

# Rinstrum WIM Presentation

NCWM 2016 Interim Meeting

San Diego CA



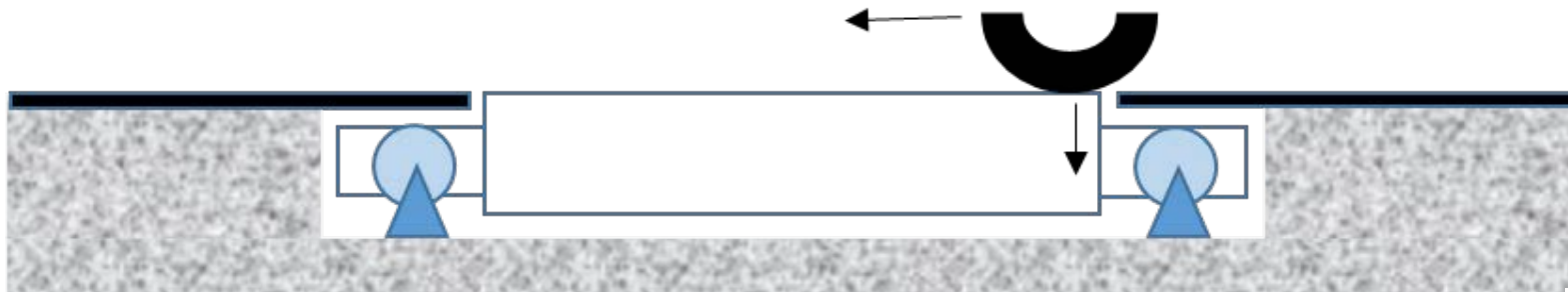
# WIM Axle Scale

- WIM Axle Scale
- Operate at 1-3 miles per hour
- Patent pending design virtually eliminates mechanical noise from load introduction
- Self contained pre cast slab with integrated weigh bridge
- Factory adjusted and leveled to ensure smooth transition
- Installed on foundation of compacted crushed stone to help absorb vibration

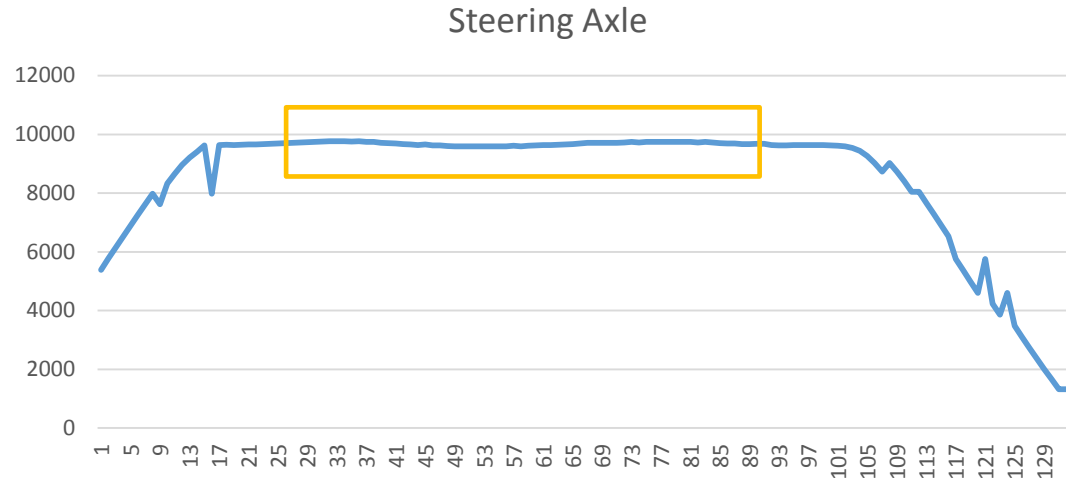


# Why does it work?

- Load Cell mounting geometry virtually eliminates mechanical noise when transitioning on/off the scale
- No “opposite lifting effect” as found on traditional designs that place the load cells in each corner under the weighbridge
- The downward force is always inside the fulcrum point(s) for all cells
- The scale “acts” as if the load is static, when in fact it is dynamically rolling across the platform



