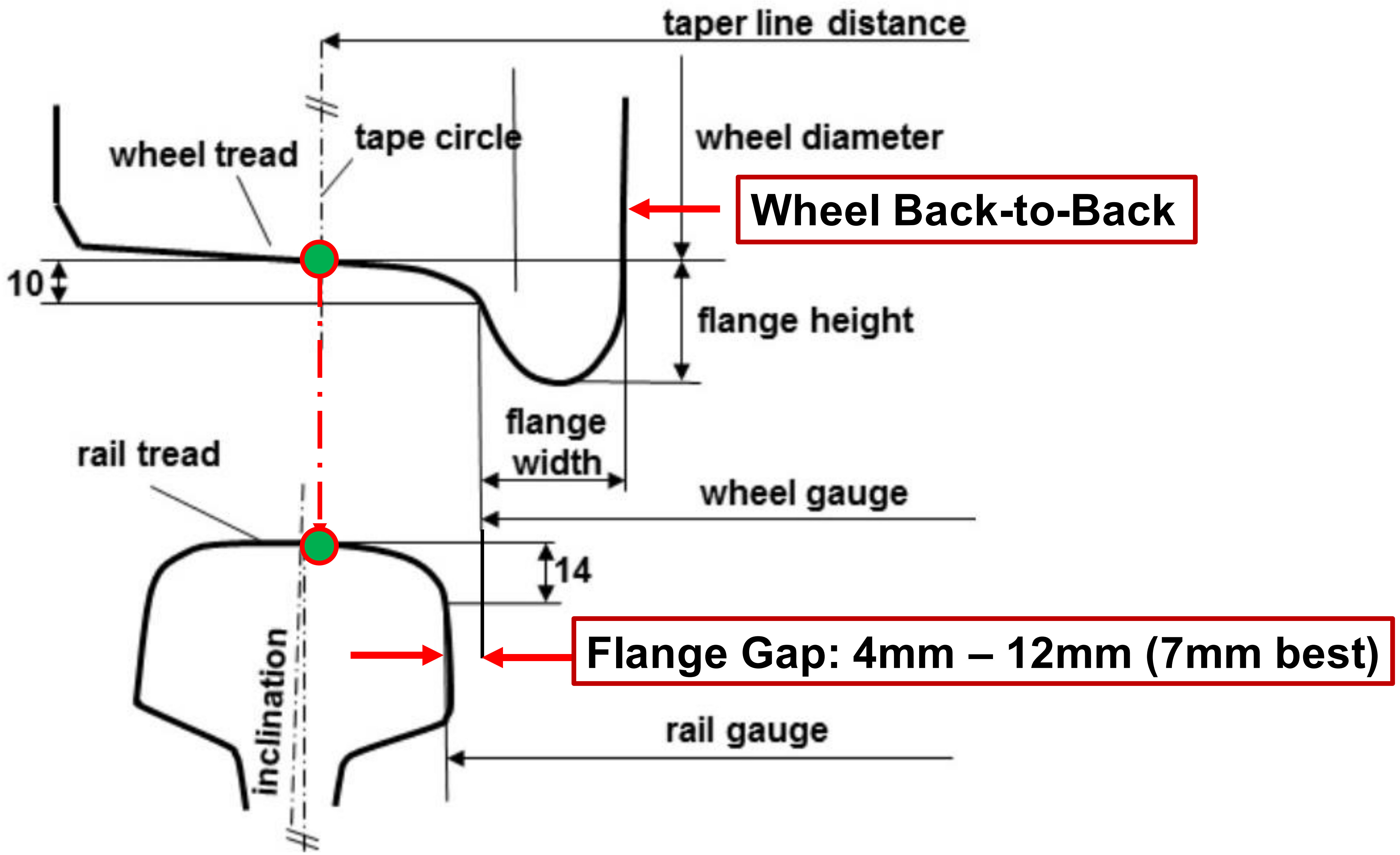


PRINCIPLES COURSE

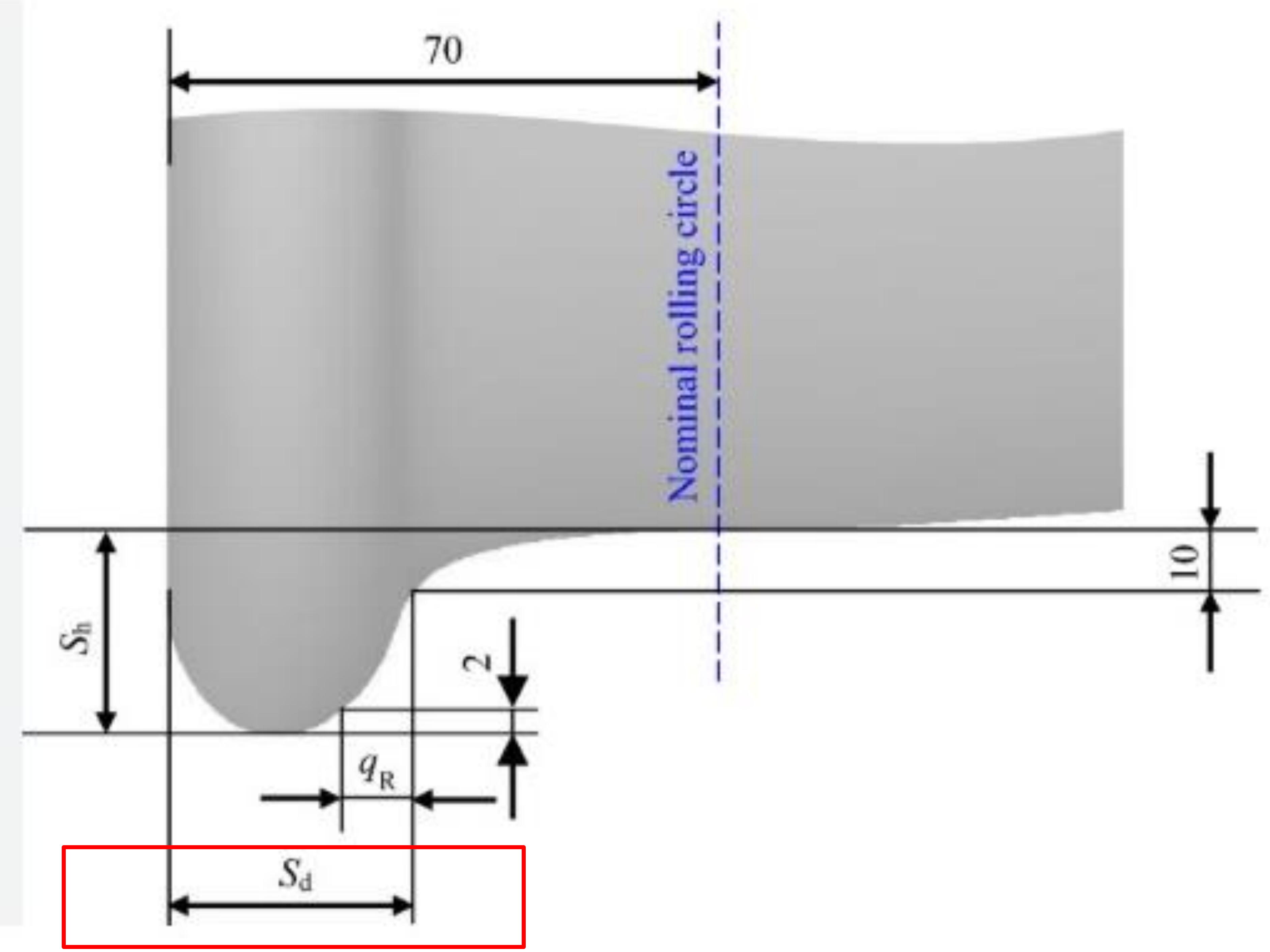
ALSTOM
· mobility by nature ·

PRINCIPLES COURSE

Wheel to Rail Interface Description



Typical Wheel Profile

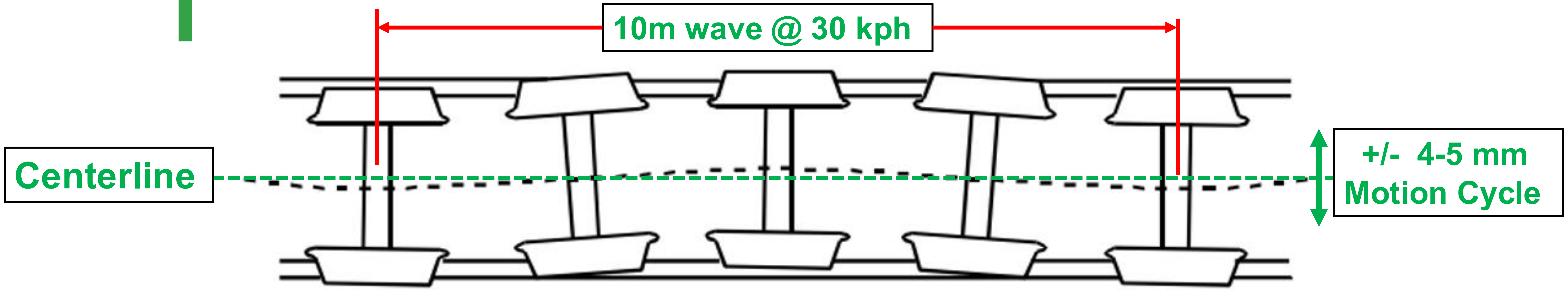


Parameter
S_h=Flange height
S_d=Flange thinkness
q_R = Flange slope quota

Limit value
27.5 mm ≤ S_h ≤ 36 mm
22 mm ≤ S_d ≤ 33 mm
6.5 mm ≤ q_R

ALSTOM · mobility by nature ·

Motion of a Free Wheelset

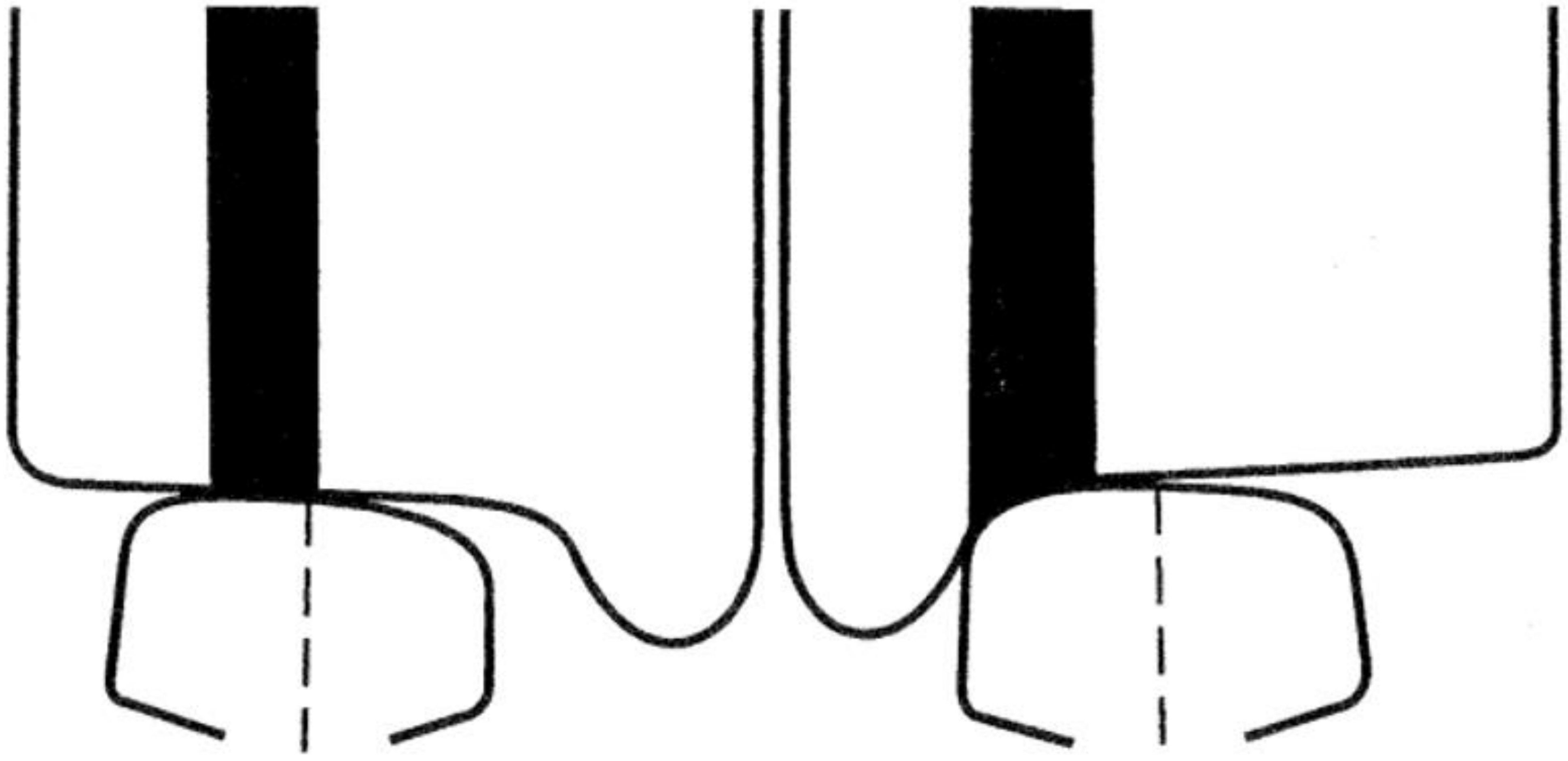


If a free wheelset is rolling along the track, starting from a displaced position, then it will initially steer itself towards the centreline of the track as a result of the rolling radius difference. As it reaches the centreline of the track it will have a yaw angle to the track, and so it will continue to roll towards the other side of the track, and so on.

This oscillatory motion along the track is known as the wheelset kinematic motion, and depends only on the geometry of the system, in particular the effective conicity of the wheelset, the wheel radius and the track gauge.

ALSTOM
· mobility by nature ·

Asymmetric profiling - improves developing rolling radius difference (△R) for steering on tangent and curved track

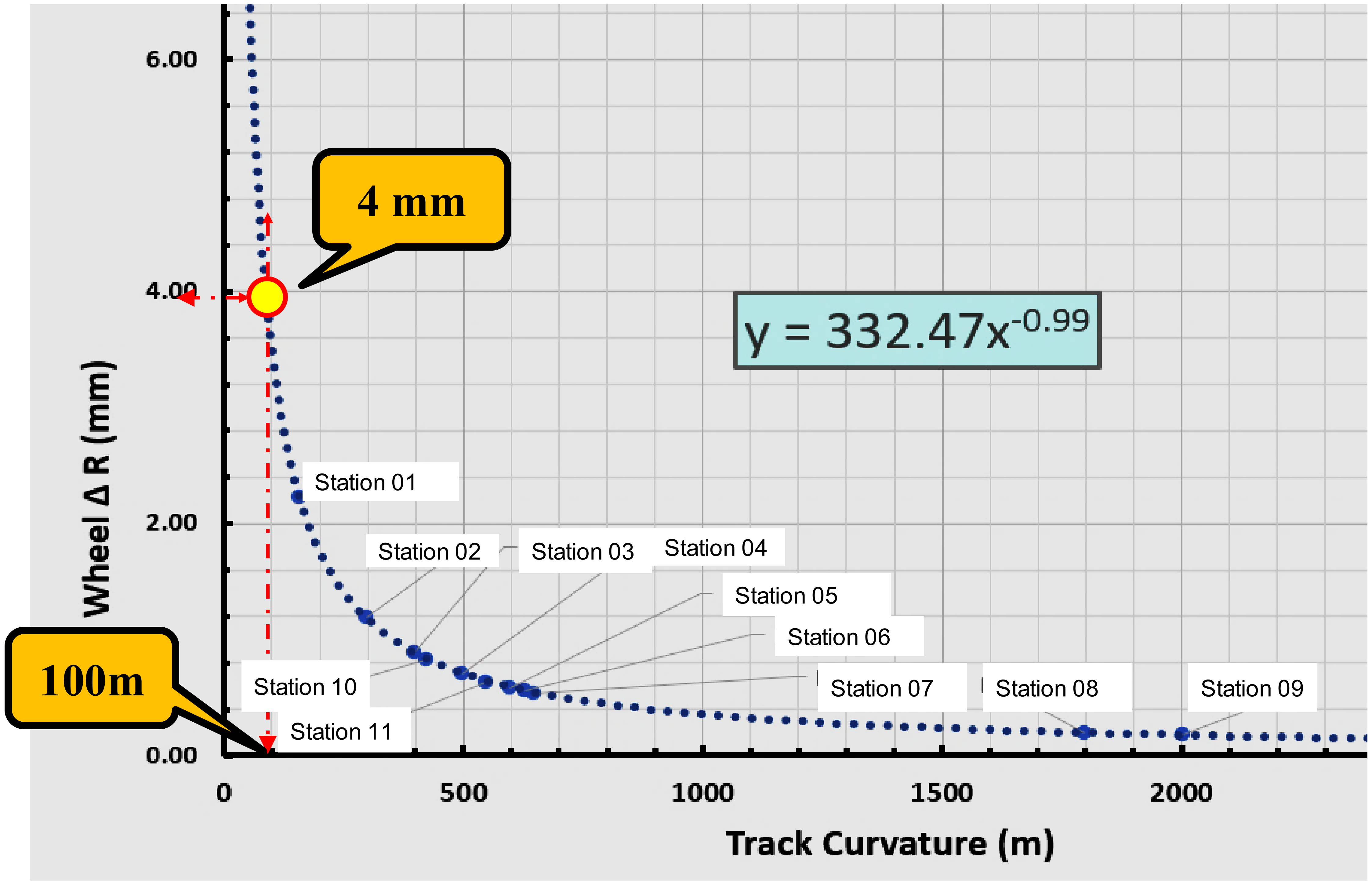


PRINCIPLES COURSE

ALSTOM · mobility by nature ·

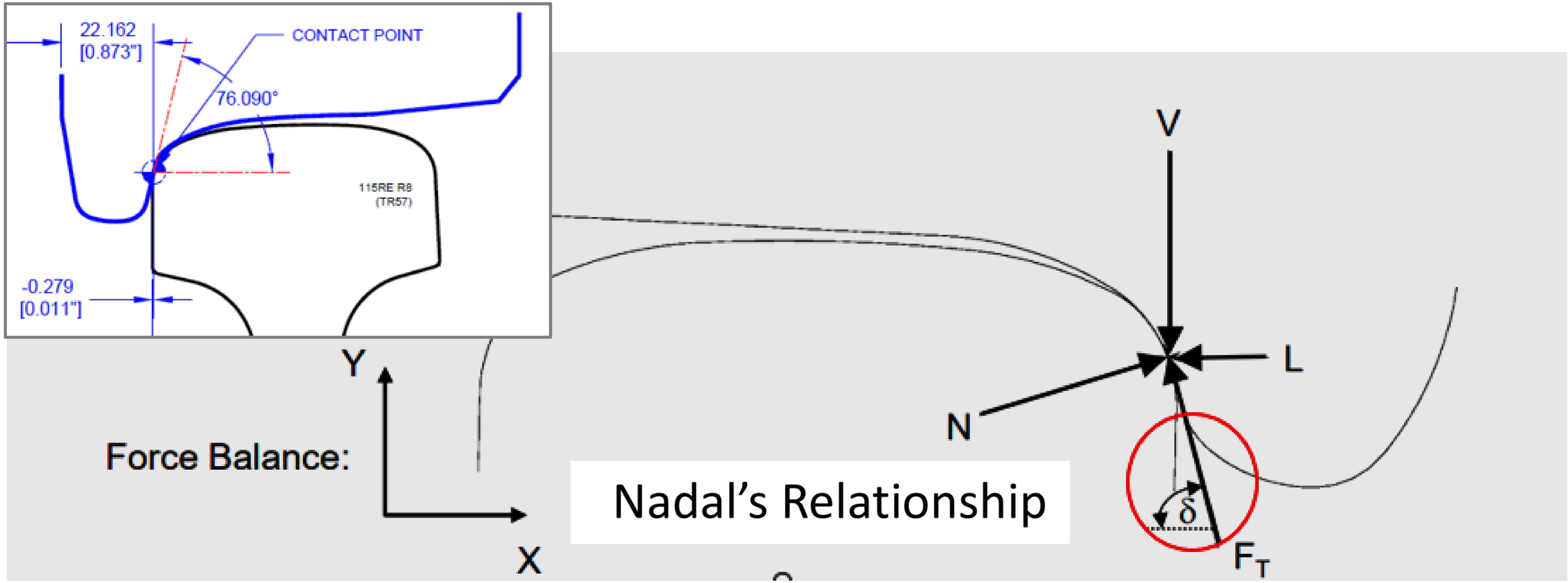
PRINCIPLES COURSE

Case Study – Typical ΔR for Curves



ALSTOM · mobility by nature ·

Safety flange angle (75 degree) - critical for preventing wheel climb through sharp curves



PRINCIPLES COURSE

ALSTOM
• mobility by nature •

PRINCIPLES COURSE

- Transit Vehicle Suspension
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- **Wheel Profile Sensitivity**
- Improving Wheel Profiles
- Dynamic Modelling – Normal vs Improved
- Conclusion

ALSTOM
· mobility by nature ·

Wheel Profile Sensitivity

The optimization of the wheel profile requires unique target requirements for each of the following design parameters:

- Effective conicity
- One-point contact
- Continuous increasing rate for wheelset Delta R
- Evenly distributed contact patch

Result, smooth wheelset steering on tangent and curves.

ALSTOM · mobility by nature ·

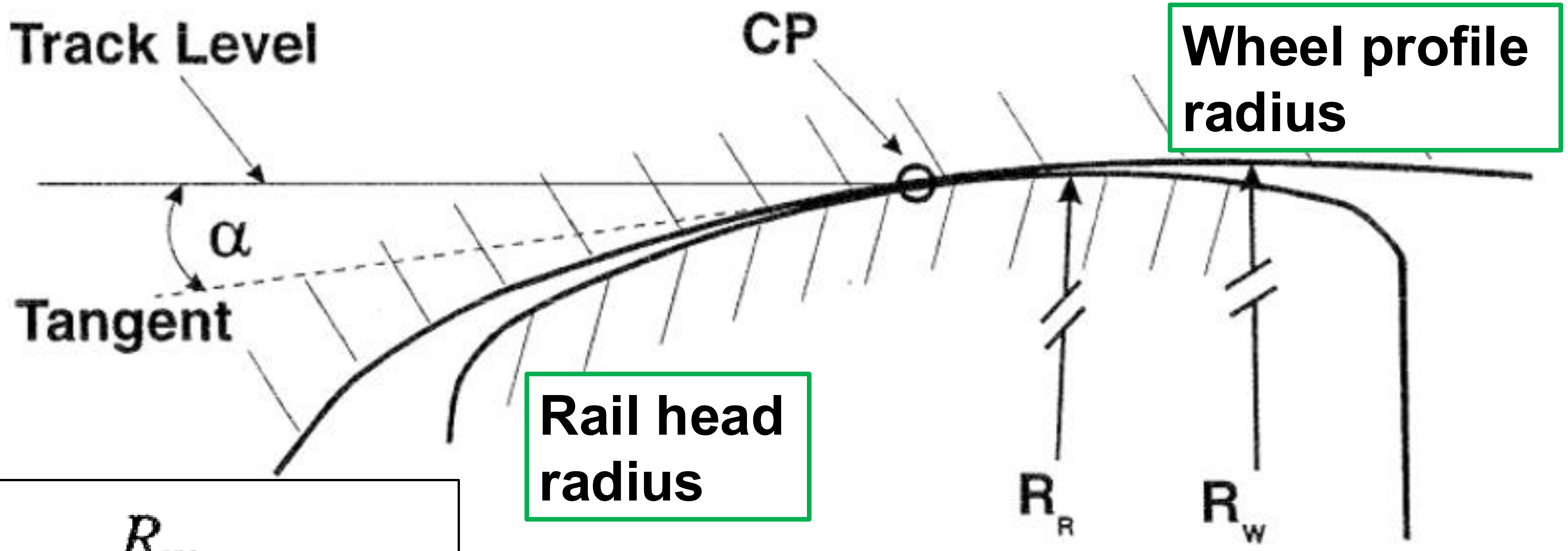
Effective Conicity (λ)

- When the rolling wheelset is offset on tangent rails, self-centering (steering) forces should normally act on the wheelset to ***maintain central position*** on the rail head.
- If the steering force is too low, or too high, the wheelset will overshoot and go too far to the other side where a new set of steering forces turn it back the other way.
- The wheelset is said to be **hunting** for the center position causing sinusoidal rail wear and rail corrugation. The hunting force is governed by a parameter known as the effective conicity.

