



**Go Further**

**WLTP**

**Driving Trace Index**

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# Driving Trace Index

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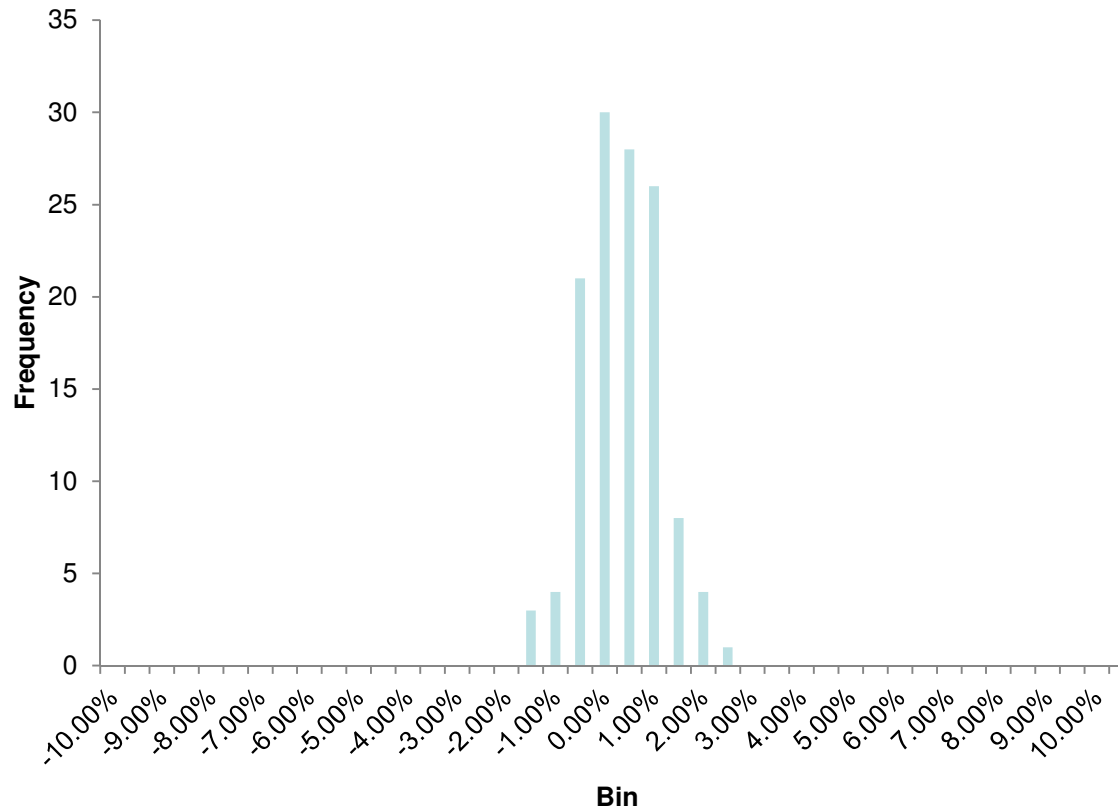
- **Background**
- **Data Analysis**
- **Recommendations**



- **Ford has reanalysed a high volume of tests run in house on cycles WLTC (4 phase cycle and individual phases), FTP and US-06 to establish ASCR, RMSSE and IWR metrics.**
- **Only the WLTC 4 phase cycle graphs are included, slides of the individual phases and / or FTP / US-06 could be included on request**
- **The WLTC drive has been shown on the drivers aid without tolerance bands, the drivers were instructed to follow the trace. This data has been collected since the cycle was finalised (v 5.3) and has now been post processed.**



