

# Automotive Tyre Rolling Resistance Regulation

Three modern key problems:

1. **METHOD(s)** – under final upgrading now.
2. **EQUIPMENT** – requires extended preparing for wide RR control in tyre manufacturer laboratories.
3. **NORMS** – under preparation by Tyre Industry now.

## Methods normative documents in action / development (end 2008)

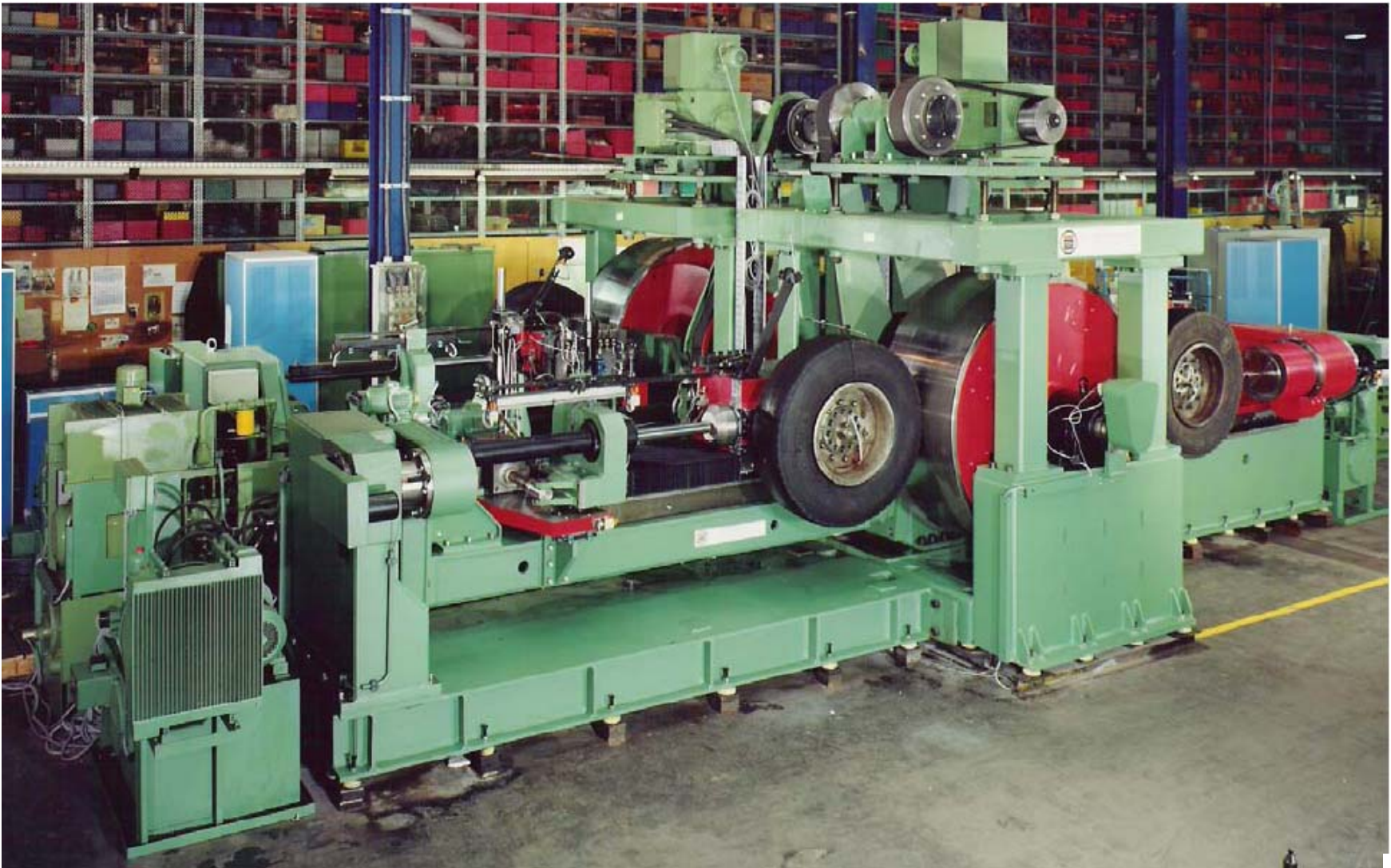
Standard	Test speed km/h
ISO 18164 “Methods of Measuring Rolling Resistance – Passenger Car, Truck & Bus, and Motorcycle Tyres”	80 (50,90,120)
SAE J2452 "Stepwise coastdown methodology for measuring rolling resistance"	115 - 15
ISO(ETRTO) CD 28580 “Tyre Rolling Resistance measurement method designed to ease international cooperation and, possibly, regulation building”.	80
ISO 18164 Amendment, Annex D “Deceleration method based on time-distance measuring”	Full range 90(120) - 0