PRINCIPLES COURSE

ALSTOM · mobility by nature ·

Single Point Contact (CP) - critical for Effective Conicity to govern stability and producing lower wheel / rail wear rates



$$\lambda = \frac{R_W}{R_W - R_R} \sin\alpha$$

Target Effective Conicity - between 0.1 and 0.2 on tangent track

ALSTOM
• mobility by nature •

Delta Radius on Tangent track (ΔR)

- Stability is achieved by optimizing the surface contact angle and Delta R * between the two axle wheels relative to track level.
- Too small, or too large, the resulting contact angle and radius difference starts instability along with increases in surface contact stress and higher wear rates.

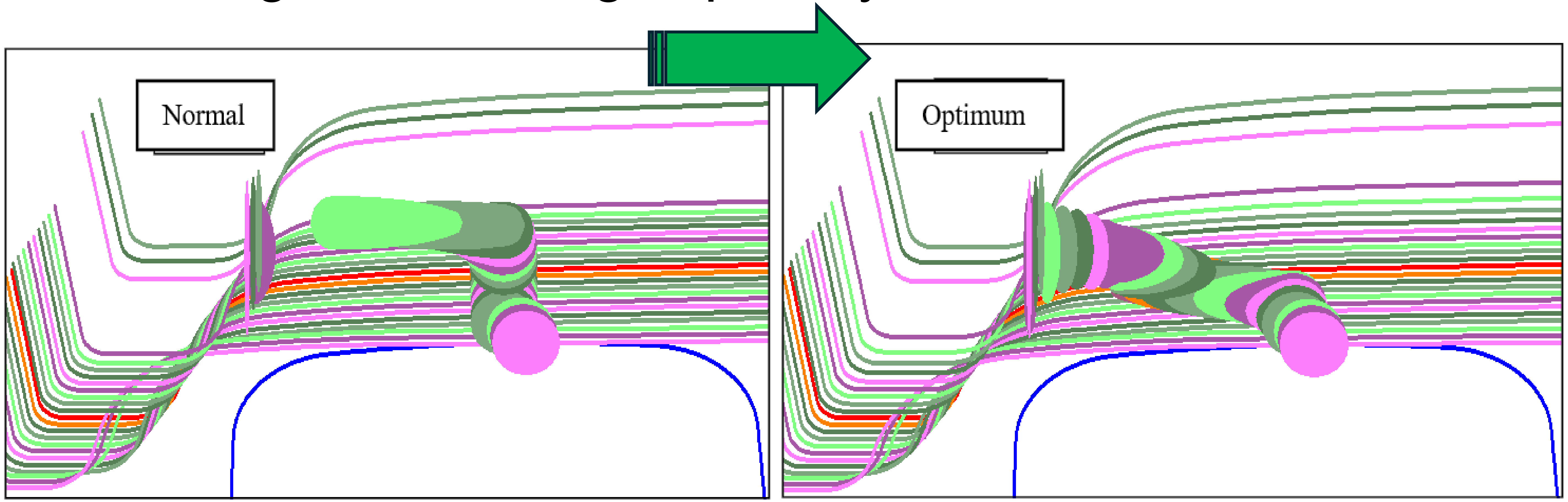
****Target* ΔR*: between 0.75 – 1.00 during 3–4mm offset***

PRINCIPLES COURSE

ALSTOM
• mobility by nature •

Evenly Distributed Contact Patch

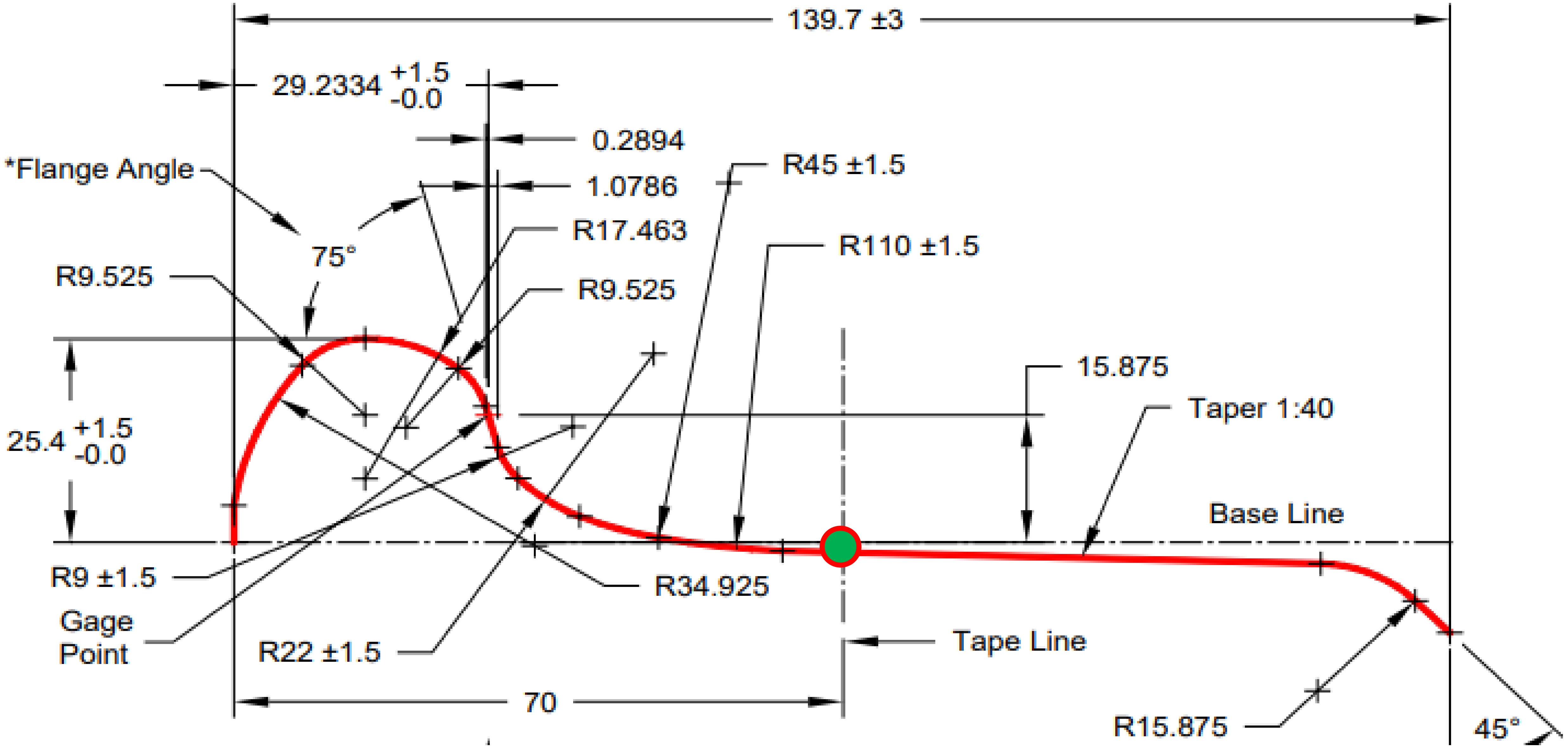
A uniformly distributed movement of the contact patch during lateral offset of the wheelset throughout the alignment equalizes wear and provides a more stable steering and tracking capability for the life of the wheelset.



- Transit Vehicle Suspension
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- **Improving Wheel Profiles**
- Dynamic Modeling – Normal vs Improved
- Conclusion

ALSTOM
· mobility by nature ·

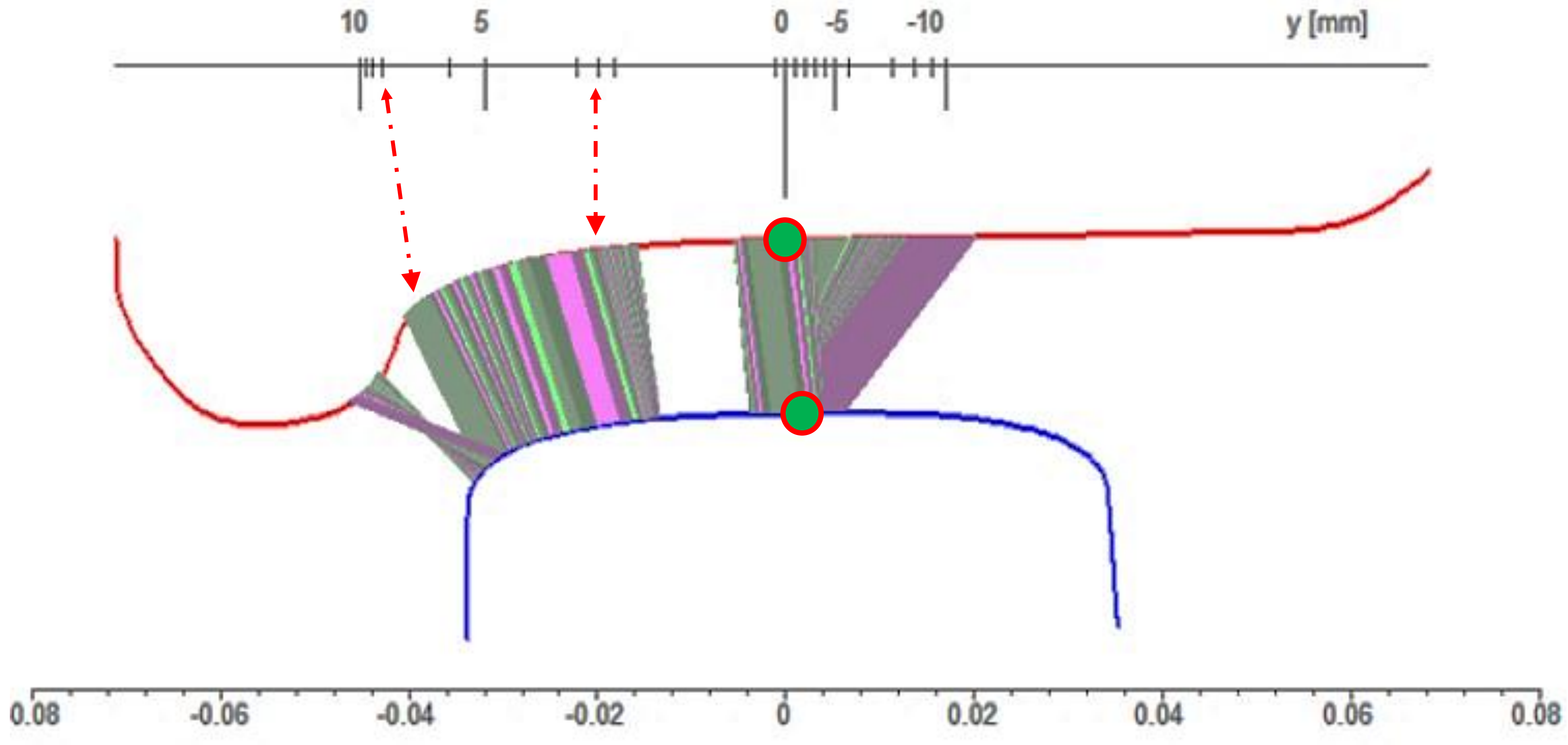
Case Study - APTA 340 Wheel Profile
(115RE_1:40 cant)



ALSTOM
· mobility by nature ·

Case Study – Normal Wheel/Rail Contact Points (115RE_10" radius, 1:40 cant)

For comparison, the plot below shows the modeling of the Contact Point distribution for the APTA 340 profile.

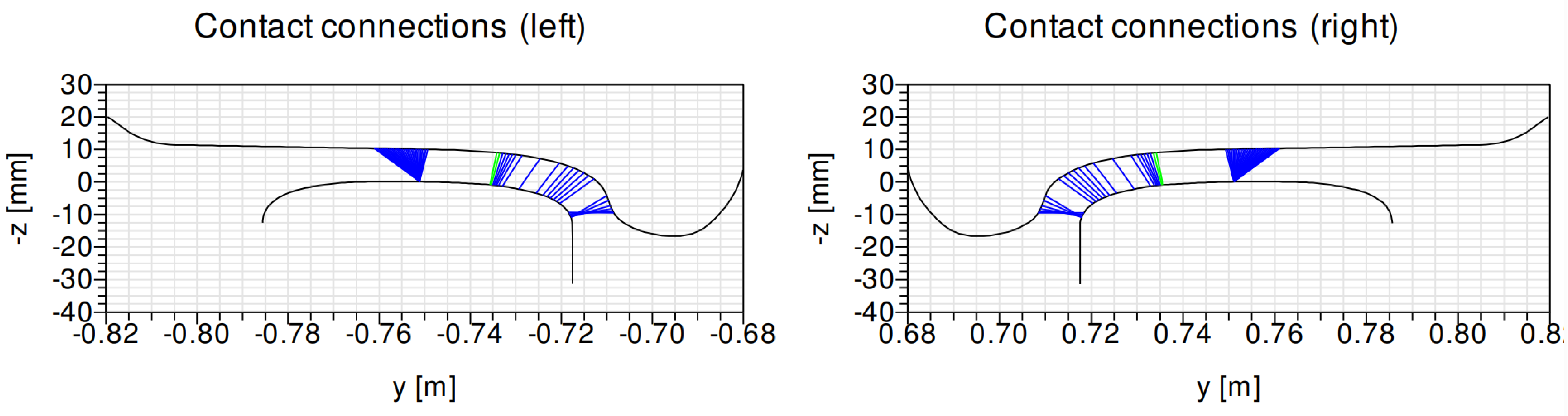


PRINCIPLES COURSE

ALSTOM
· mobility by nature ·

Normal – Wheel/Rail Contact Points
(115RE_1:40 cant)

The jump in the contact patch for the APTA 340 profile can be seen at a 1.5mm lateral offset of the wheelset. This jump in the contact patch, and the associated change in rolling radius difference, will cause high longitudinal forces in the contact patches, giving higher wear as well as initiating corrugation.



ALSTOM · mobility by nature ·

Improved – Even Distributed Contact Path

Recent developments towards a **wheel profile generation tool** allows creation of the profile directly based upon the shape and inclinations of the rail head. Once the rail head profile and cant are defined (example: standard or thru MiniProf, new or partially worn) an enhanced progressive profile can be automatically detailed for final confirmation studies.

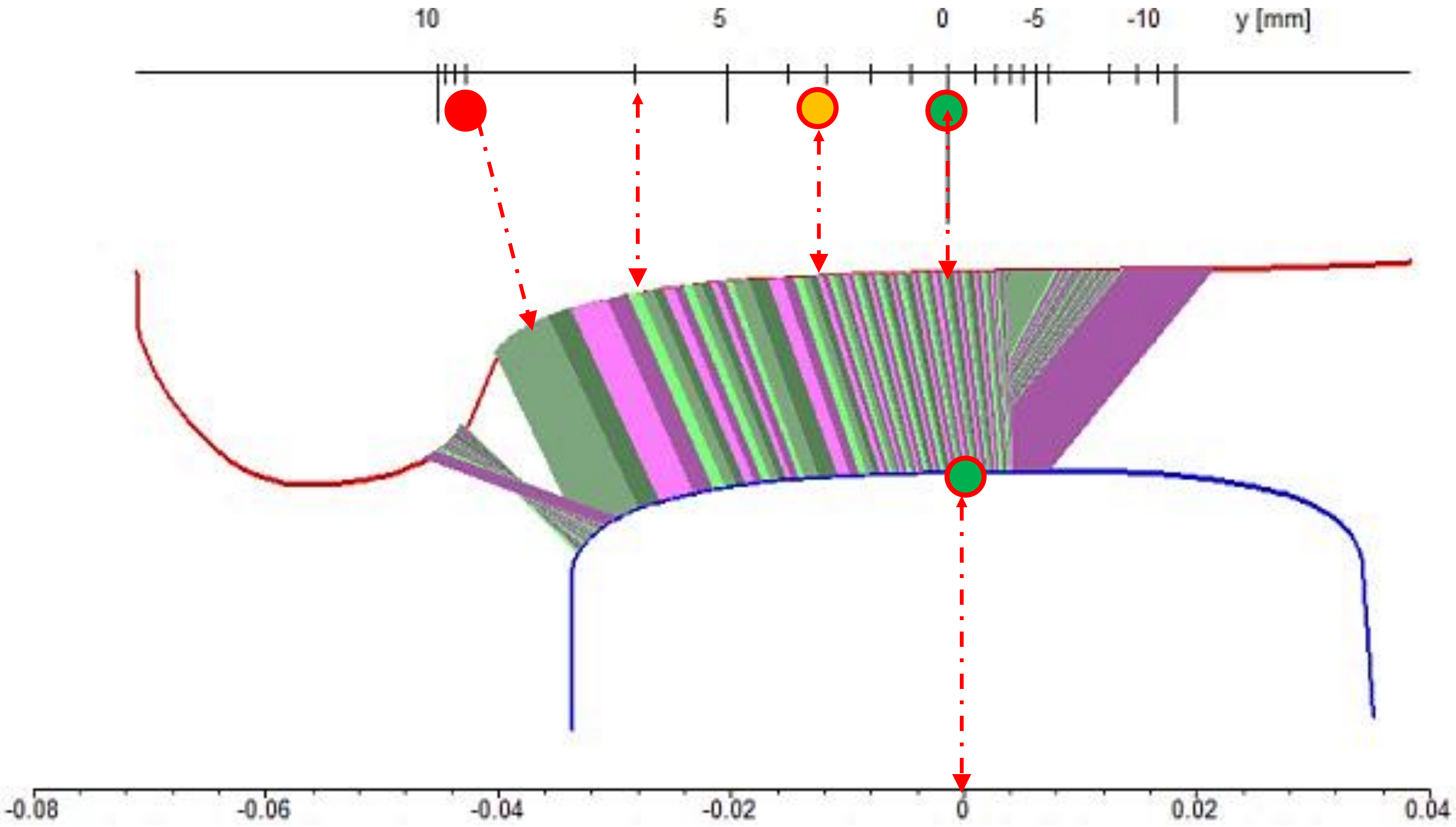
The improved process allows wheel manipulation to give lower effective conicity values, good for running on straight tracks (>1200m radius curves), or higher conicity profiles that reduce guiding forces (flanging) in narrower curves, ideal for curvy metro networks.

ALSTOM · mobility by nature ·

PRINCIPLES COURSE

Improved – Wheel/Rail Contact Points

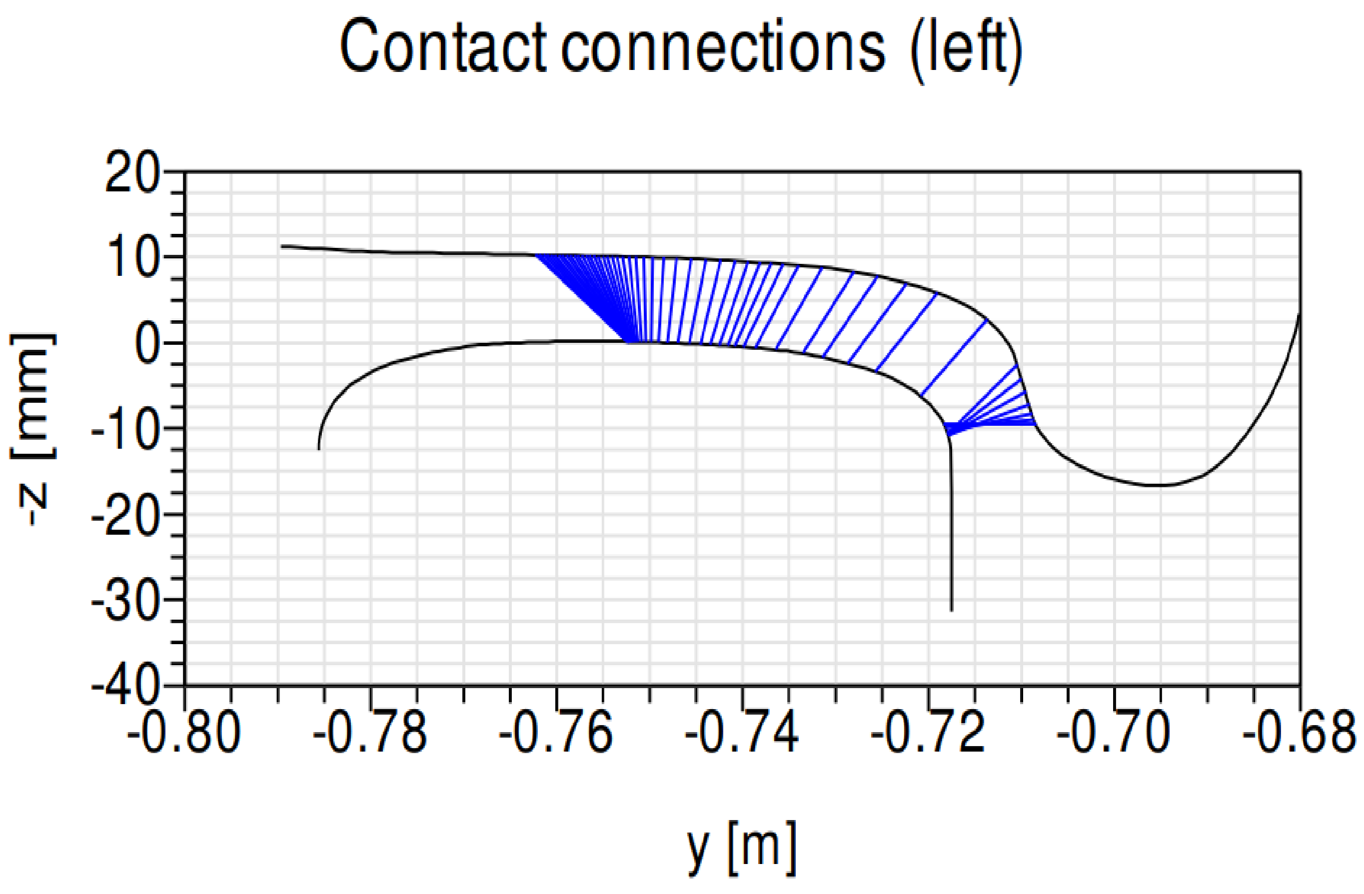
(115RE_ 10” radius , 1:40 cant)