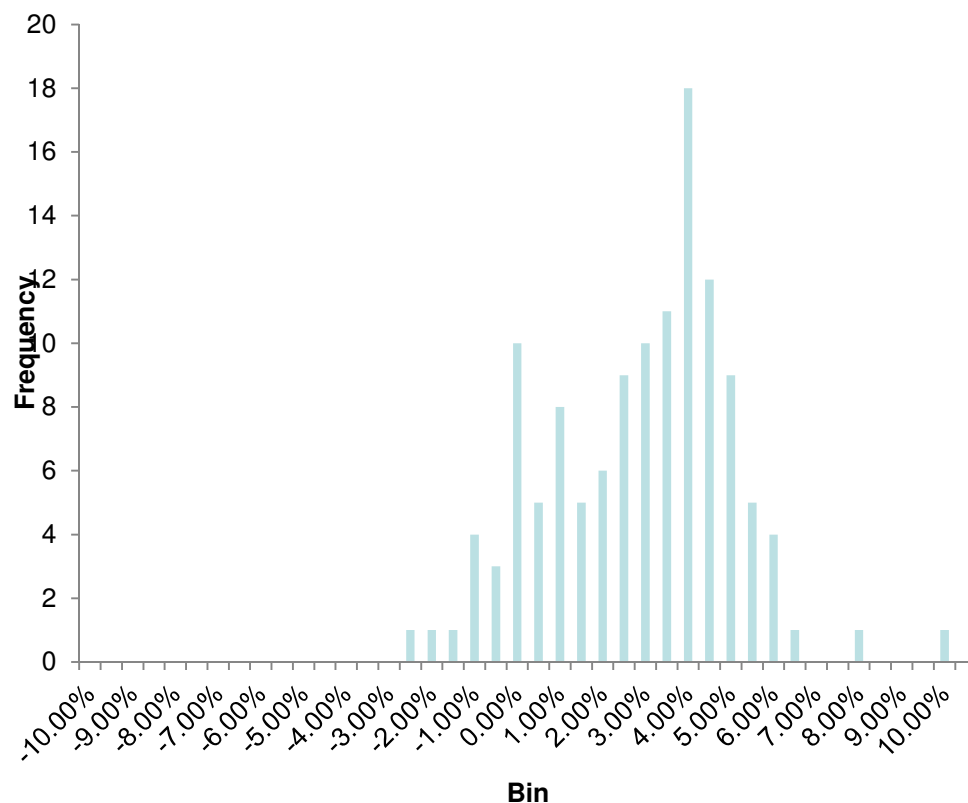
## EER Histogram



**Data quality check using EER (drive energy distribution) shows a tight normal distribution. Mean is very close to 0. Data set therefore can be further analysed for the other metrics.**



## ASCR Histogram

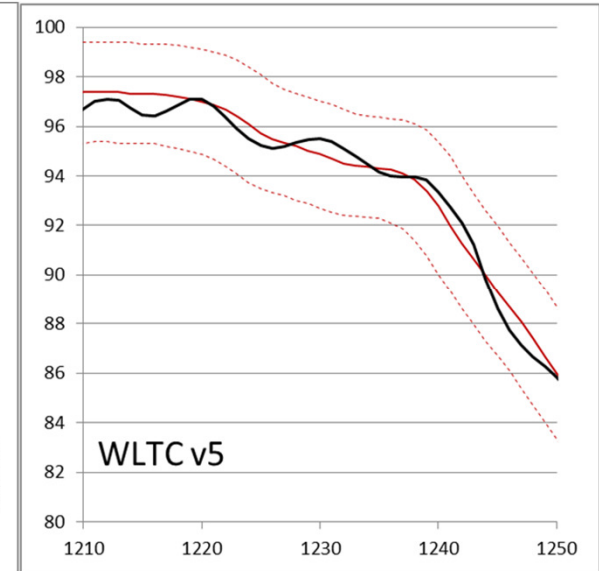
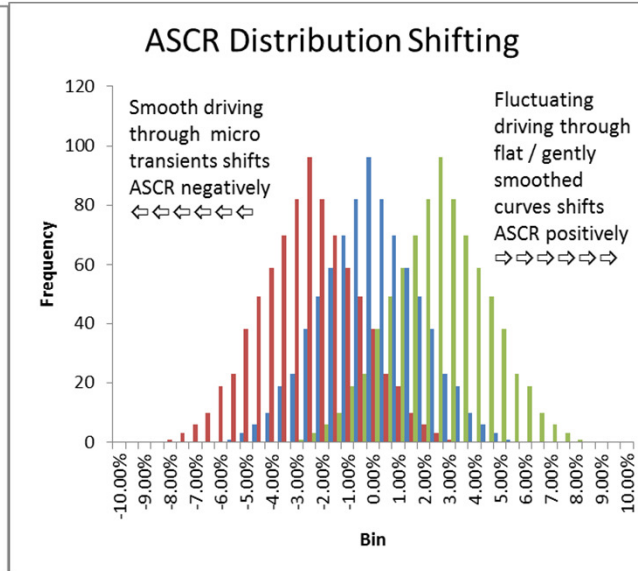
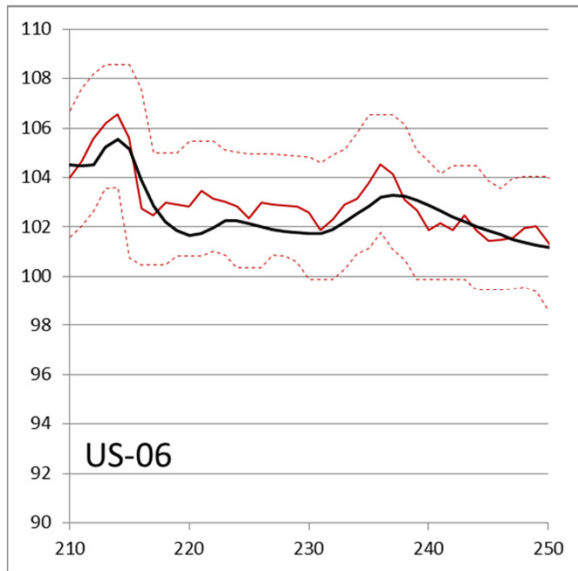