# How Does It Work?



Samples	84
Average	9640
Max	9770
Min	9590
Speed	2.4
Variance	180

5385 5775 6150 6520 6890 7260 7620 7980 7620 8330 8650 8955 9215 9410 9620 7980 9640 9650 9640 9650 9660 9660 9670 9680 9690 9700 9710 9725 9735 9745 9755 9765 9770 9765 9760 9770 9740  
 9740 9715 9700 9685 9670 9660 9640 9660 9625 9625 9605 9590 9590 9595 9595 9595 9595 9590 9595 9610 9595 9610 9620 9635 9635 9645 9655 9665 9685 9715 9715 9715 9715 9715 9725 9740 9725  
 9745 9750 9750 9750 9750 9745 9745 9725 9745 9725 9700 9685 9685 9665 9670 9675 9675 9635 9630 9630 9640 9635 9640 9635 9640 9625 9610 9590 9540 9435 9265 9030 8730 9030 8730 8400 8045  
 8045 7665 7290 6910 6530 5755 5370 4985 4605 5755 4225 3855 4605 3480 3100 2730 2365 2010 1665 1325 1325

There is no special “magic” with this scale. The performance comes from reduction of mechanical noise resulting from a patent-pending load cell mounting geometry. Because the load cells work so well the controller has time and a high number of samples to average.



# 5 Consecutive Runs of the Same Vehicle

	Axle 1	Axle 2	Axle 3	Axle 4	Axle 5	Axle 6	GVW	Error
<b>Run 1</b>	9,640	16,000	15,600	12,560	12,580	11,780	78,160	+20 lbs.
<b>Run 2</b>	9,600	16,040	15,580	12,540	12,560	11,760	78,080	-60 lbs.
<b>Run 3</b>	9,640	16,000	15,560	12,560	12,600	11,800	78,160	+20 lbs.
<b>Run 4</b>	9,600	16,060	15,580	12,520	12,580	11,840	78,180	+40 lbs.
<b>Run 5</b>	9,620	16,040	15,580	12,500	12,560	11,860	78,160	+20 lbs.
<b>Average</b>	9,620	16,028	15,580	12,536	12,576	11,808		
<b>Rounded</b>	9,620	16,020	15,580	12,540	12,580	11,800		
<b>Divisions</b>	2	3	2	3	2	5		

Actual truck GVW as measured on a certified full length scale is 78,140 lbs.

# NIST Traceable Test Procedure

- Dynamically test with unloaded (empty) test truck
  - Make 3 or more runs across the scale between 1 and 3 MPH
  - All runs must be in the same direction
  - Minimize engine idling and distance driven between runs for fuel-load economy
  - Take an average of all runs and set that as the vehicle TARE weight
- Dynamically test with loaded test truck
  - Load test truck with a minimum of 21,000 lbs. of NIST traceable known weights
  - Make 3 or more runs across the scale between 1 and 3 MPH
  - All runs must be in the same direction as the test runs in step 1
  - Minimize engine idling and distance driven between runs for fuel-load economy
  - Take an average of all runs and set that as the vehicle GROSS weight
- Verify Tolerance
  - Calculate the NET weight by subtracting the TARE weight from the GROSS weight
  - The scale will PASS if the NET weight is within Class III L maintenance tolerance of the test load of NIST traceable known weights used in step 2
    - Class III L Maintenance tolerance at 21,000 test load is 3d or 60 lbs.
    - Pass criteria is only applied to NET weight vs. NIST test load

# Example of NIST Traceable Test Report

EXAMPLE: NIST Traceable Dynamic Test in 20 Lb. Graduations			
Vehicle Description	Item	Displayed Reading	Tolerance
Empty Test Truck	Run 1	28,360	-2d
	Run 2	28,440	+2d
	Run 3	28,420	+1
	Average	28,406	
	<b>Calculated TARE (rounded)</b>	<b>28,400</b>	
Loaded Test Truck with 21,000 lbs. Traceable Weights	Run 1	49,400	-1d
	Run 2	49,440	+1d
	Run 3	49,420	0d
	Average	49,420	
	<b>Calculated GROSS (rounded)</b>	<b>49,420</b>	
	<b>Calculated NET Weight</b>	<b>21,020</b>	+1d
	Test Load	21,000	<b>PASS</b>
	Variance	20 lbs.	

# We heard your feedback (and want more)

1. Provide data and test results supporting the accuracy claims
2. Improve the Test Procedure with direct traceability to NIST Standards
3. Seek guidance from a new WIM work group and Conference members
4. Consider putting the WIM legal-for-trade proposal in the Scales Code
5. Remove the Direct Law Enforcement application