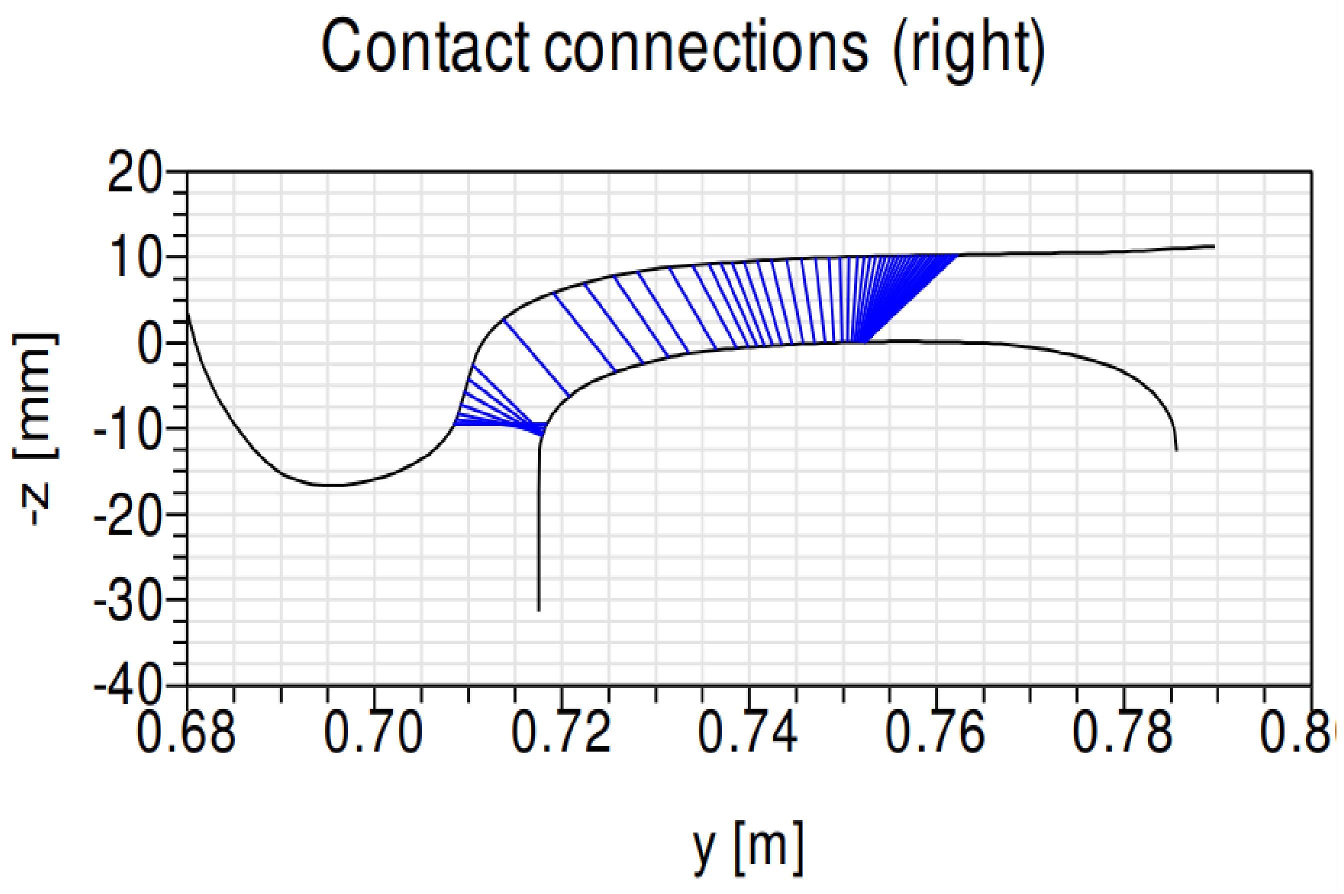


ALSTOM
· mobility by nature ·

Improved Wheel Profile (115RE_1:40 cant)

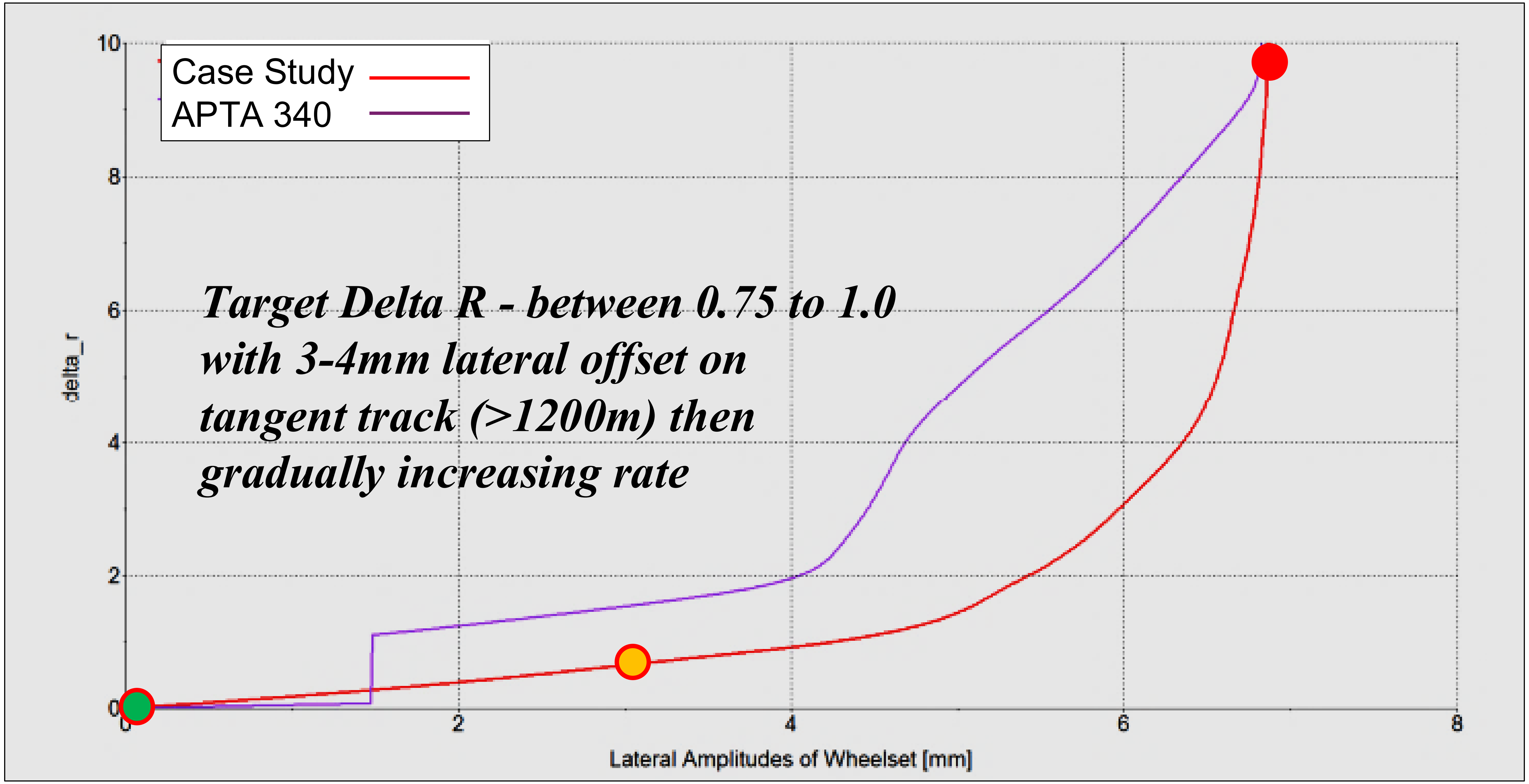
The Case Study profile is continuous throughout the 7mm lateral amplitude cycle. This demonstrates that there is single point contact along with smooth steering transitions at all lateral displacements thus achieving low-wear capability.





ALSTOM · mobility by nature ·

Comparing Wheel Profiles for Delta R
(115RE_1:40 cant)

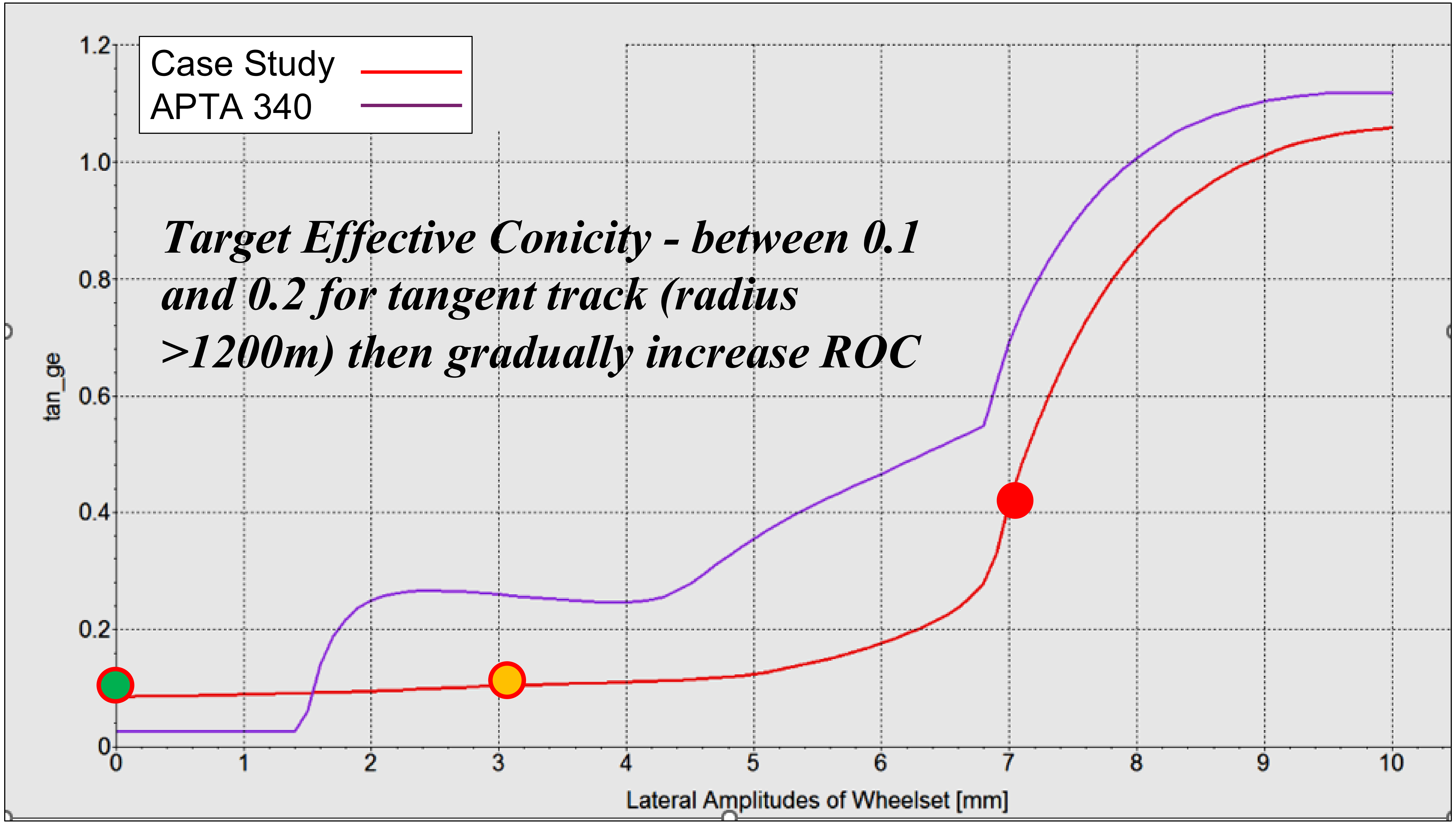


PRINCIPLES COURSE

ALSTOM
· mobility by nature ·

PRINCIPLES COURSE

Comparing Effective Conicity
(115RE_1:40 cant)



ALSTOM
• mobility by nature •

PRINCIPLES COURSE

- Transit Vehicle Suspension
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- **Dynamic Modeling – Normal vs Improved**
- Conclusion

ALSTOM
· mobility by nature ·

Dynamic Modeling – Manipulating ΔR

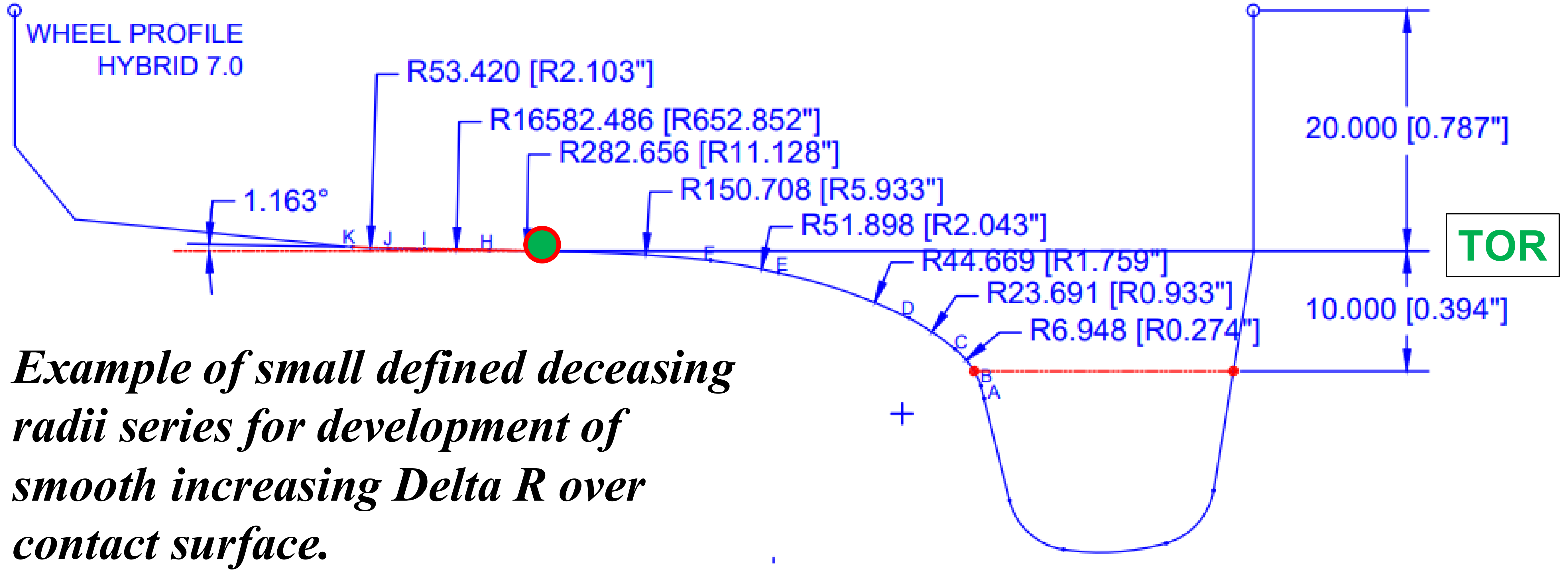
Key design criteria for defining an improved wheel profile is the precise selection of the defined **wheelset Delta R** during lateral amplitude movements over the rail head.

To accomplish this, small evenly spaced series of radius are defined along a continuous path from initial Point of Contact to the maximum movement. These small radii replaces the standard large radii or slopes of the standard profile.

An engineering **AutoCAD** analysis tool was developed for local examination and manipulation of a wheel profile for trial visualization of actual motion of the wheelset over the rail profile.

ALSTOM · mobility by nature ·

Dynamic Modeling – Manipulating ∆R

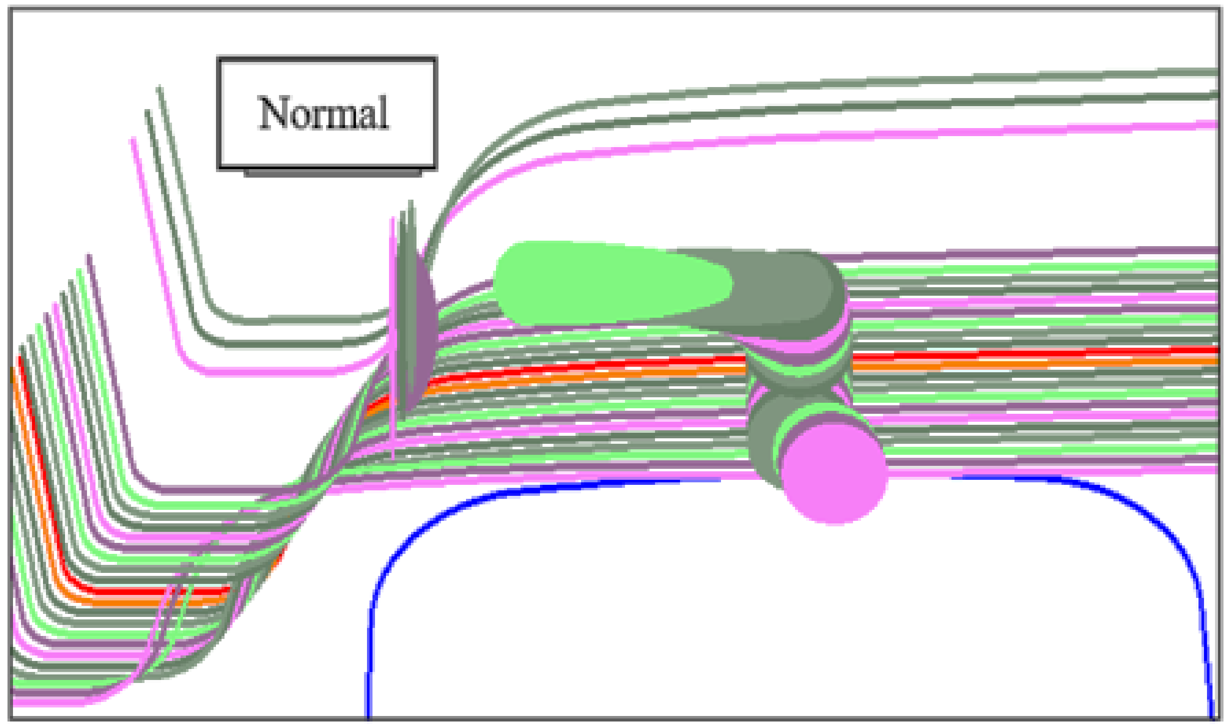


Example of small defined deceasing radii series for development of smooth increasing Delta R over contact surface.

1

Dynamic Modeling - Normal Profile
(115RE 8"_1:40 cant)

Uneven contact transitions



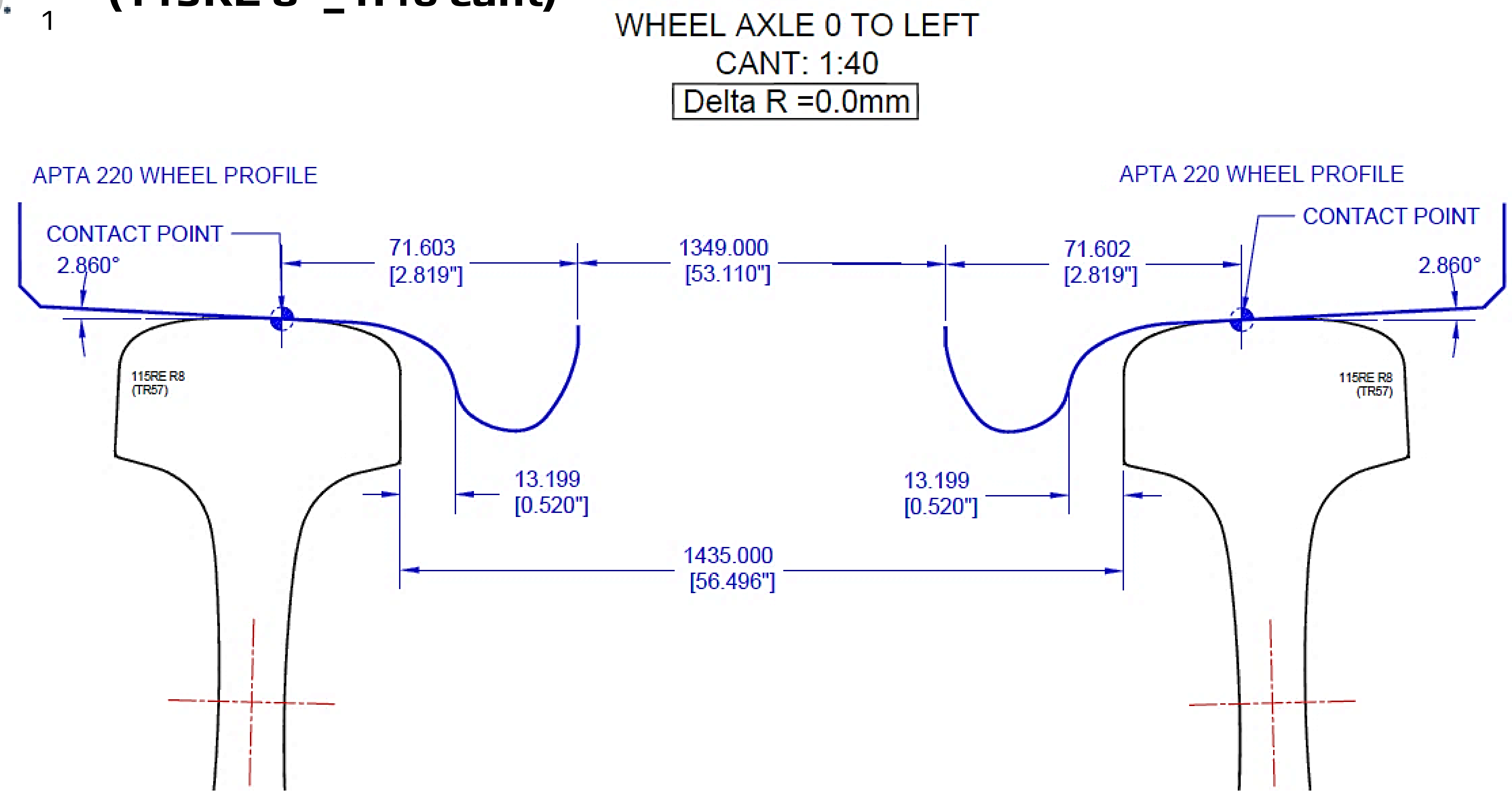
PRINCIPLES COURSE

ALSTOM · mobility by nature ·

1

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)