Limit	% Pass Rate	% Scrap Rate
± 2%	33.60%	66.40%
± 3%	50.40%	49.60%
± 4%	73.60%	26.40%
± 5%	90.40%	9.60%
± 6%	97.60%	2.40%
± 7%	98.40%	1.60%
± 8%	99.20%	0.80%

**ASCR histogram biased positive on WLTC.  
Japanese proposal +/-3% would reject approx 50% of tests**



# ASCR Distribution Shifting



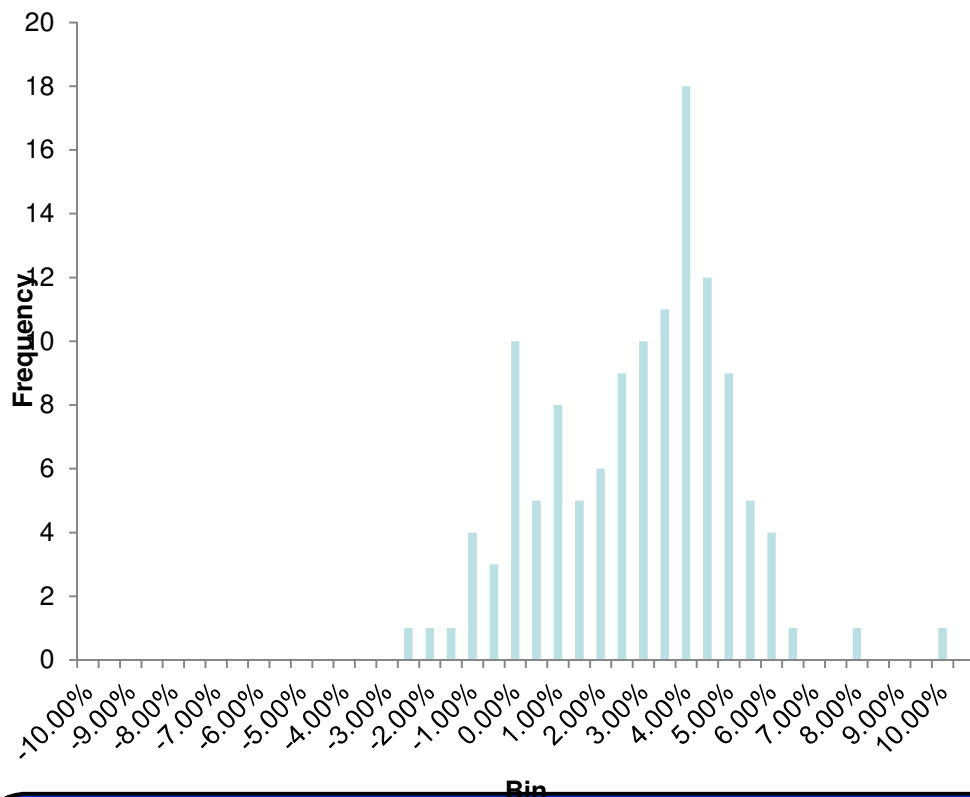
Smooth driving  
through micro  
transients shifts  
ASCR negatively  
←←←←←←

Fluctuating driving through flat /  
gently smoothed curves shifts ASCR  
positively  
⇒⇒⇒⇒⇒⇒

Some cycles have a tendency to shift the ASCR distribution, WLTC appears to bias the ASCR