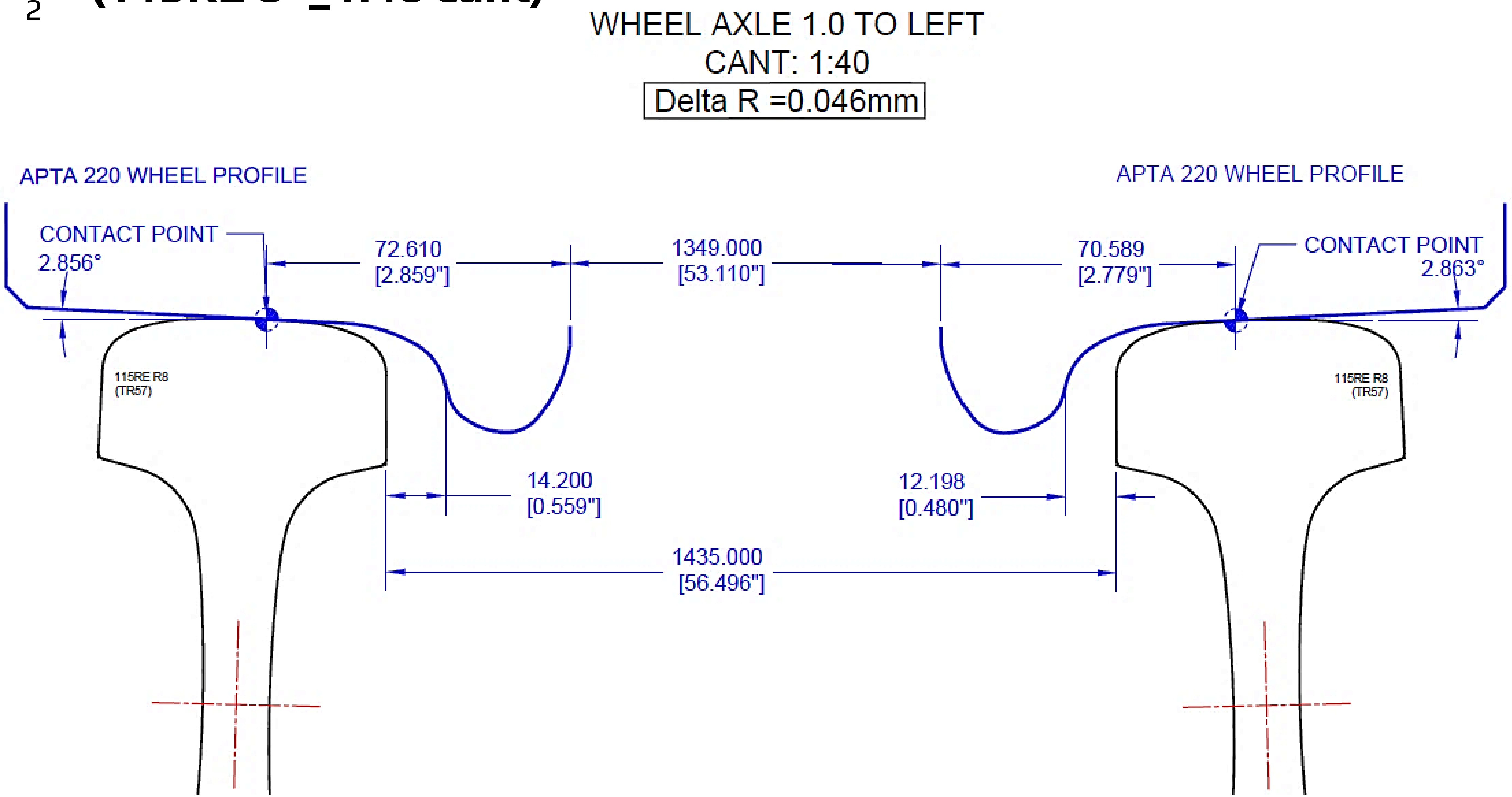


ALSTOM · mobility by nature ·

2

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)



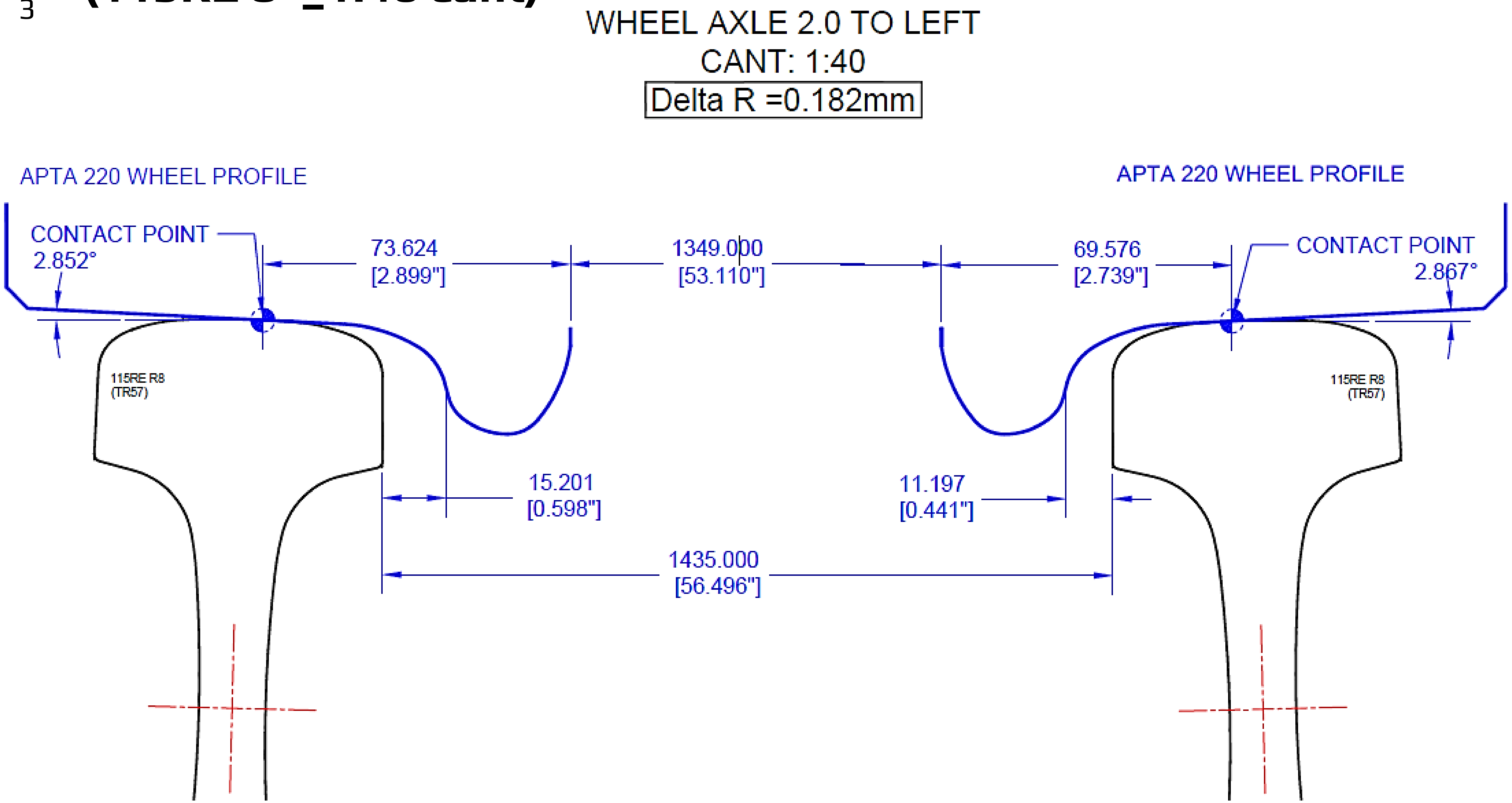
PRINCIPLES COURSE

ALSTOM · mobility by nature ·

3

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)



PRINCIPLES COURSE

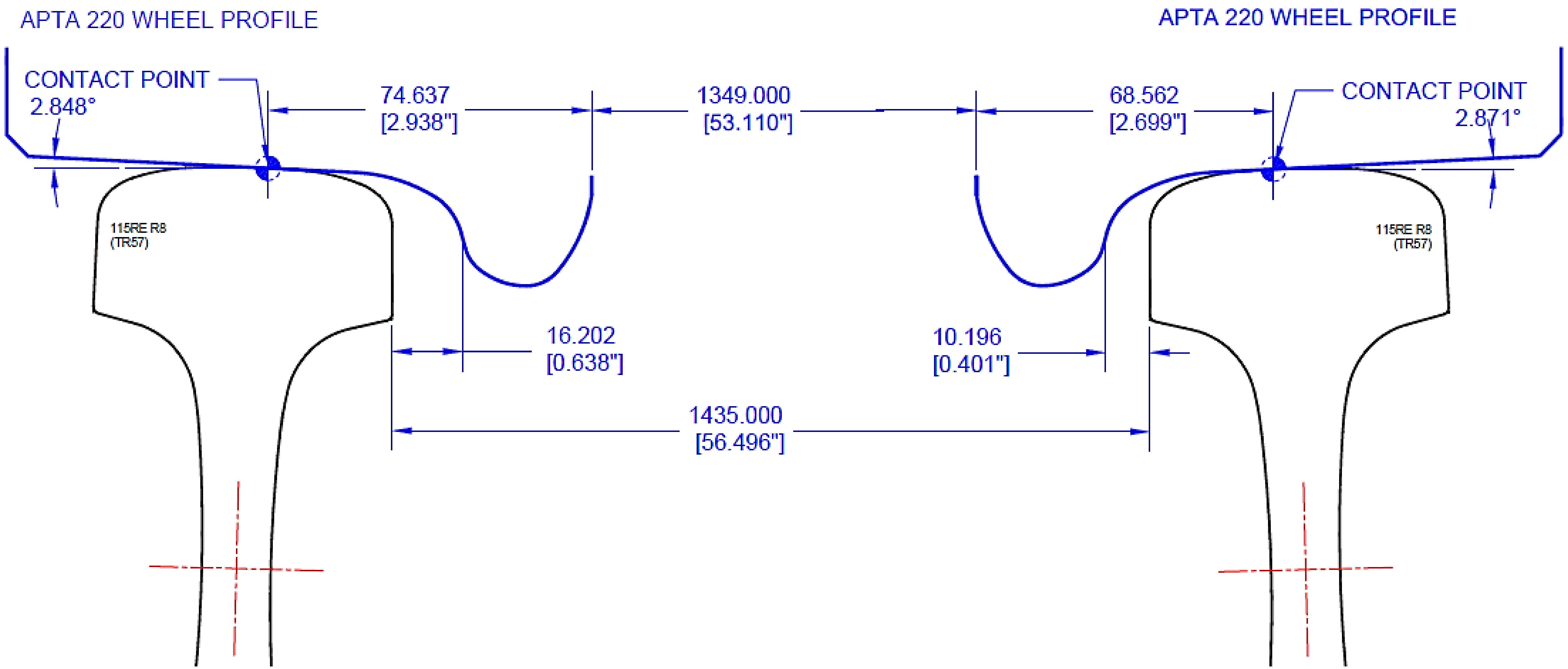
ALSTOM
· mobility by nature ·

4

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)

WHEEL AXLE 3.0 TO LEFT
CANT: 1:40
Delta R =0.274mm

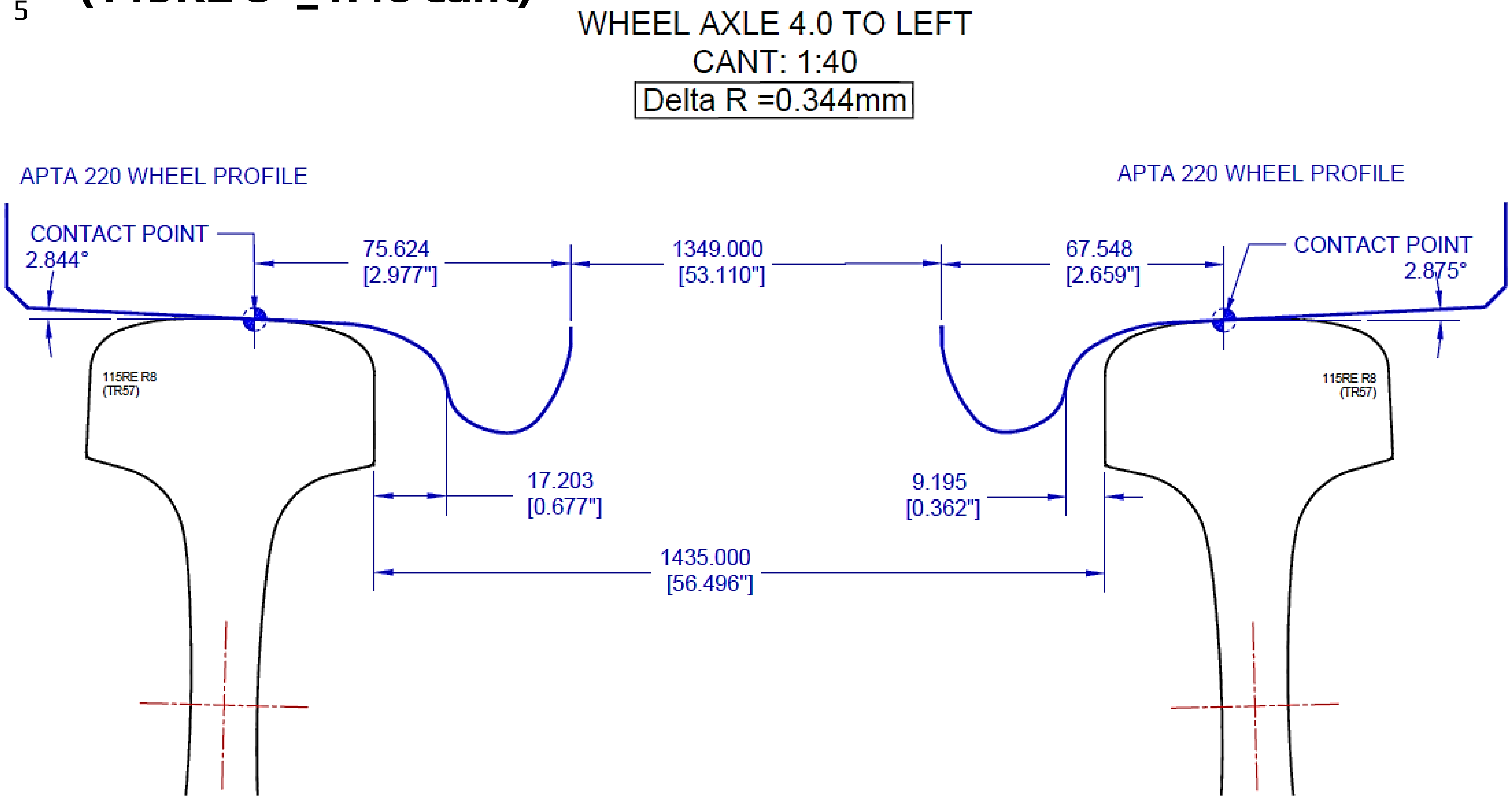


PRINCIPLES COURSE

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)

5

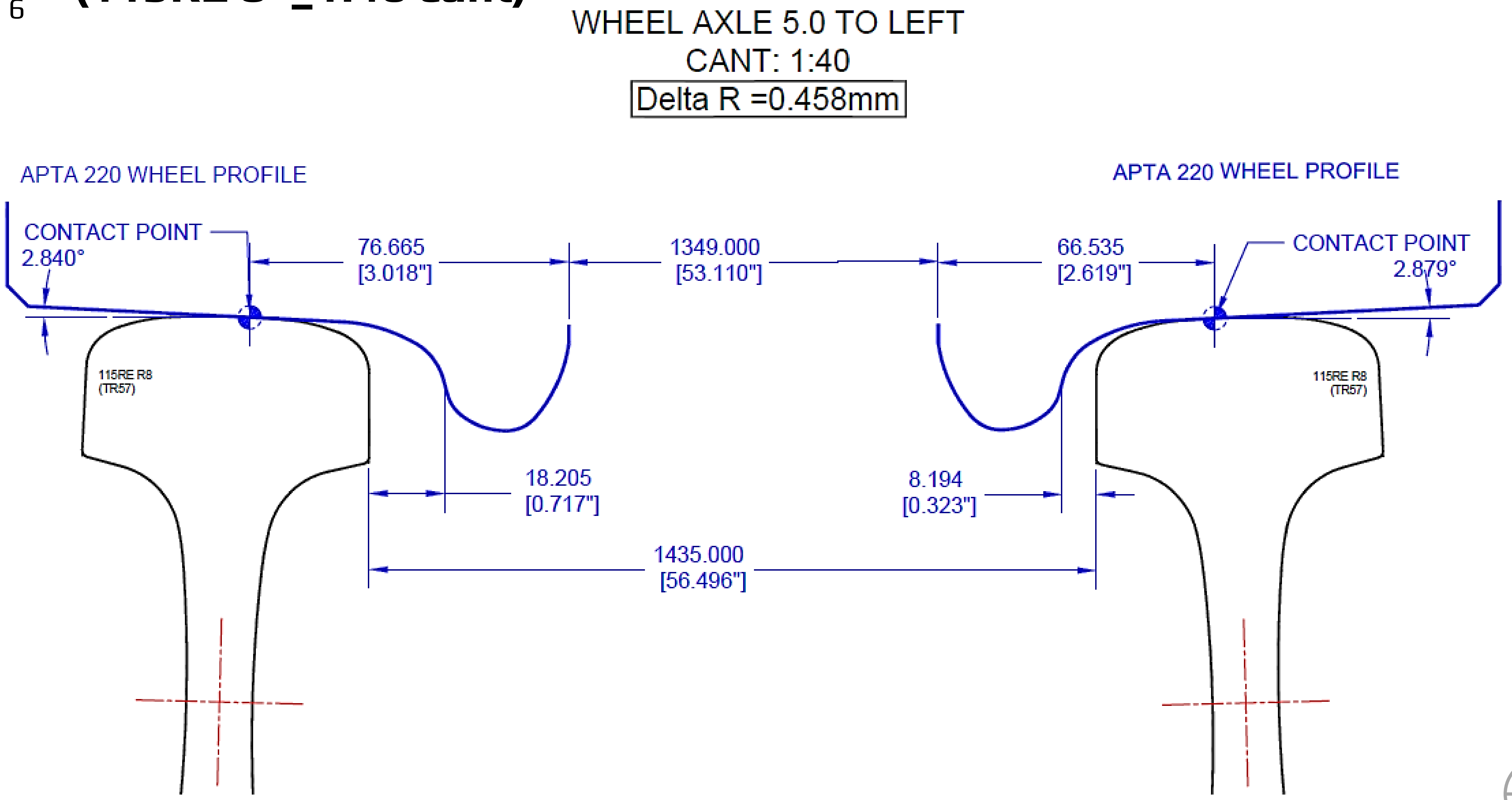


ALSTOM · mobility by nature ·

6

Dynamic Modeling - Normal Profile

(115RE 8”_1:40 cant)



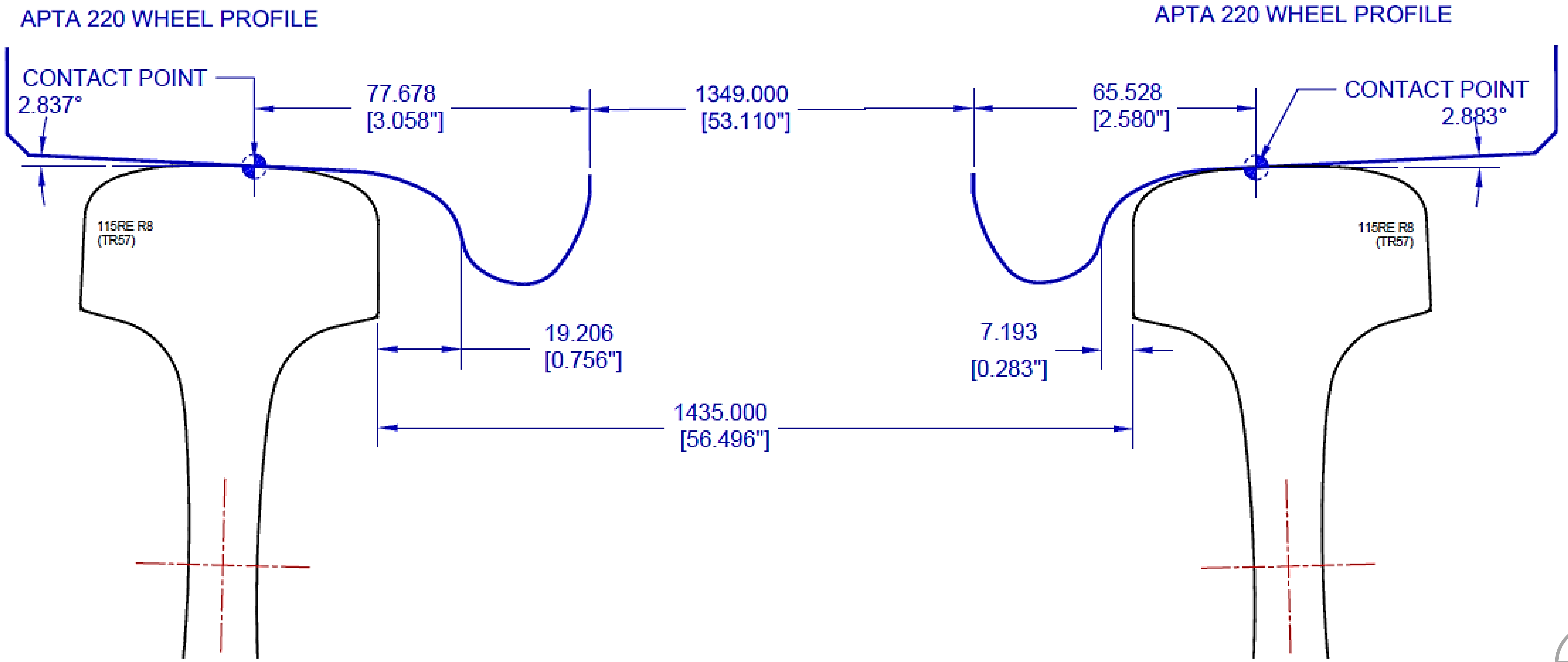
PRINCIPLES COURSE

ALSTOM · mobility by nature ·

7

Dynamic Modeling - Normal Profile
(115RE 8"_1:40 cant)

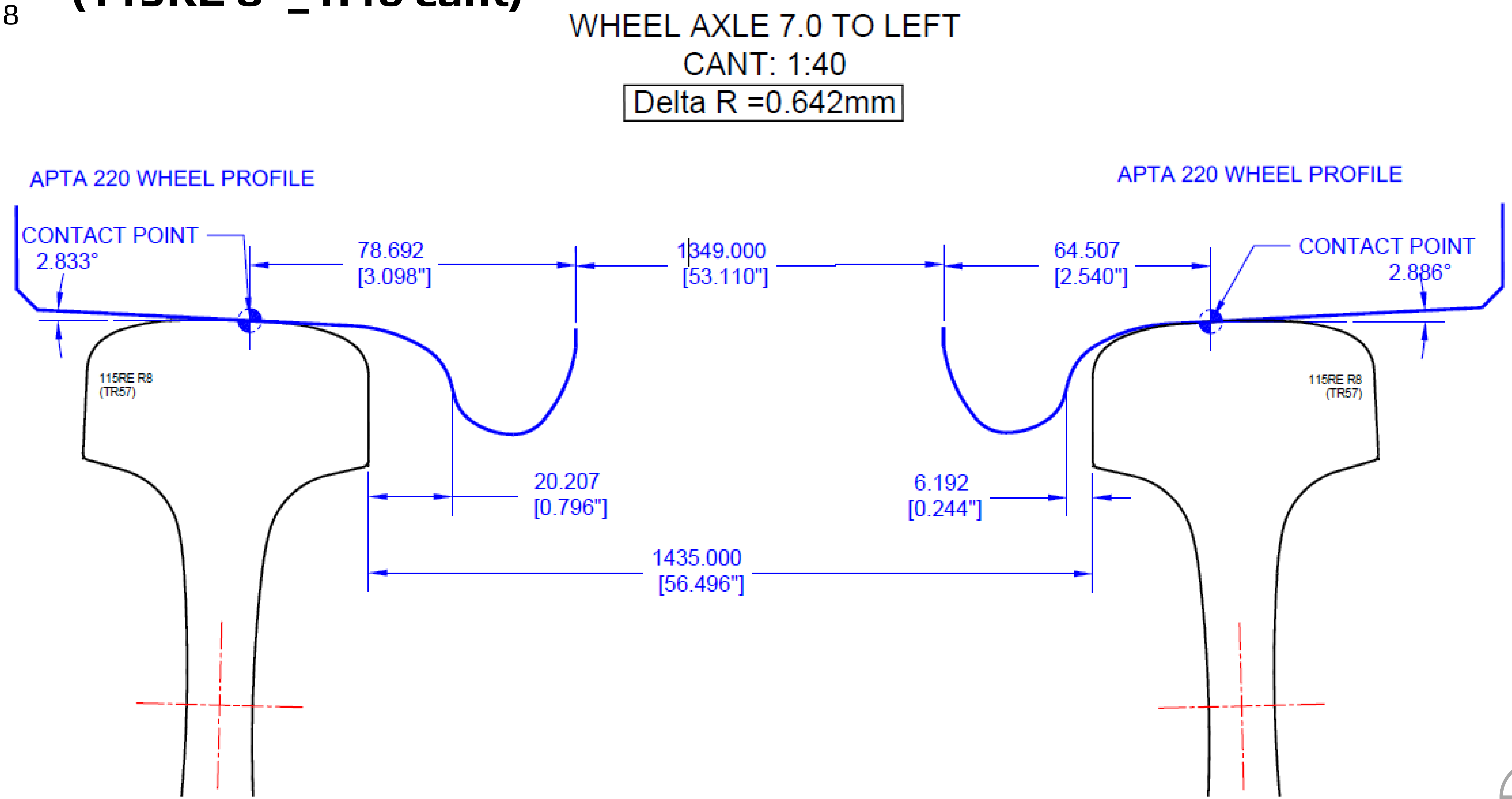
WHEEL AXLE 6.0 TO LEFT
CANT: 1:40
Delta R =0.549mm



ALSTOM · mobility by nature ·

8

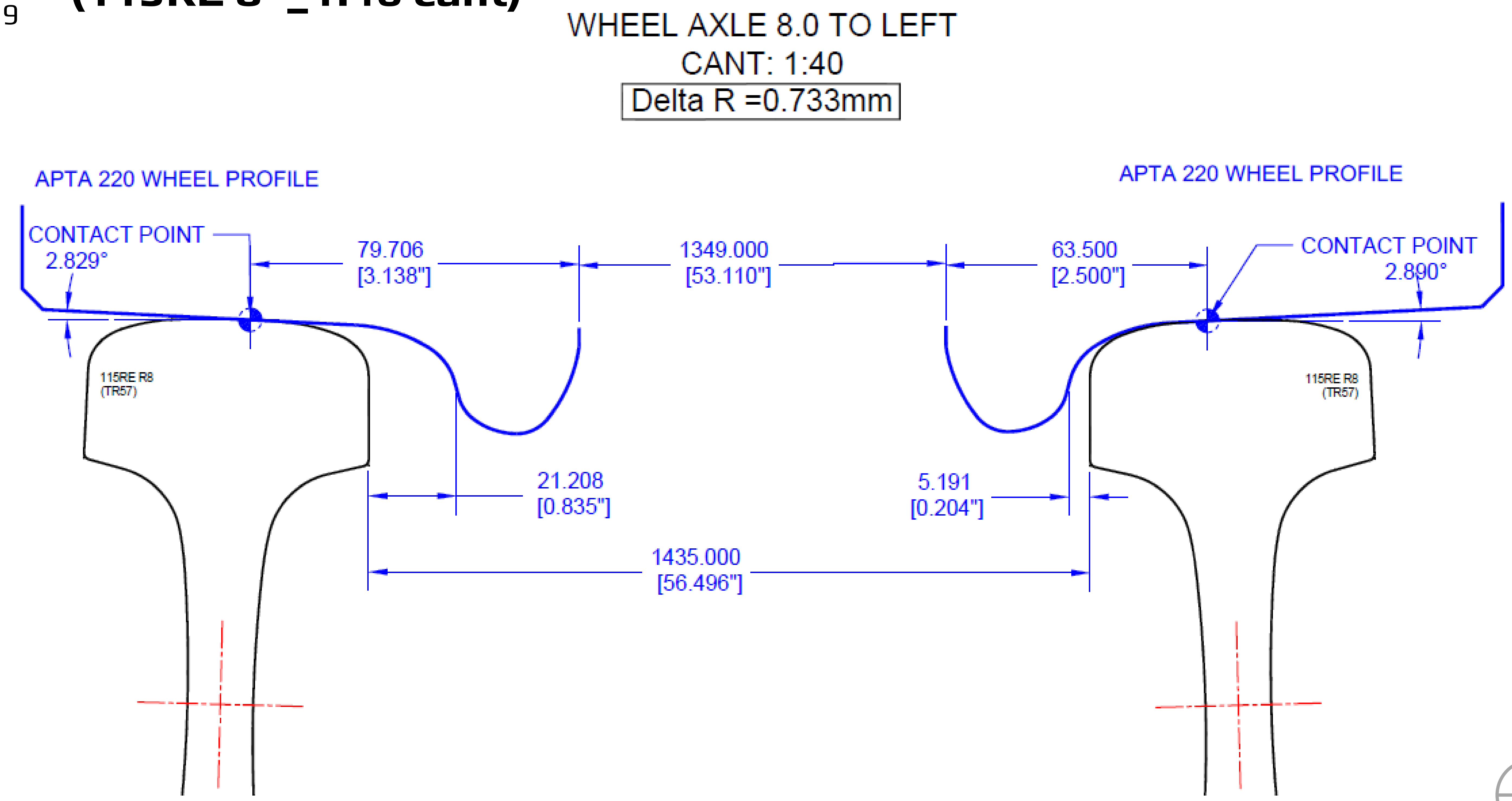
Dynamic Modeling - Normal Profile
(115RE 8"_1:40 cant)



PRINCIPLES COURSE

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)



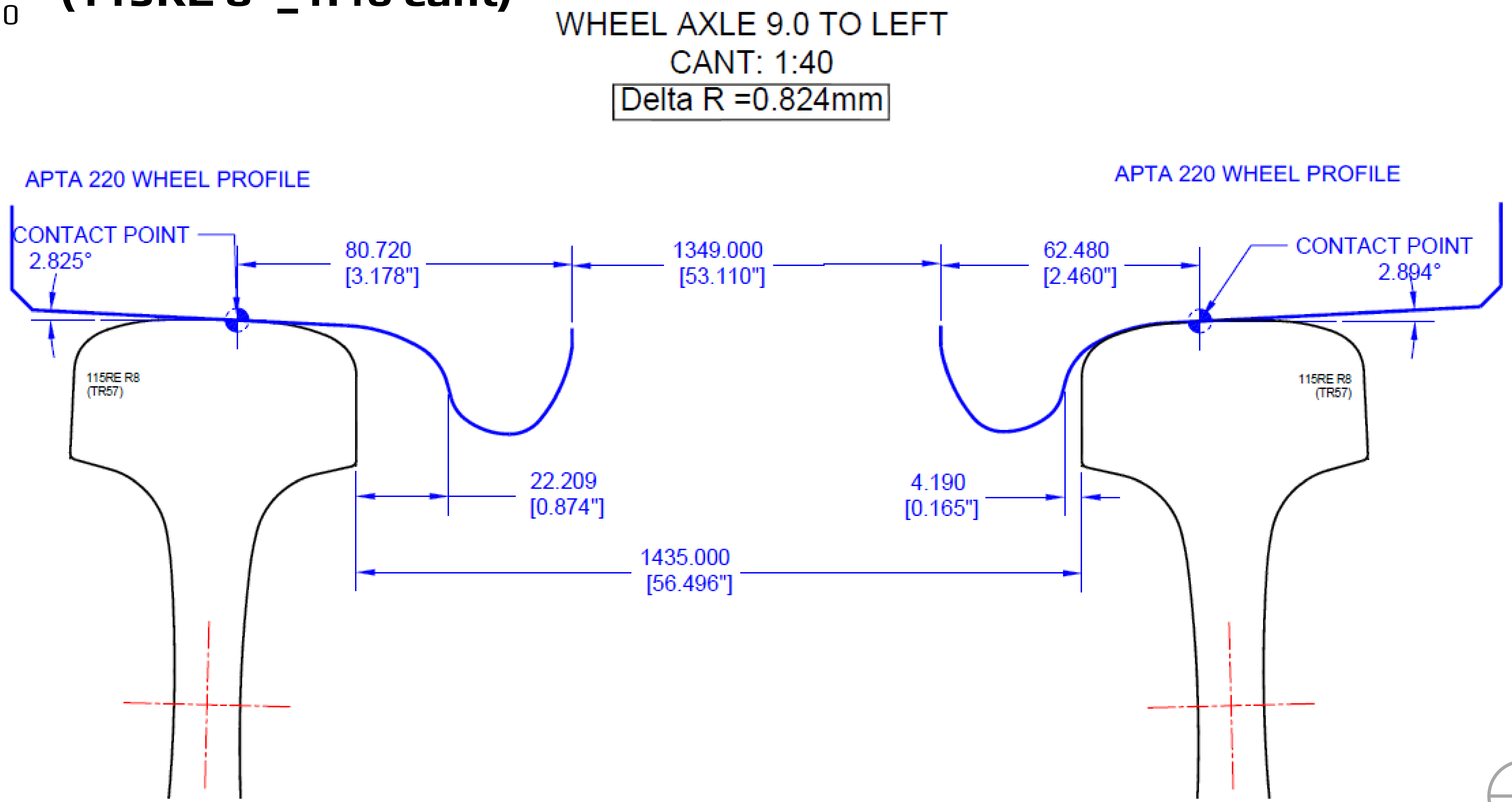
PRINCIPLES COURSE

ALSTOM · mobility by nature ·

10

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)



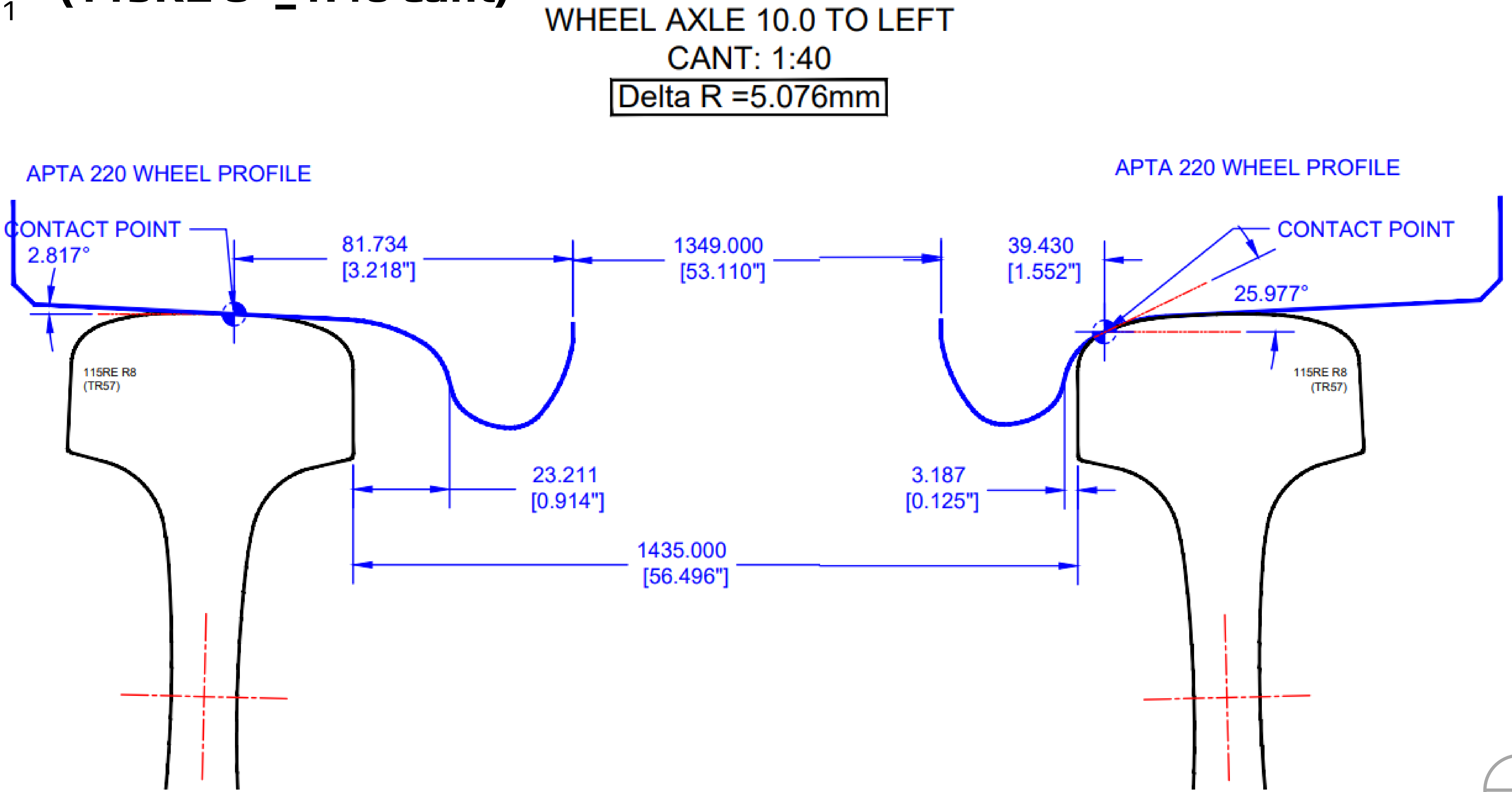
PRINCIPLES COURSE

ALSTOM · mobility by nature ·

11

Dynamic Modeling - Normal Profile

(115RE 8”_1:40 cant)

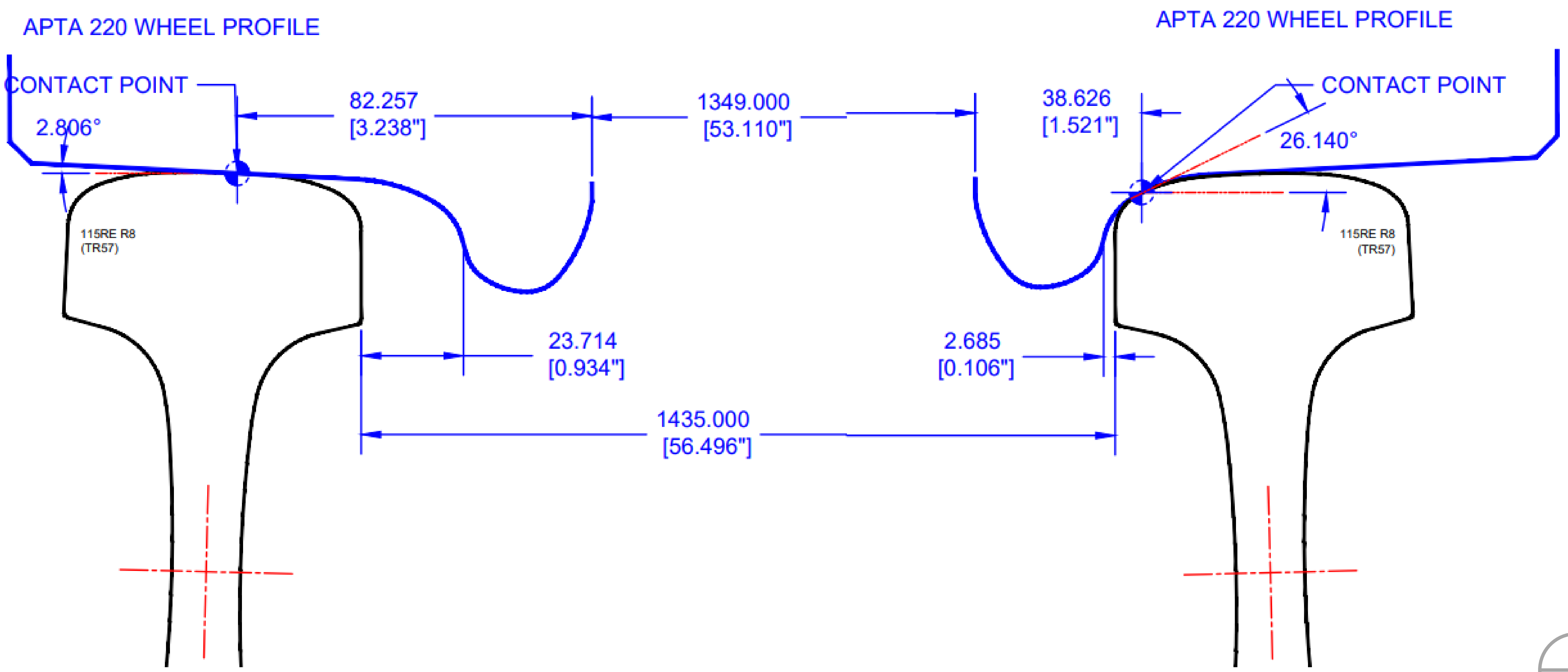


Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)

12

WHEEL AXLE 10.5 TO LEFT
CANT: 1:40
Delta R =5.484mm

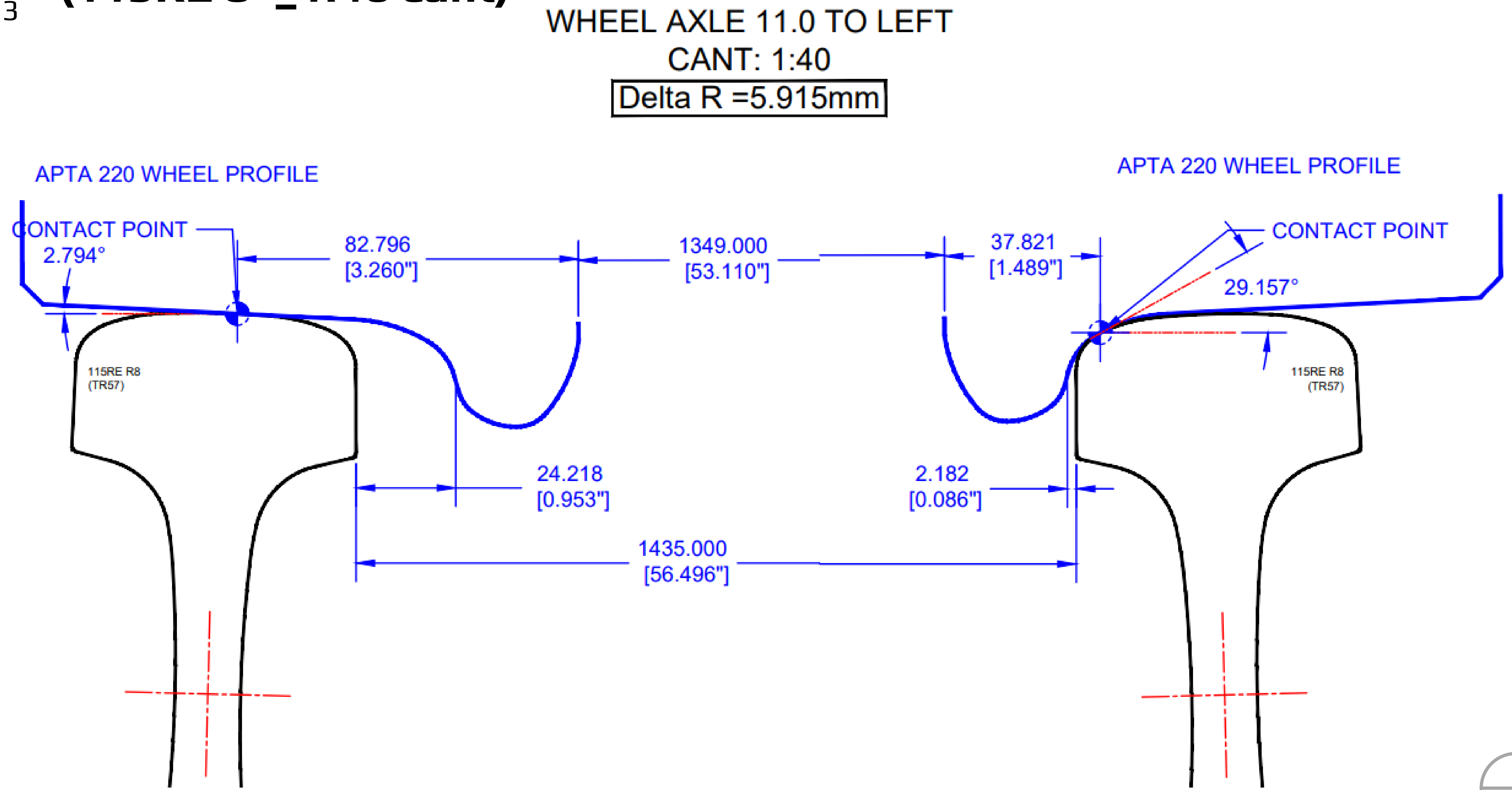


ALSTOM · mobility by nature ·

13

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)