### ASCR Histogram



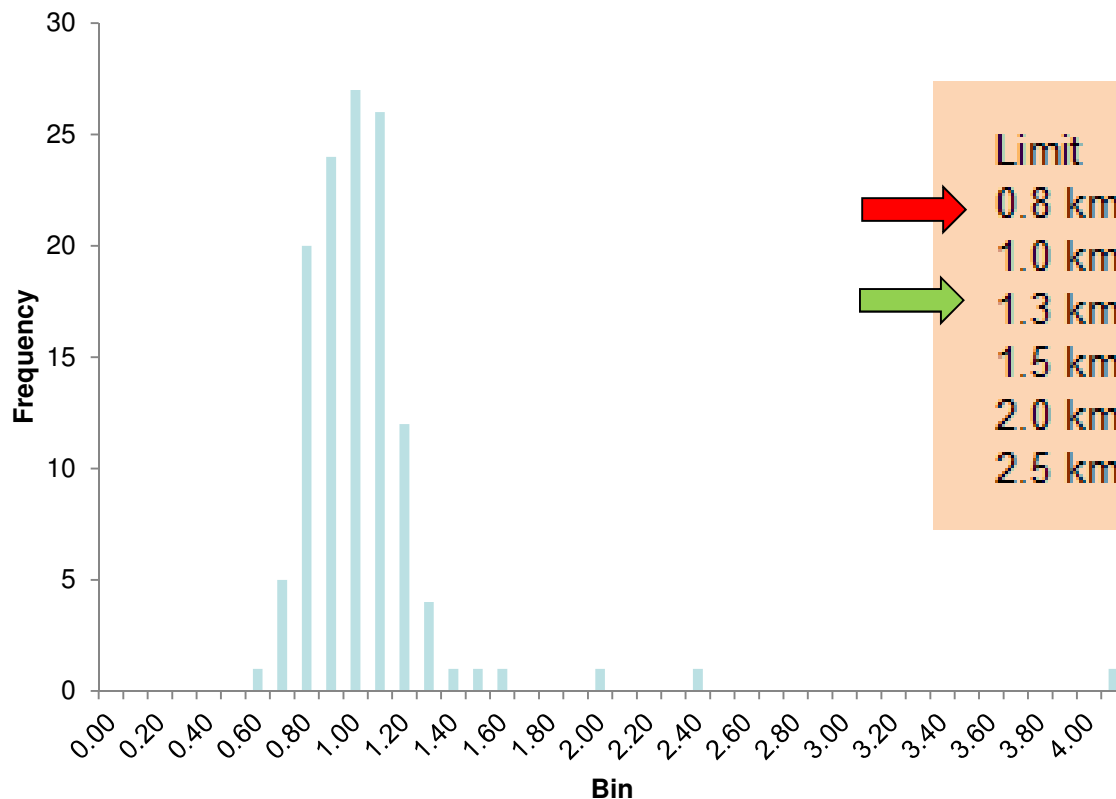
**Positive ASCR means actual driving contains more microtransients than on the original drive trace.**

**-2 to +4 % tolerance band takes valid test pass rate to >70%**

**Counter proposal on ASCR  
Tolerance -2 to + 4% to partly compensate for  
WLTC tendency to bias to the right.**



## RMSSE (km/h) Histogram



Limit	% Pass Rate	% Scrap Rate
0.8 km/h	20.80%	79.20%
1.0 km/h	61.60%	38.40%
1.3 km/h	95.20%	4.80%
1.5 km/h	96.80%	3.20%
2.0 km/h	98.40%	1.60%
2.5 km/h	99.20%	0.80%