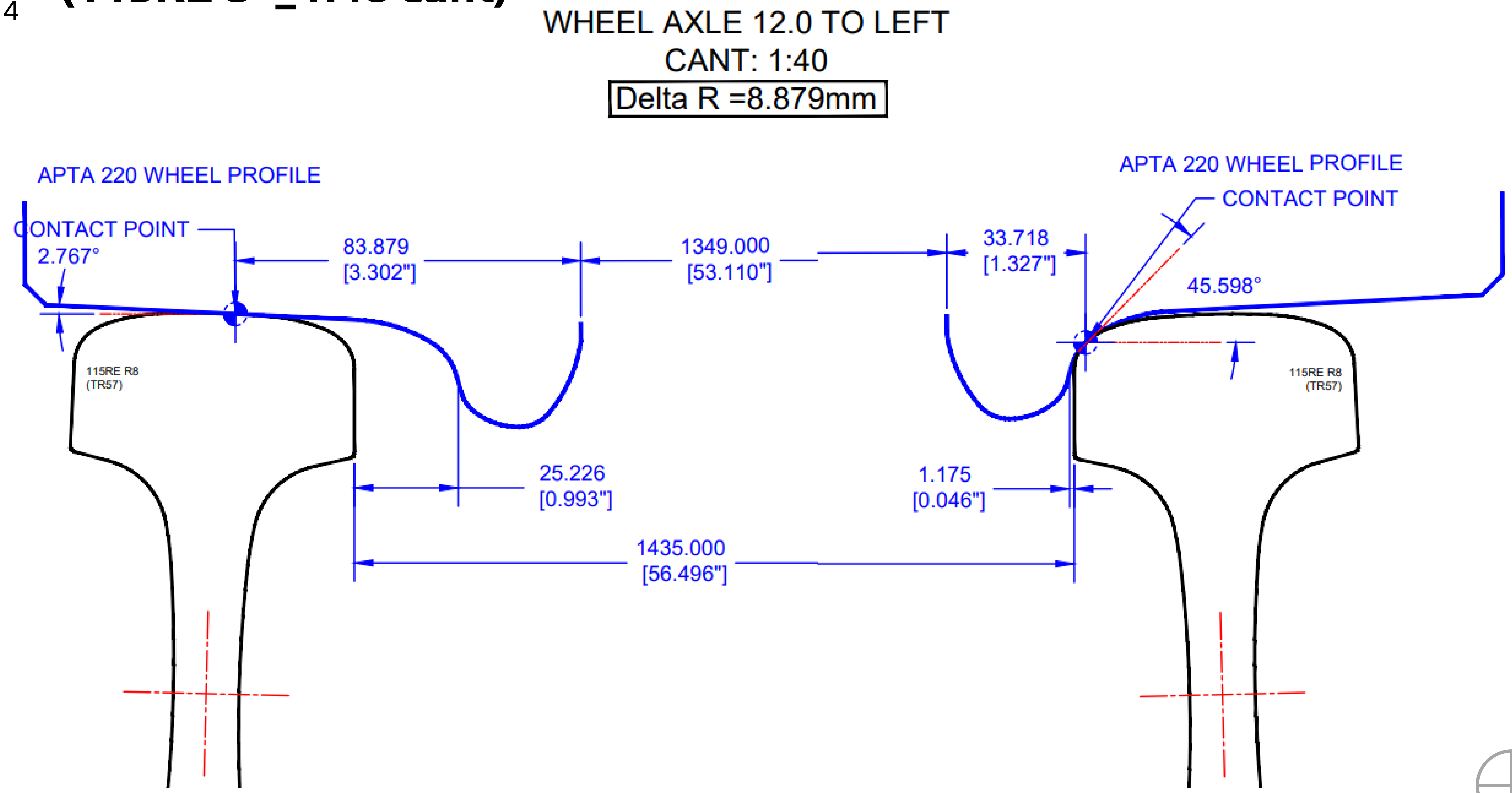


PRINCIPLES COURSE

14

Dynamic Modeling - Normal Profile

(115RE 8”_1:40 cant)

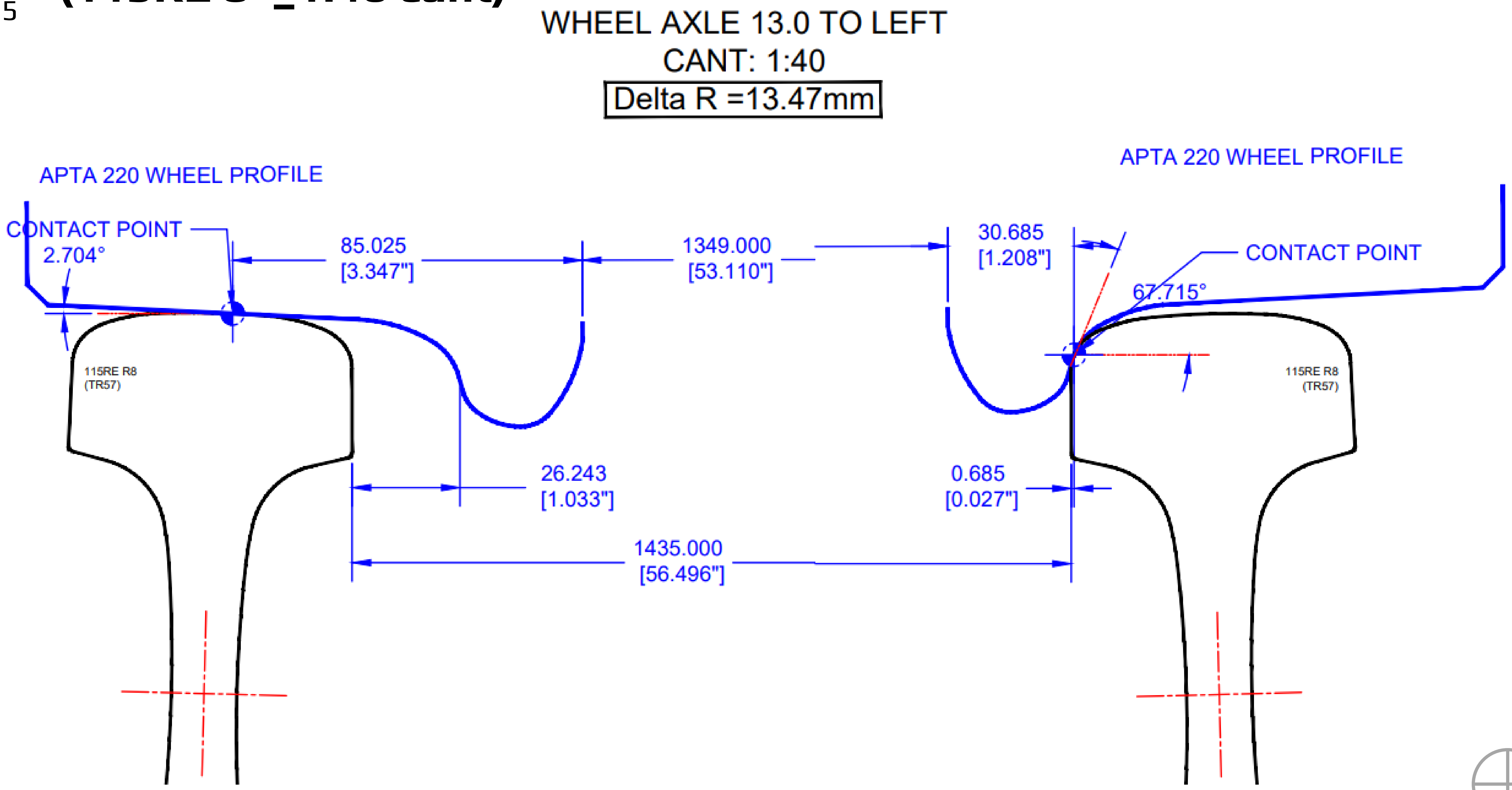


ALSTOM · mobility by nature ·

15

Dynamic Modeling - Normal Profile

(115RE 8”_1:40 cant)

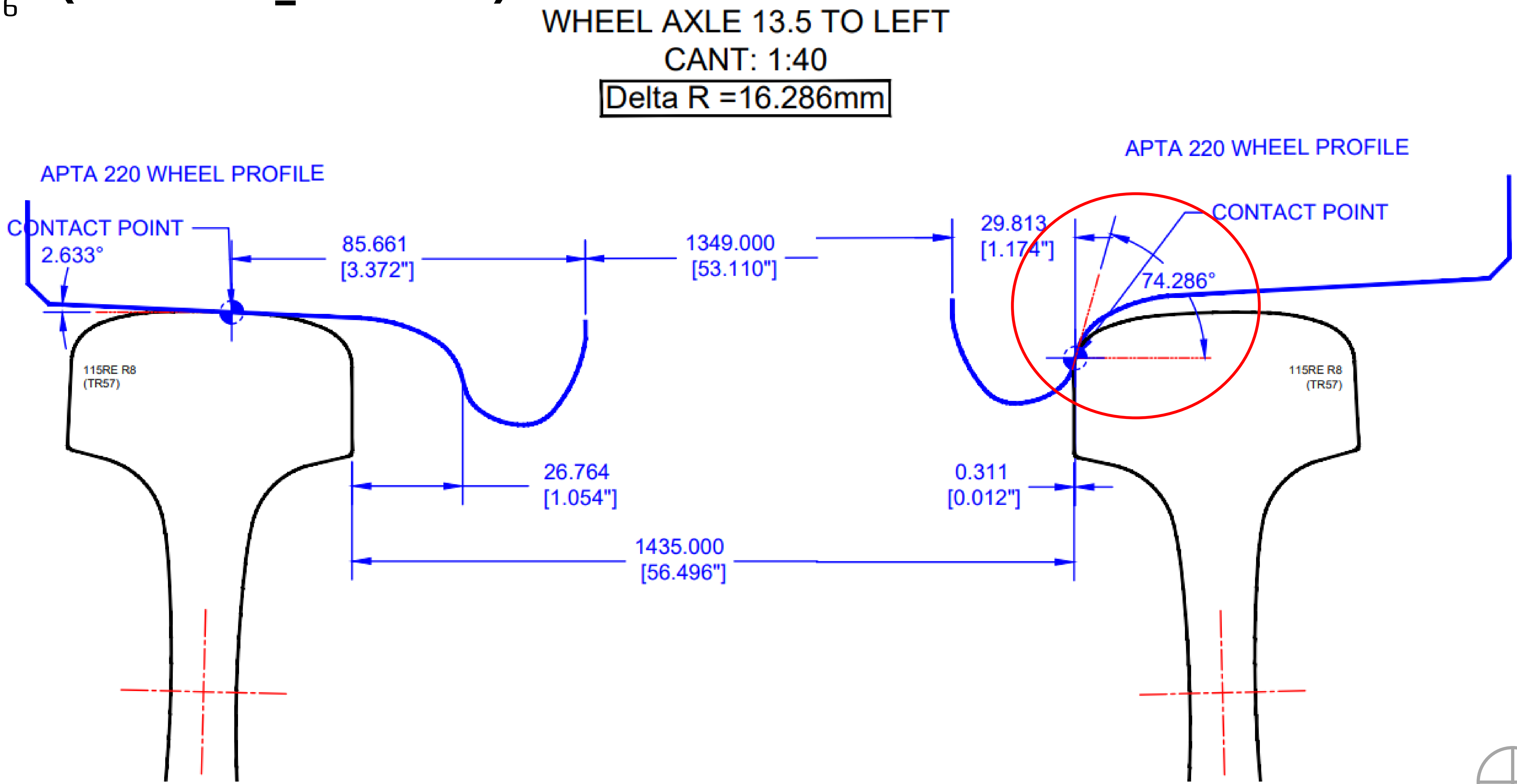


ALSTOM · mobility by nature ·

16

Dynamic Modeling - Normal Profile

(115RE 8"_1:40 cant)



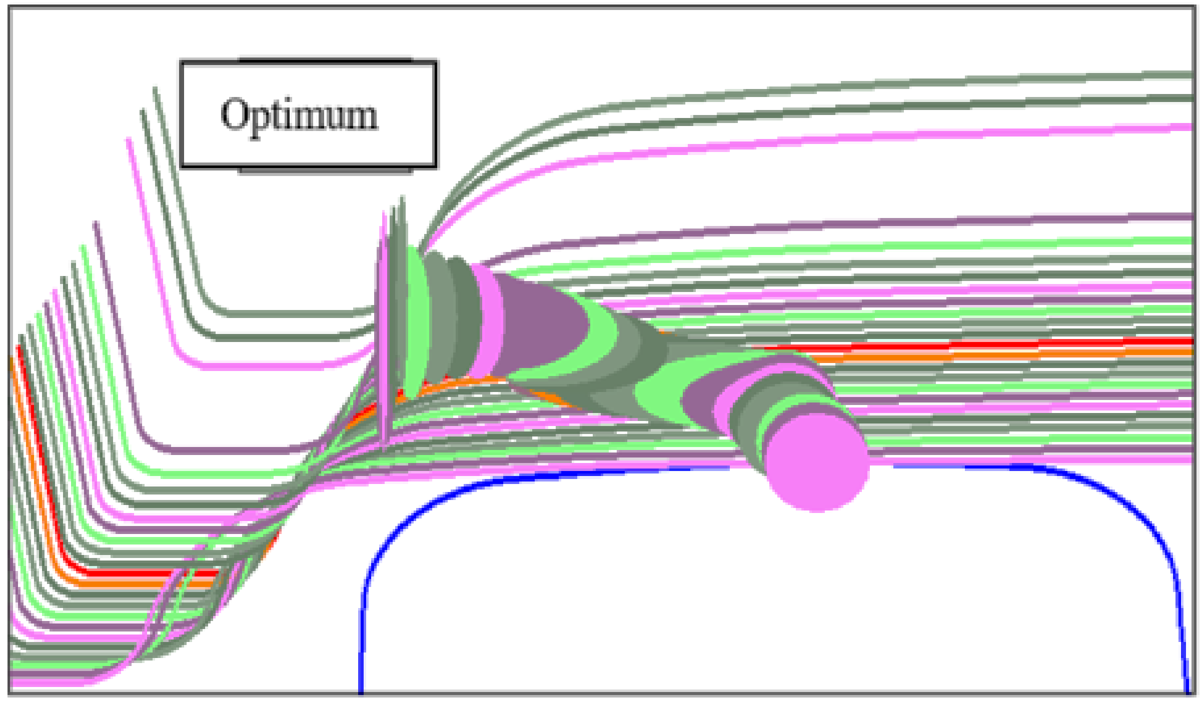
PRINCIPLES COURSE

PRINCIPLES COURSE

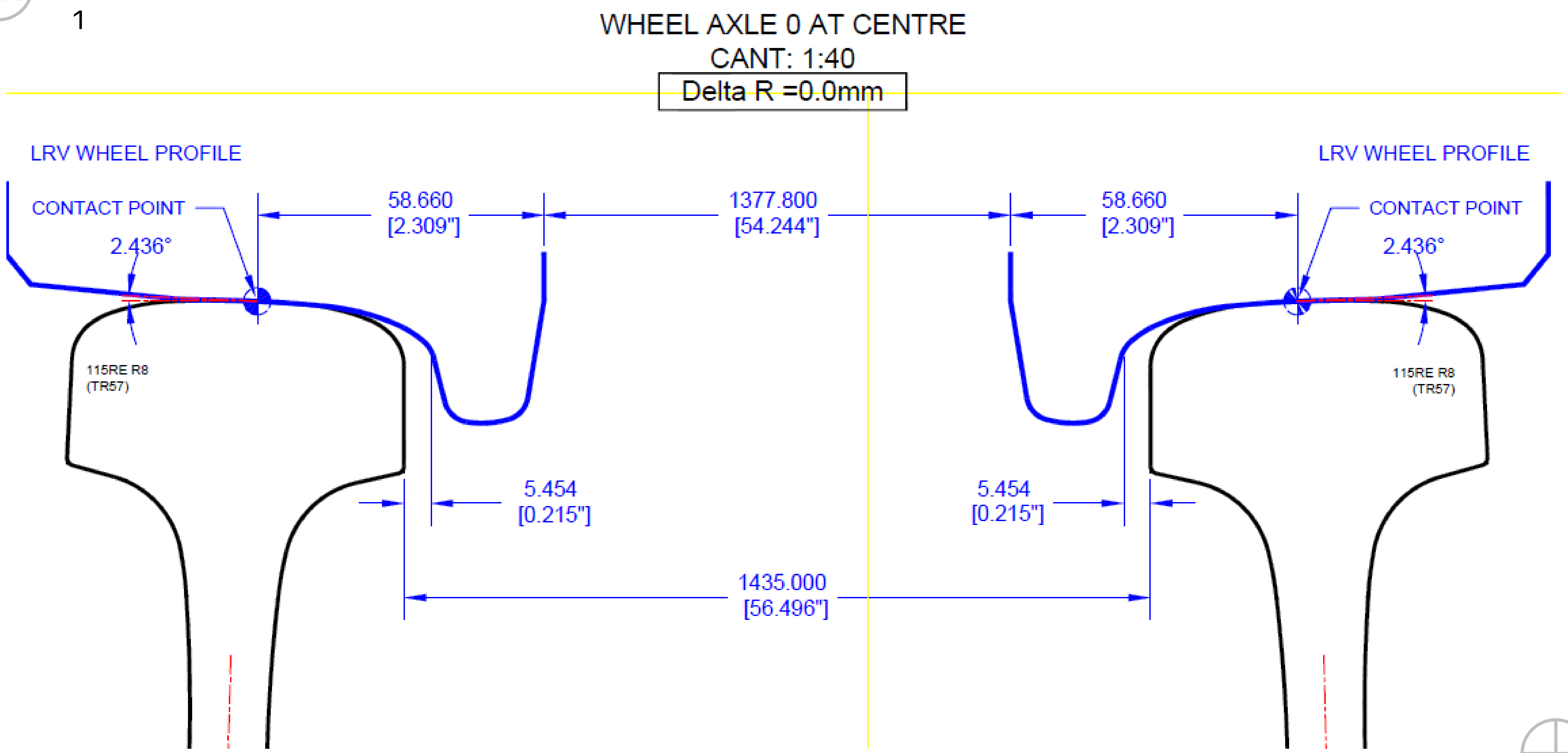
Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

Smooth steering transitions



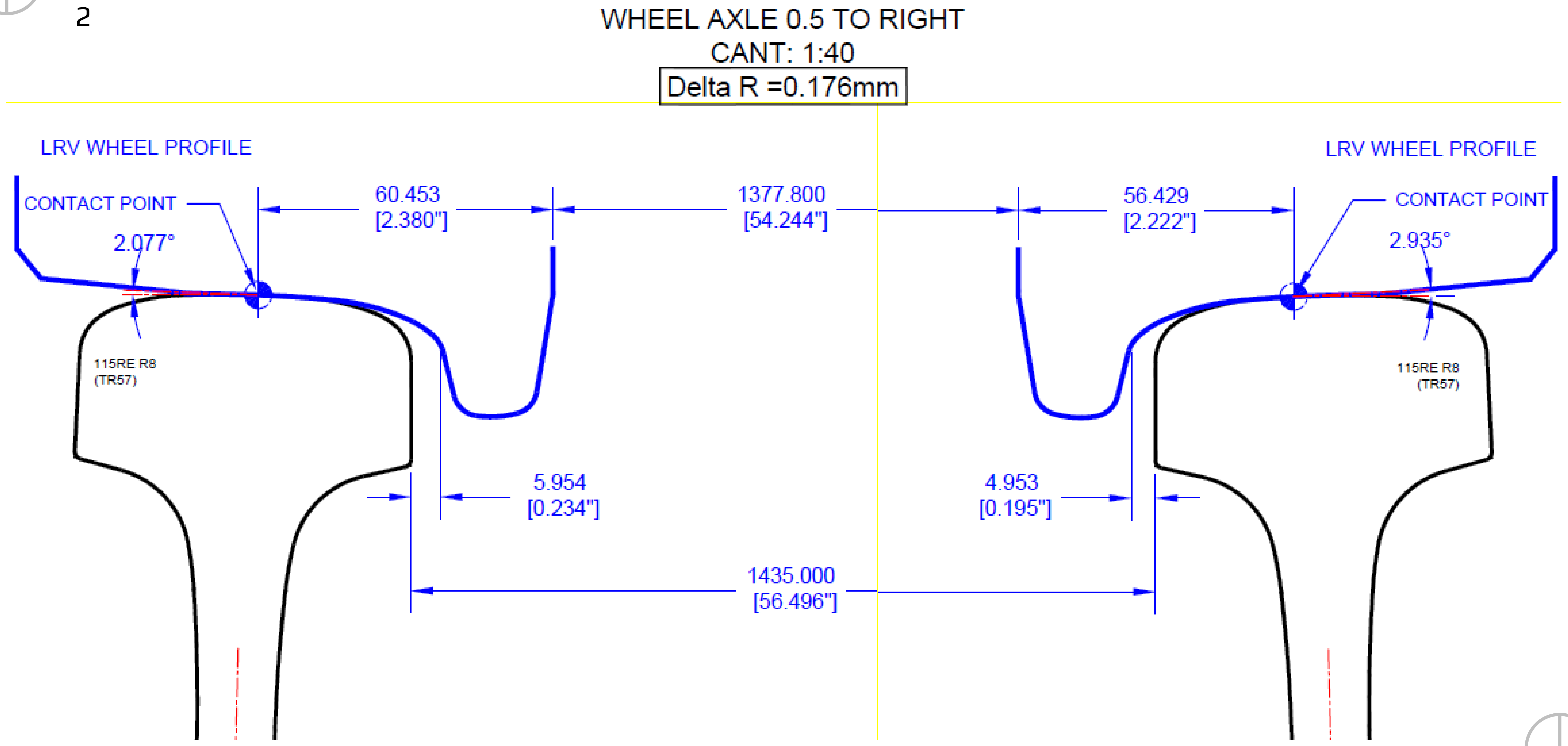
Dynamic Modeling - Improved Profile
(115RE 8"_1:40 cant)



ALSTOM · mobility by nature ·

2

Dynamic Modeling - Improved Profile
(115RE 8"_1:40 cant)



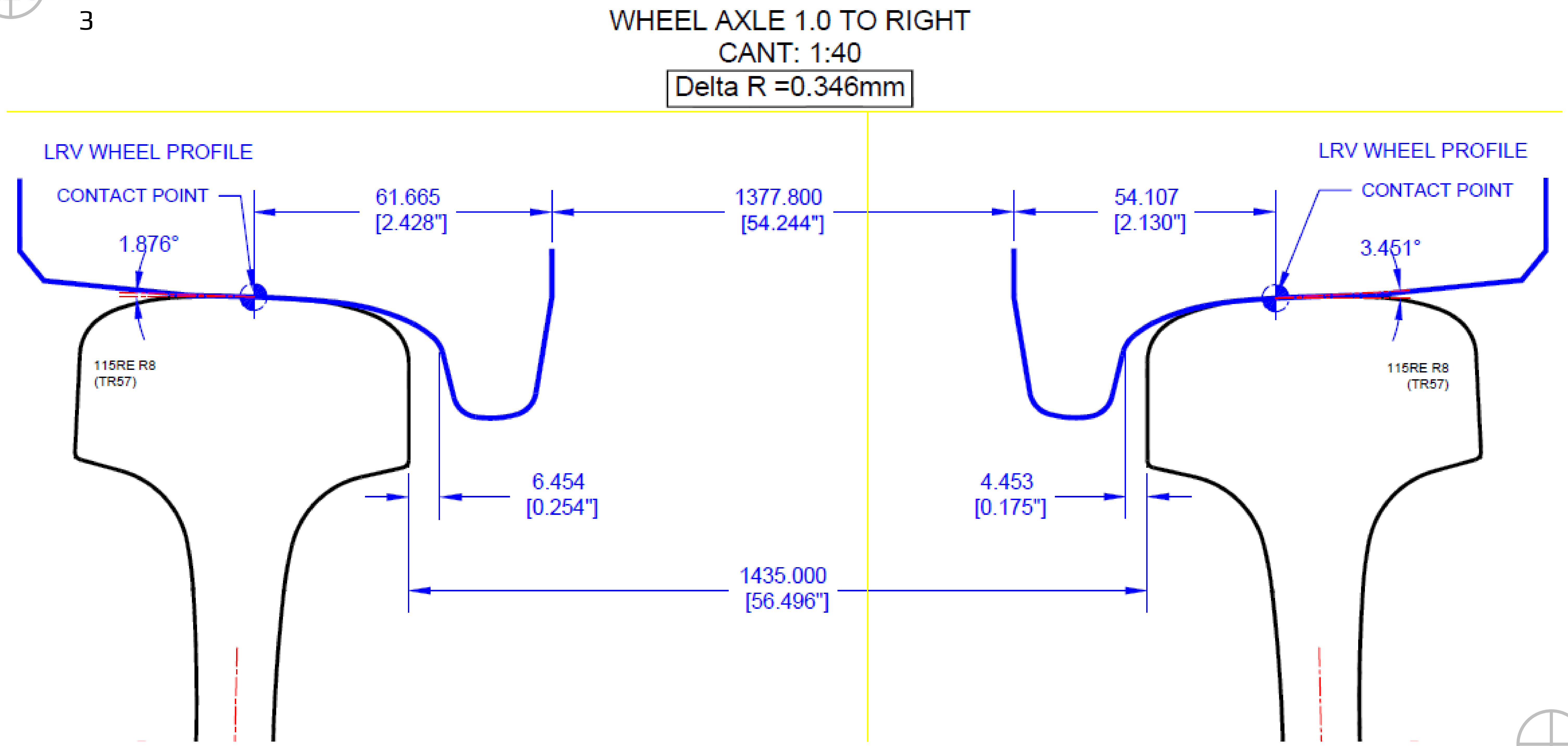
PRINCIPLES COURSE

PRINCIPLES COURSE

Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

3

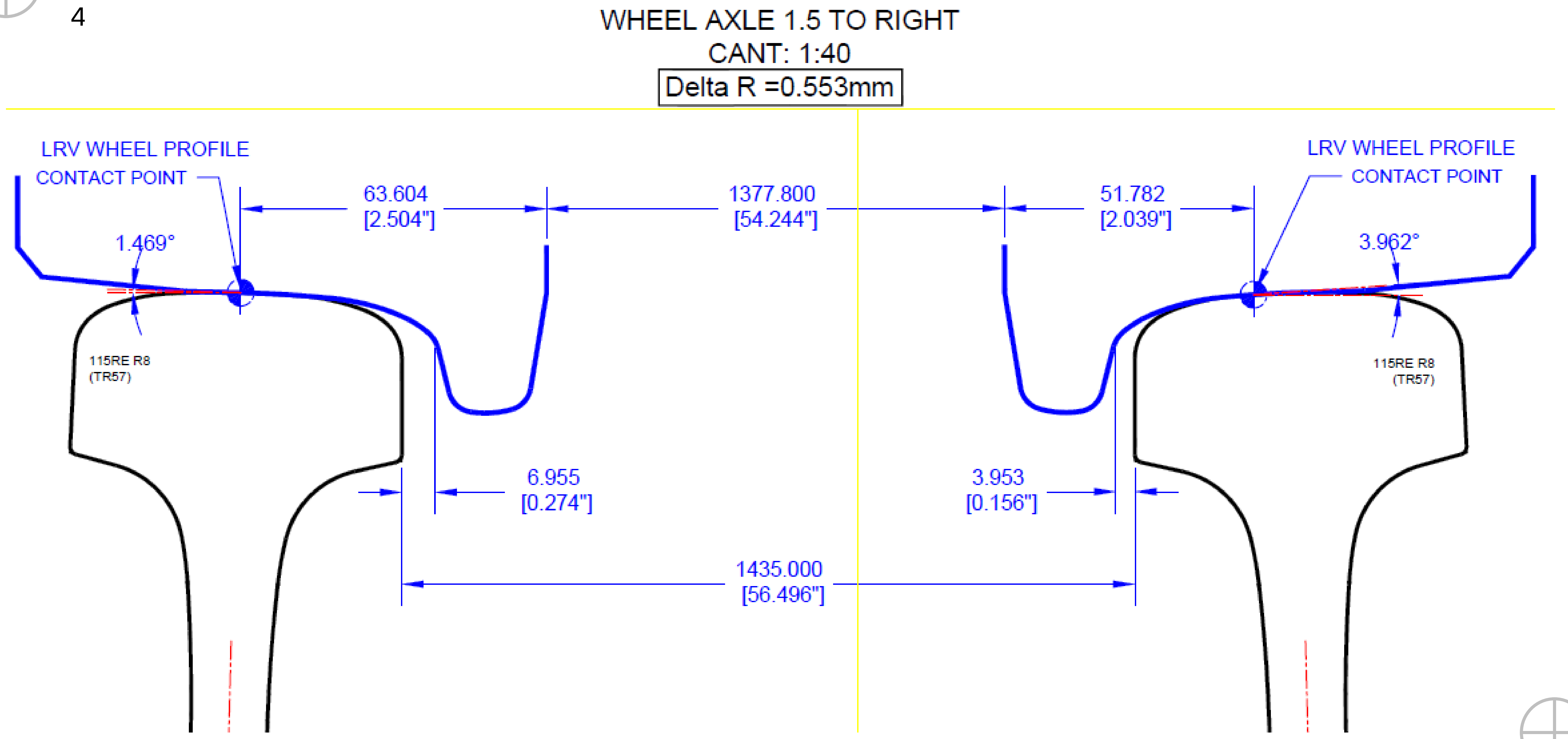


ALSTOM · mobility by nature

4

Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

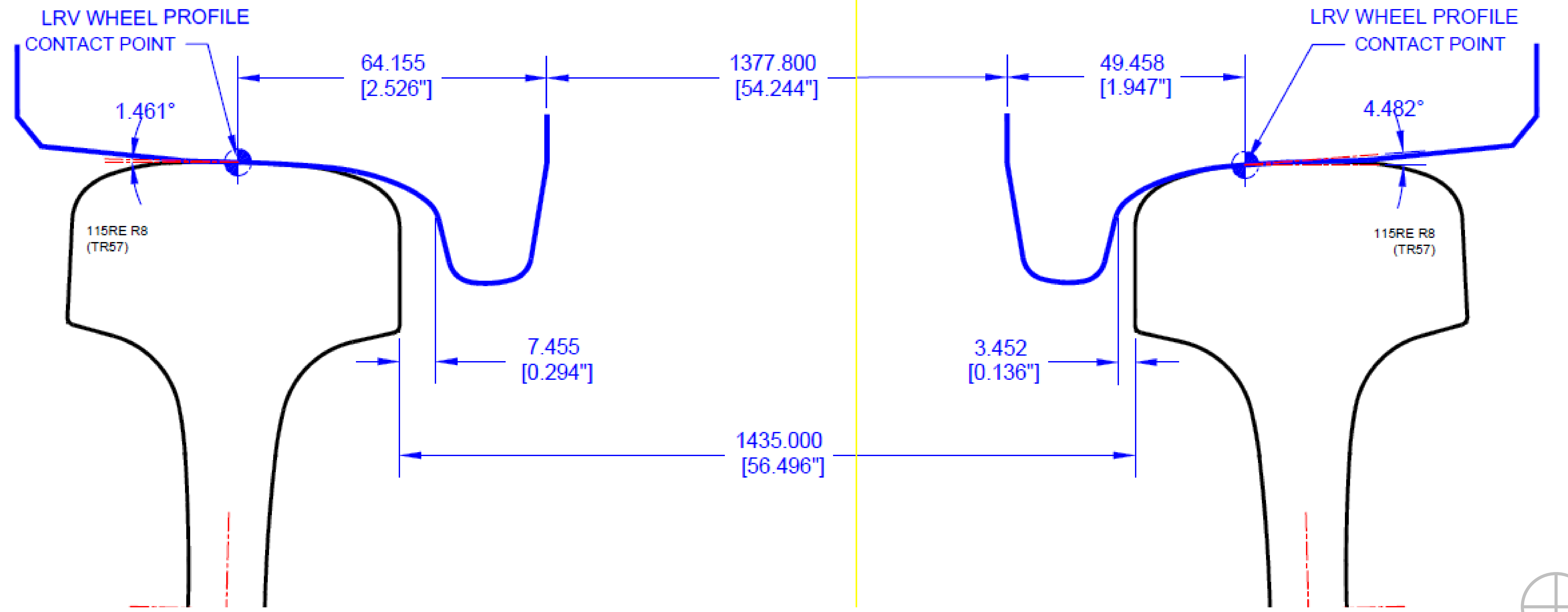


Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

5

WHEEL AXLE 2.0 TO RIGHT
CANT: 1:40
Delta R =0.739mm

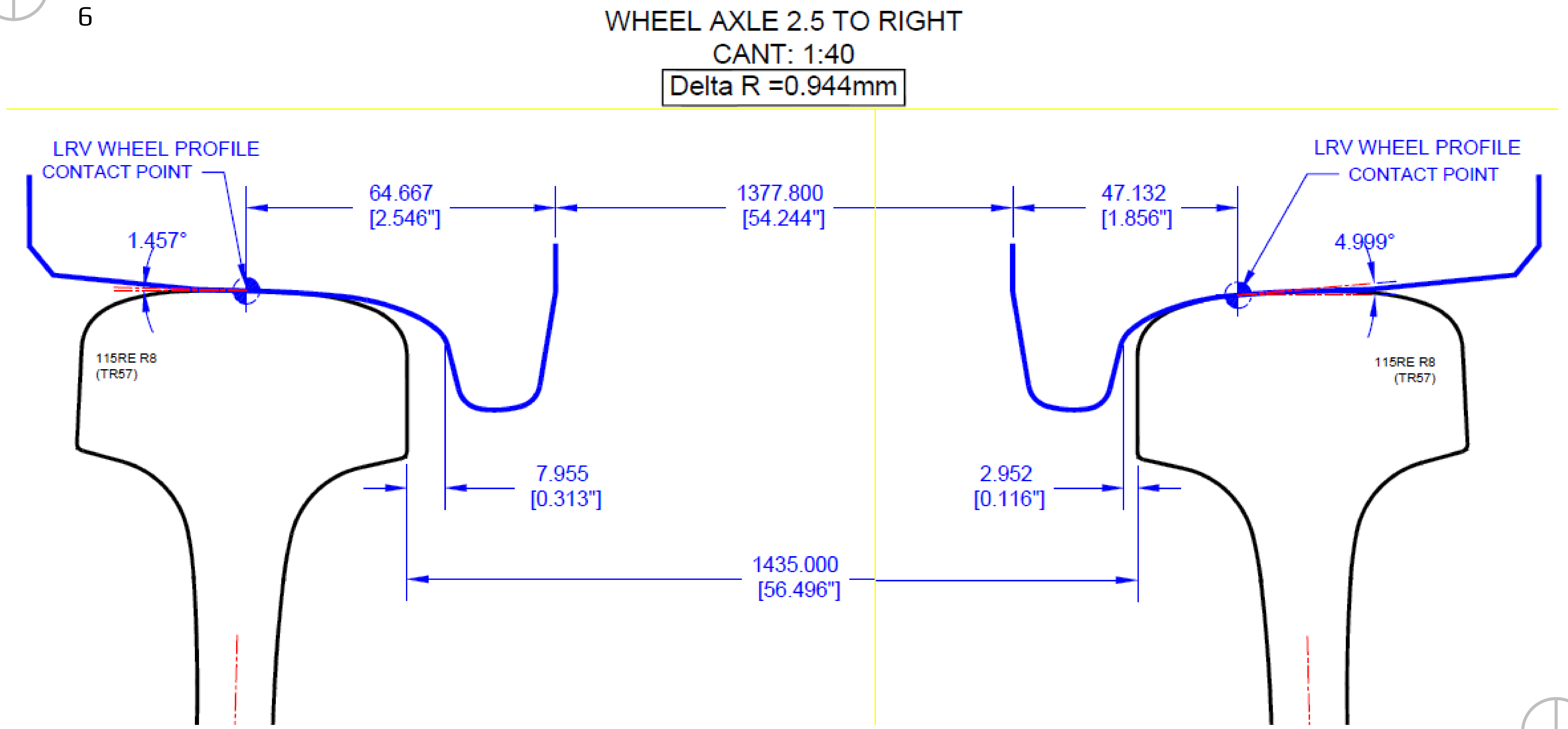


ALSTOM · mobility by nature

6

Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

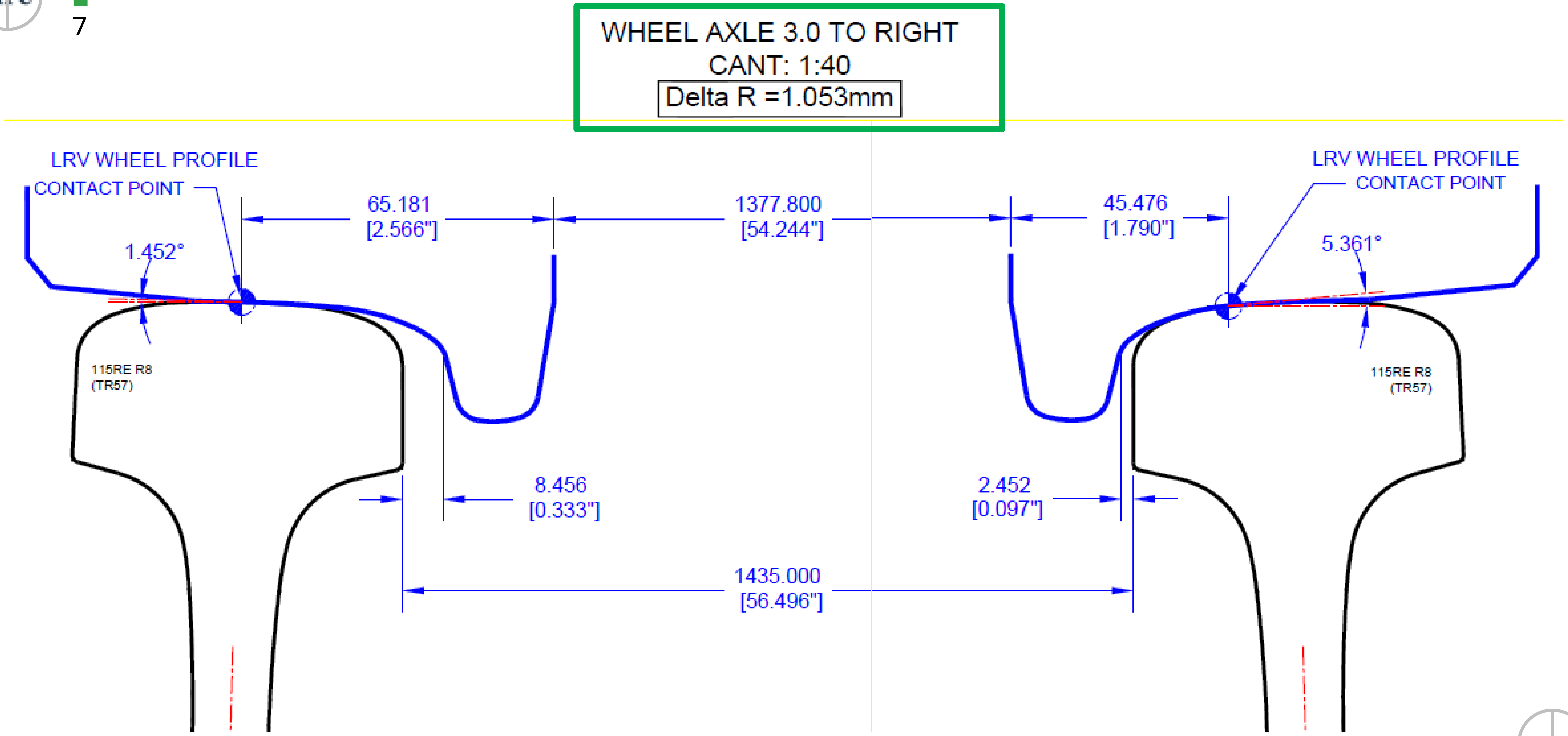


PRINCIPLES COURSE

7

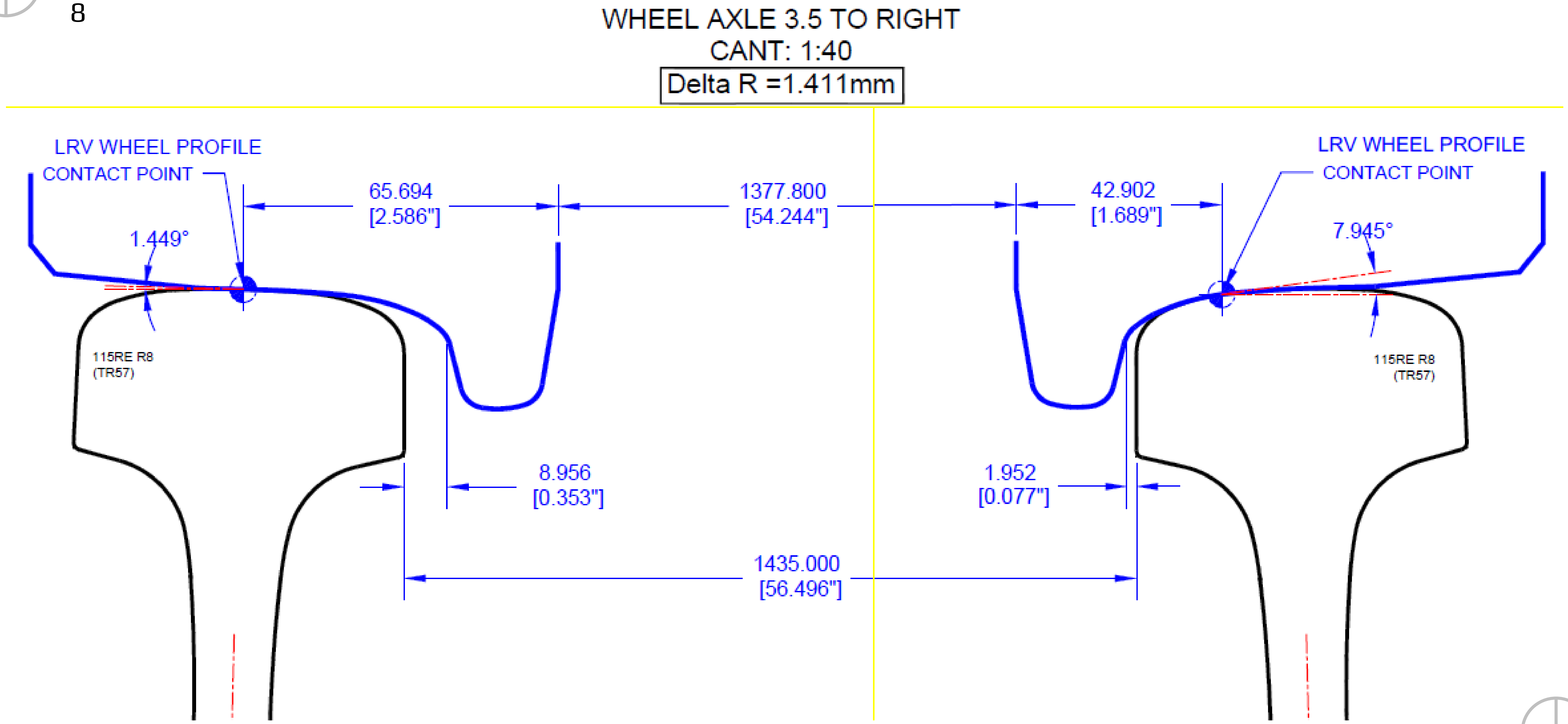
Dynamic Modeling - Improved Profile

(115RE 8”_1:40 cant)



Dynamic Modeling - Improved Profile

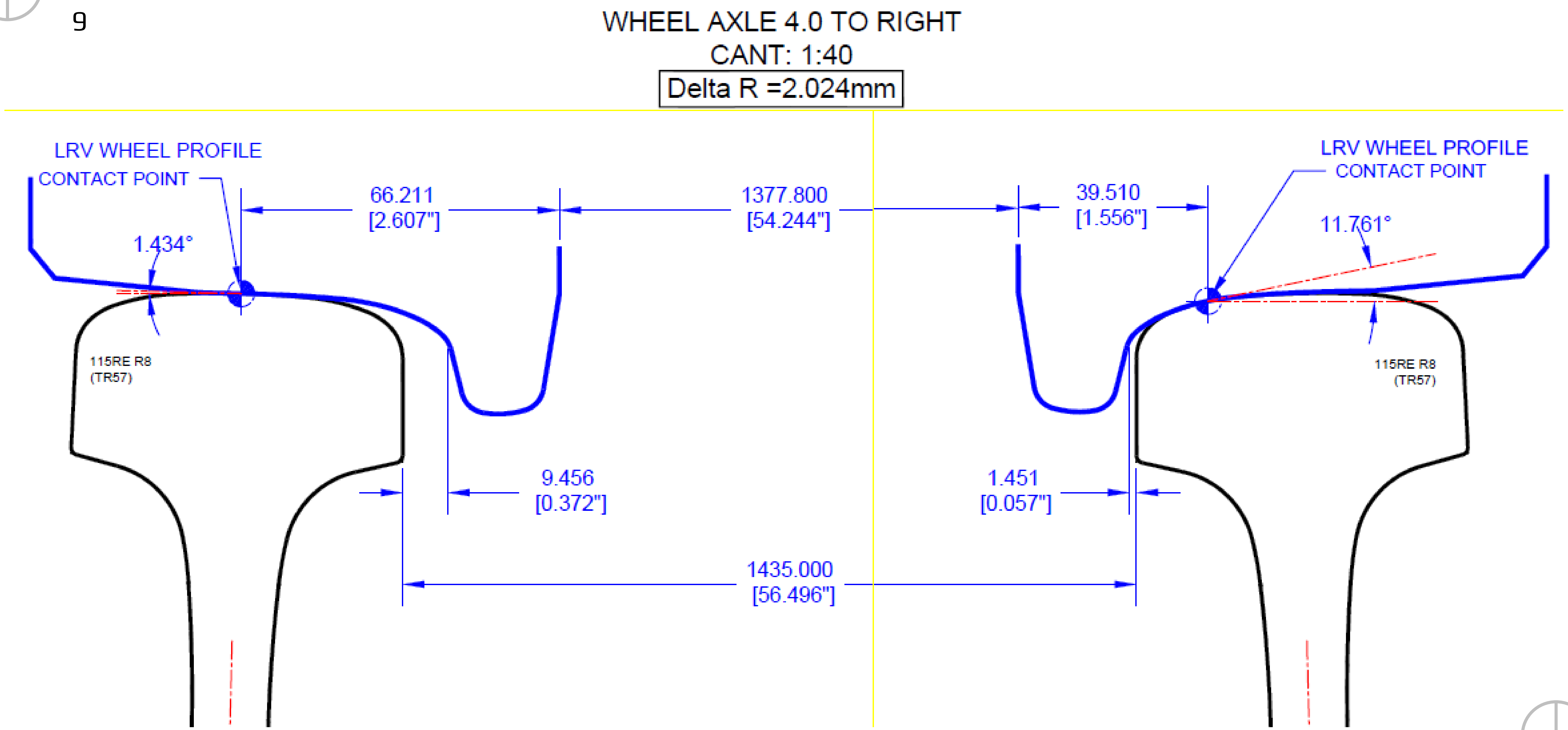
(115RE 8"_1:40 cant)



ALSTOM · mobility by nature

9

Dynamic Modeling - Improved Profile
(115RE 8"_1:40 cant)