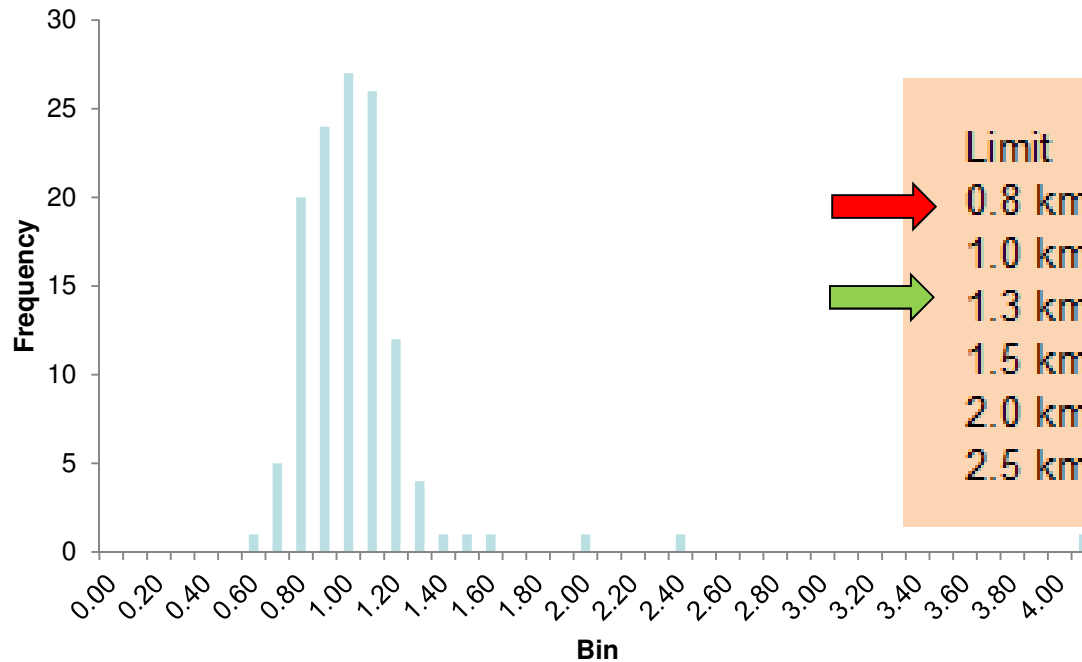
**Proposed limit of 0.8 gives valid test pass rate of 21%  
calculated in kmh.**

**SAE calculation spec refers to mph**





## RMSSE (km/h) Histogram

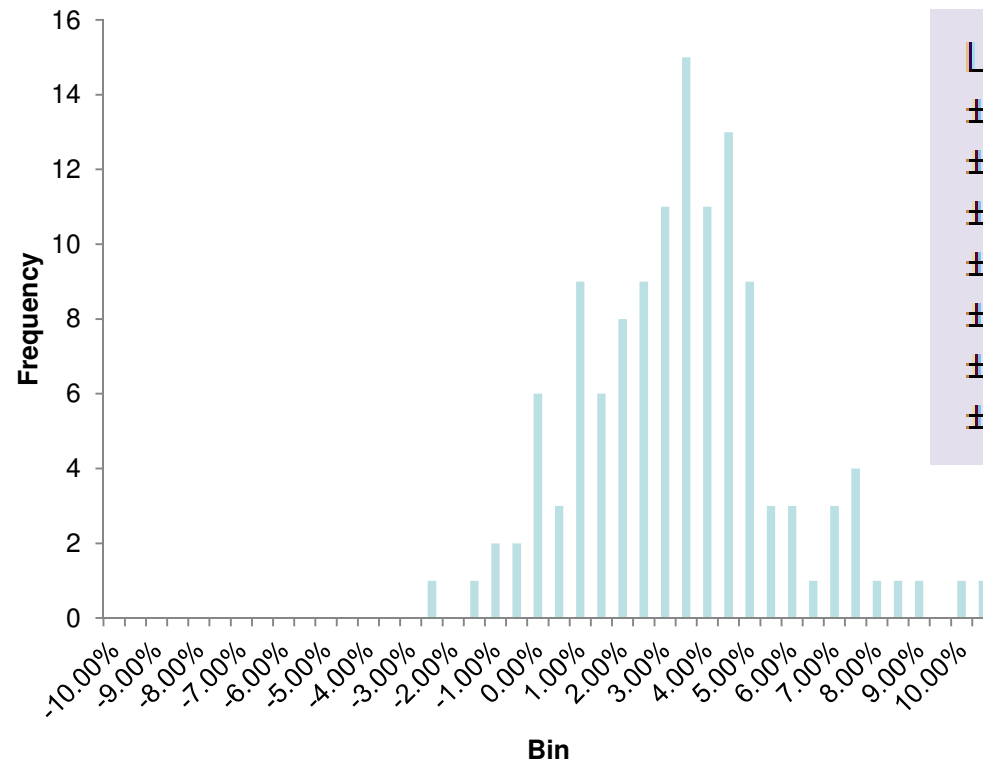


Limit	% Pass Rate	% Scrap Rate
0.8 km/h	20.80%	79.20%
1.0 km/h	61.60%	38.40%
1.3 km/h	95.20%	4.80%
1.5 km/h	96.80%	3.20%
2.0 km/h	98.40%	1.60%
2.5 km/h	99.20%	0.80%

Limits need to be converted in to kmh for this gtr  
RMSSE limit of 0.8 mph = 1.3 kmh would give >95% test validity



## IWR Histogram

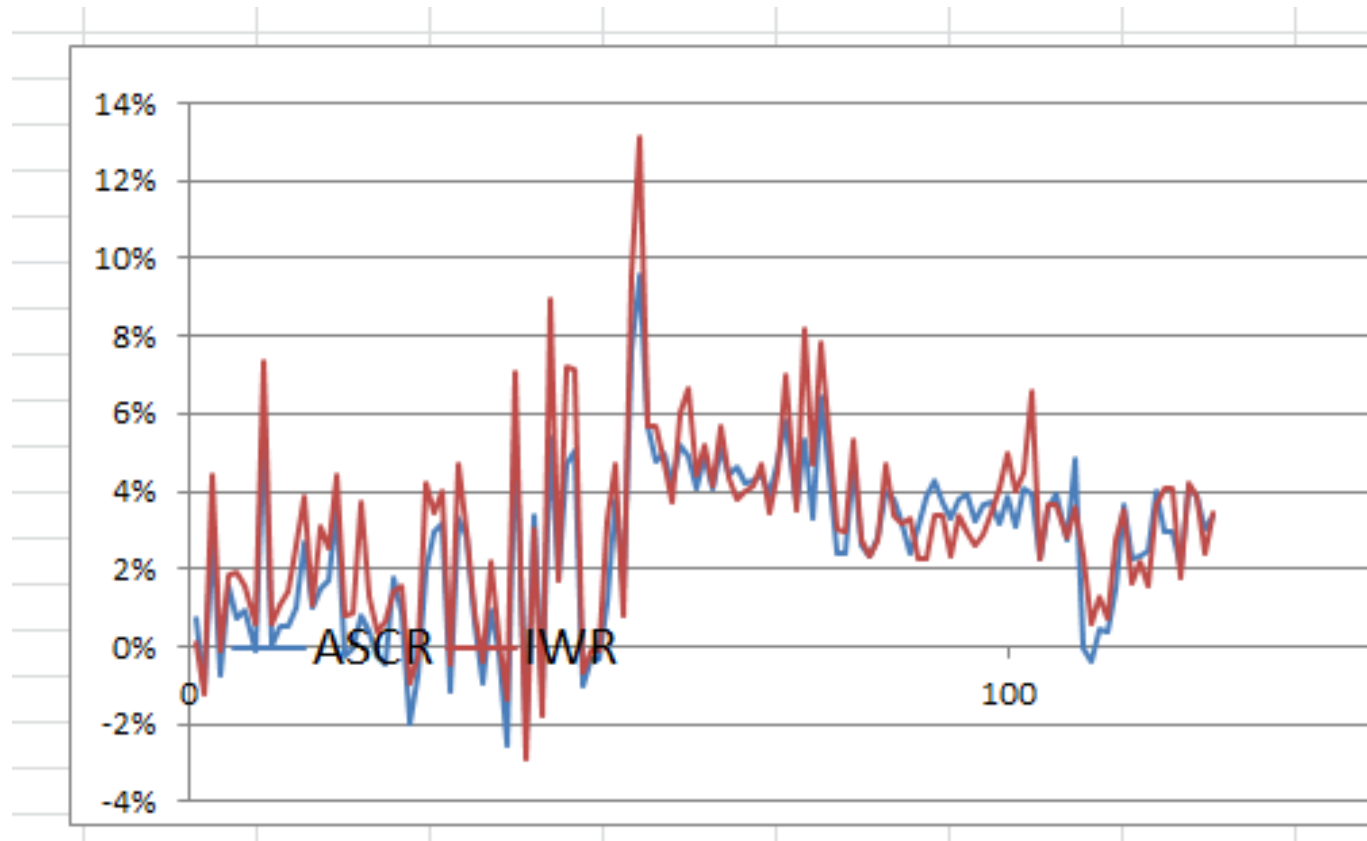


Limit	% Pass Rate	% Scrap Rate
± 2%	29.60%	70.40%
± 3%	46.40%	53.60%
± 4%	67.20%	32.80%
± 5%	84.80%	15.20%
± 6%	89.60%	10.40%
± 7%	92.80%	7.20%
± 8%	96.80%	3.20%

**IWR is similar to RMSSE but with a wider distribution and a strong positive bias**



## Comparison: ASCR and IWR



- ASCR is very similar to IWR – is there a need for both ?



**Adopt driving trace index tolerance criteria for ASCR and RMSSE as per the following counter proposal**

- **ASCR tolerance -2 to +4%**
- **RMSSE limit of 1.3 (units kmh)**
- **IWR appears to behave very similarly to RMSSE and therefore may not be necessary.**