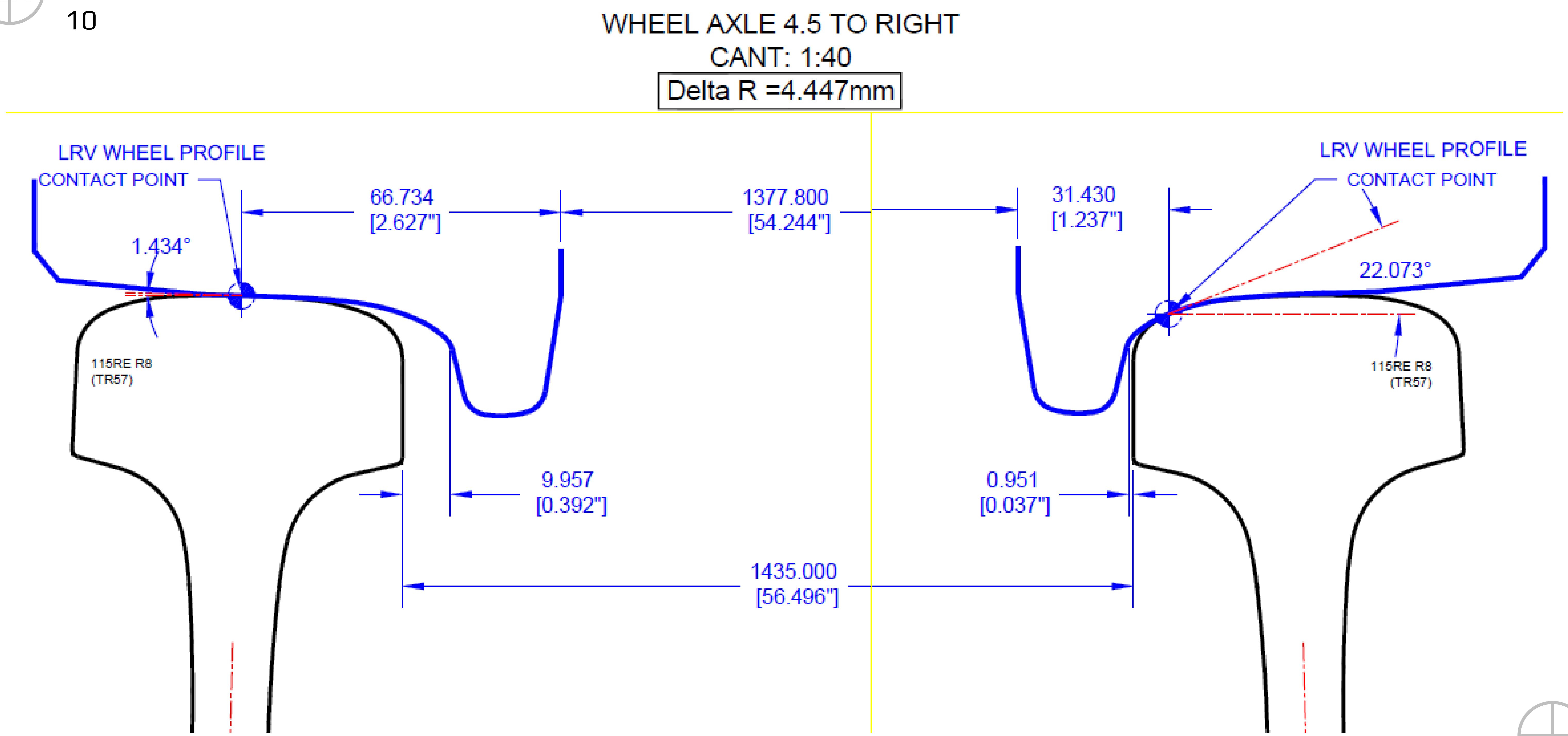


PRINCIPLES COURSE

ALSTOM
• mobility by nature

10

Dynamic Modeling - Improved Profile
(115RE 8"_1:40 cant)

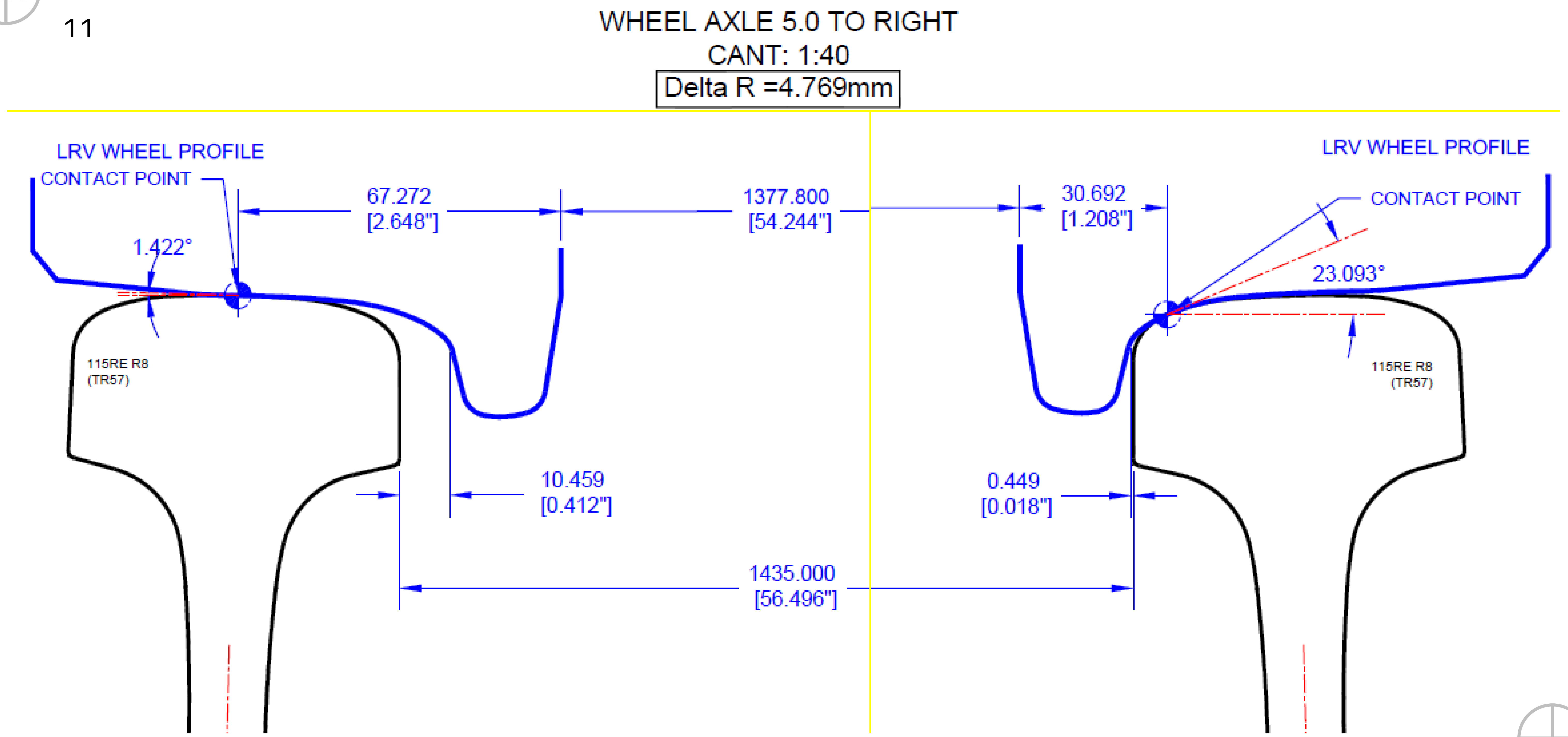


ALSTOM · mobility by nature

11

Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

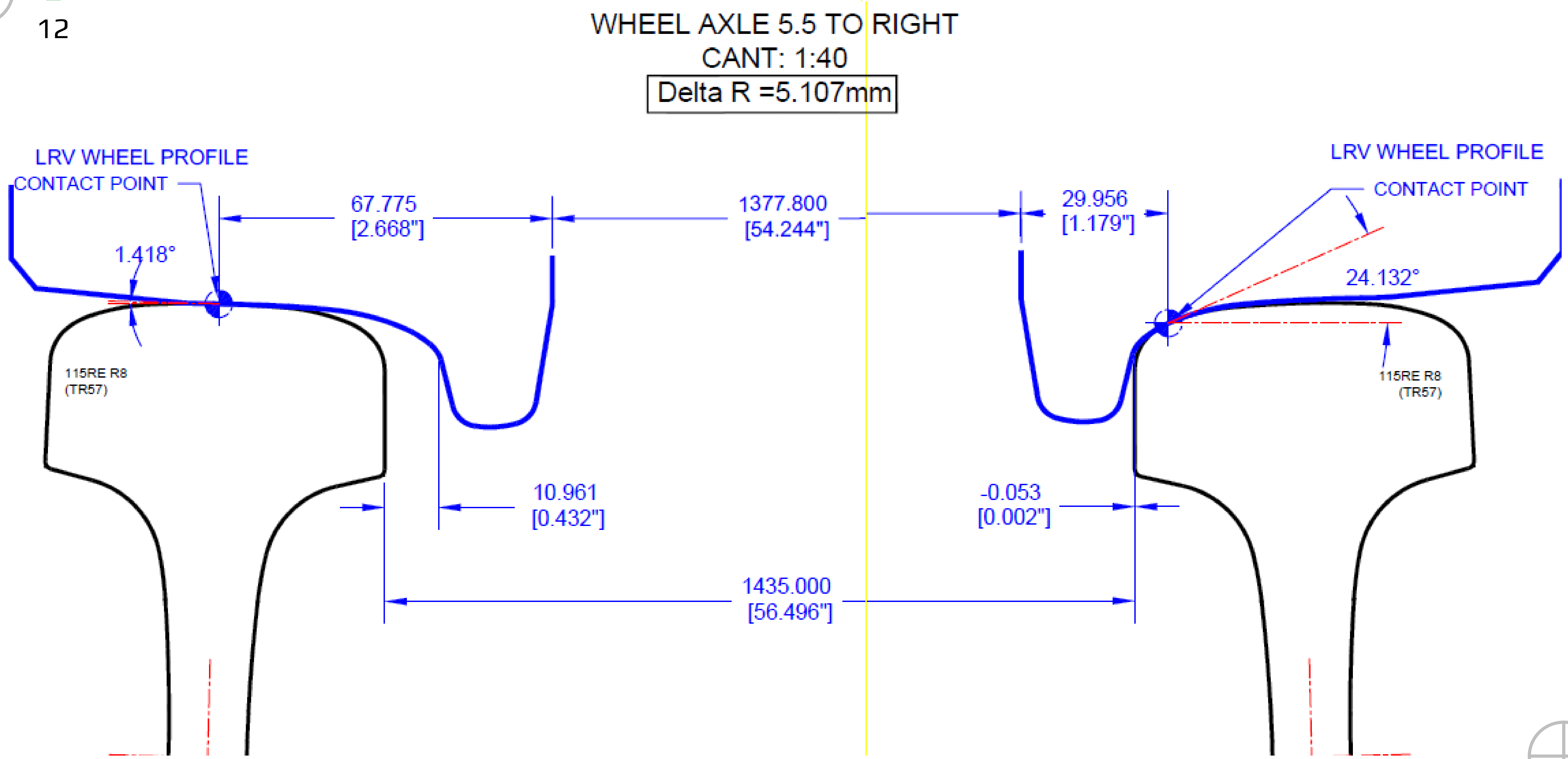


PRINCIPLES COURSE

12

Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

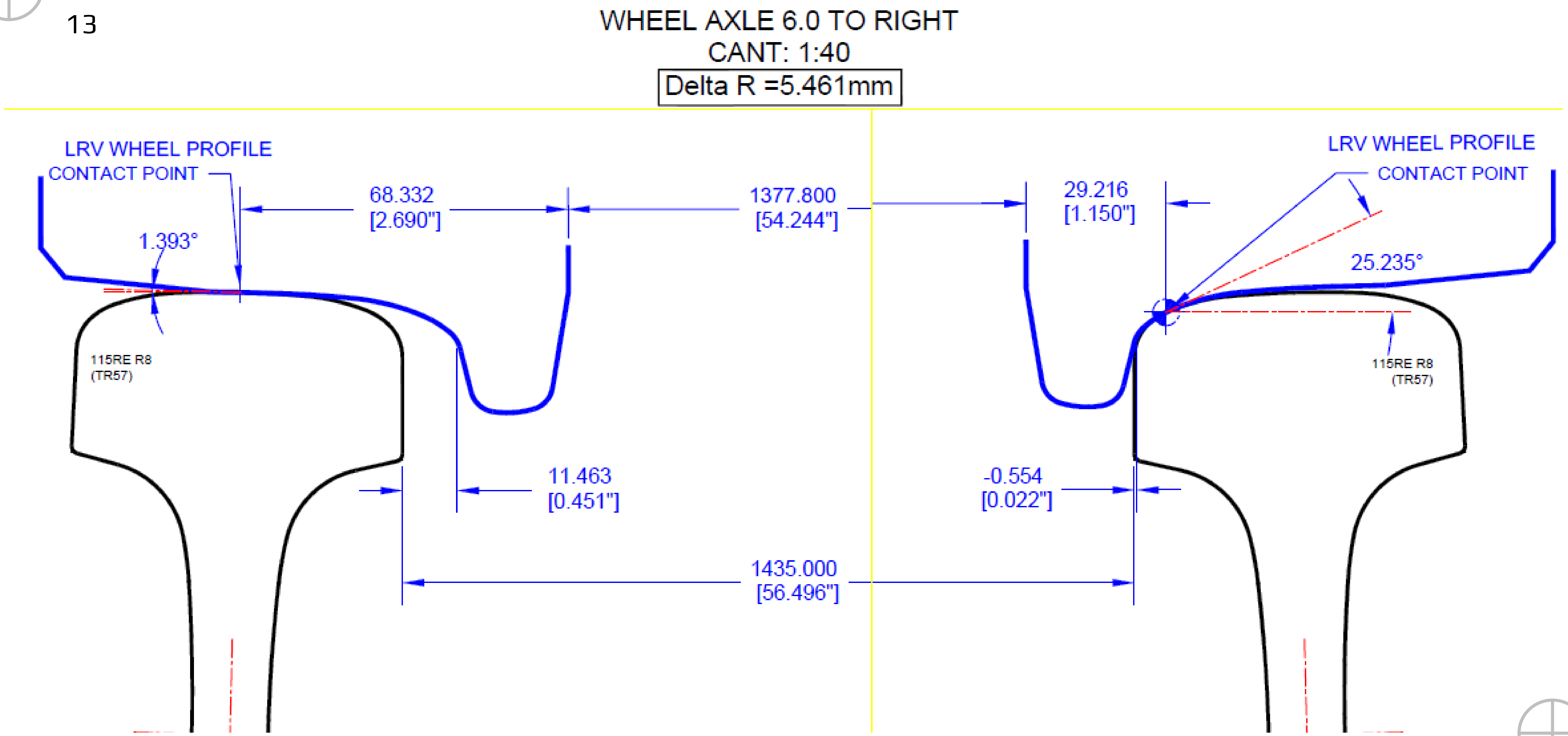


ALSTOM · mobility by nature

13

Dynamic Modeling - Improved Profile

(115RE 8”_1:40 cant)



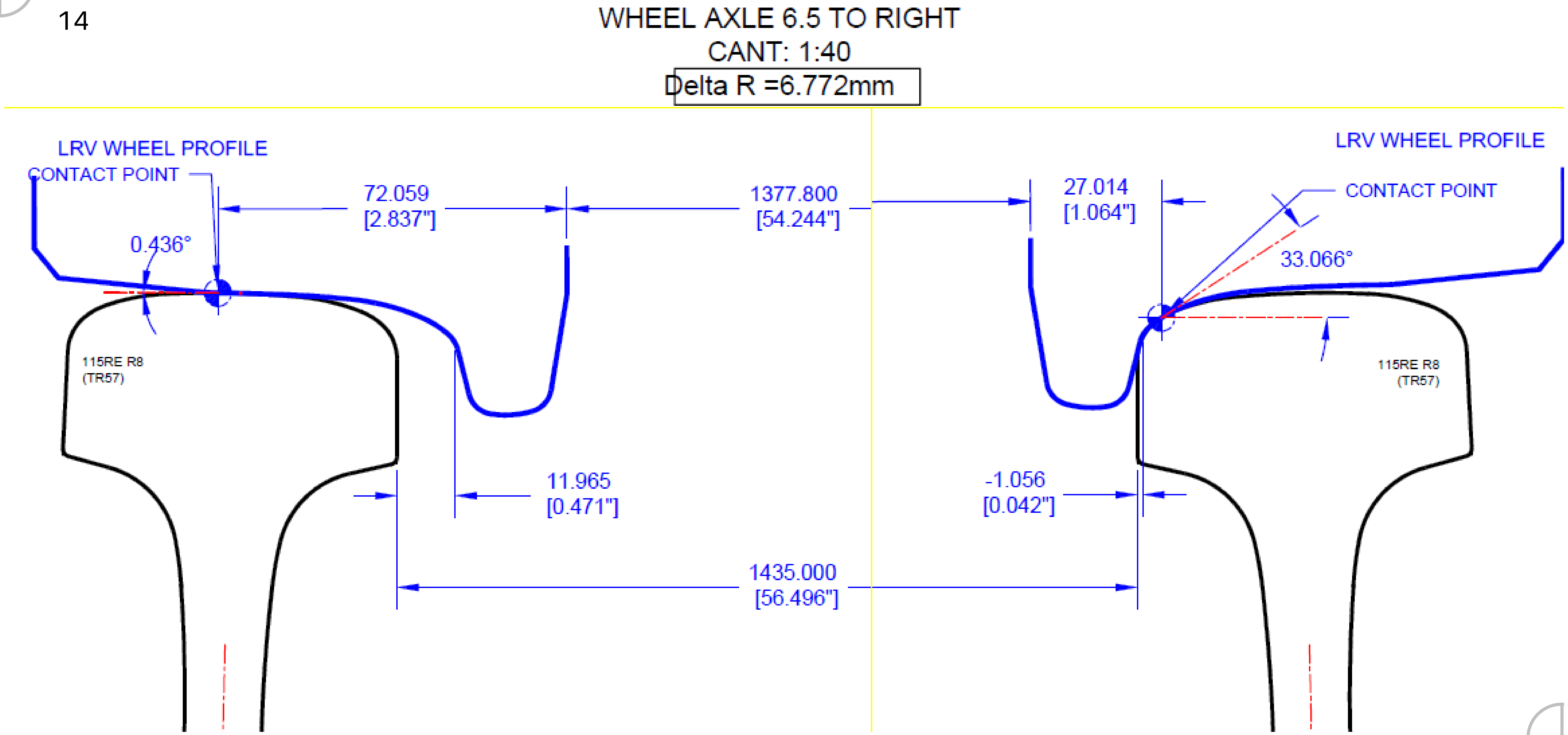
PRINCIPLES COURSE

ALSTOM · mobility by nature

14

Dynamic Modeling - Improved Profile

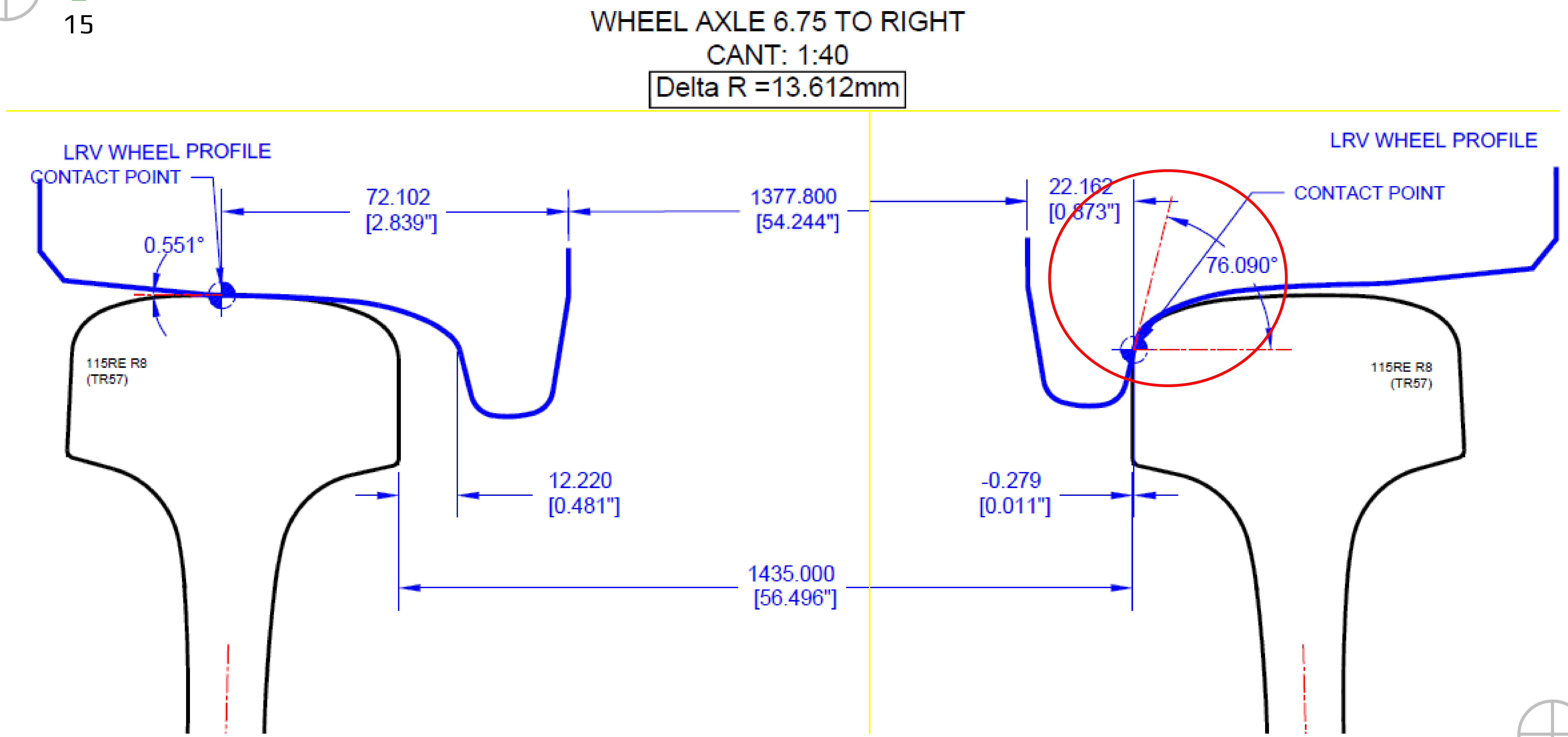
(115RE 8"_1:40 cant)



Dynamic Modeling - Improved Profile

(115RE 8"_1:40 cant)

15



PRINCIPLES COURSE

ALSTOM
• mobility by nature •

PRINCIPLES COURSE

- Transit Vehicle Suspension
- Track Influence on Stability
- Wheel-to-Rail Interface Criteria
- Wheel Profile Sensitivity
- Improving Wheel Profiles
- Dynamic Modeling – Normal vs Improved
- **Conclusion**

Benefits of Improved Profile

- Enhances self-centering running stability thereby ***Improving ride quality***.
- Reduction of rail gauge face to achieve 0.3mm per year.
- Reduction of wheel flange wear to achieve 0.03mm per 1000 kilometre (km).
- Increased wheel mileage up to 220 Tonne-kilometre (tkm).
- Avoiding hollow wear and increase the reprofiling interval for up to150tkm without re-occurring instability problems.

Conclusion

When a uniformly distributed movement of the contact patch during lateral offset of the wheelset is achieved throughout the track network, the transit vehicle and rails will exhibit reduced wear and provide a safer and more stable steering and tracking capability.

ALSTOM
· mobility by nature ·

PRINCIPLES COURSE

Q&A

www.alstom.com