**In the view of sufficient time space before RR  
Regulation introduction date RF delegation  
consider necessary  
to use this period for:**

- upgrading RR measurement methods,
- designing not expensive equipment
- data and experience collecting

In RF the subject of ISO CD 18164 Amd being standardized by GOST R 52102 is under wide industrial testing from 2003 in 3 tyre plants and NAMI (see slides below)

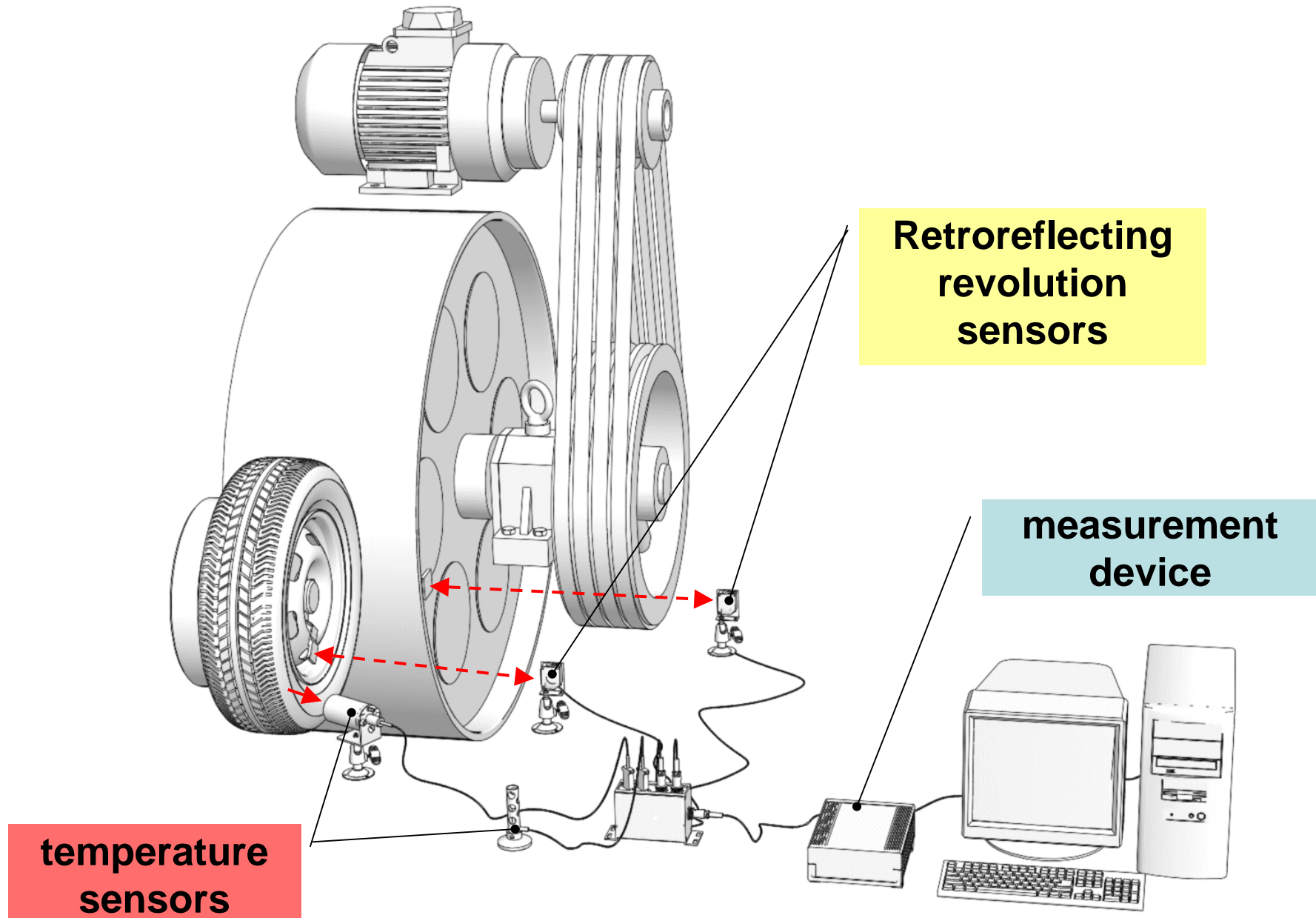
# Rolling Resistance Test Machine (400 000-450 000 \$)



# Measurement kit for anyone drum test machine (30 000-35 000\$ with software)



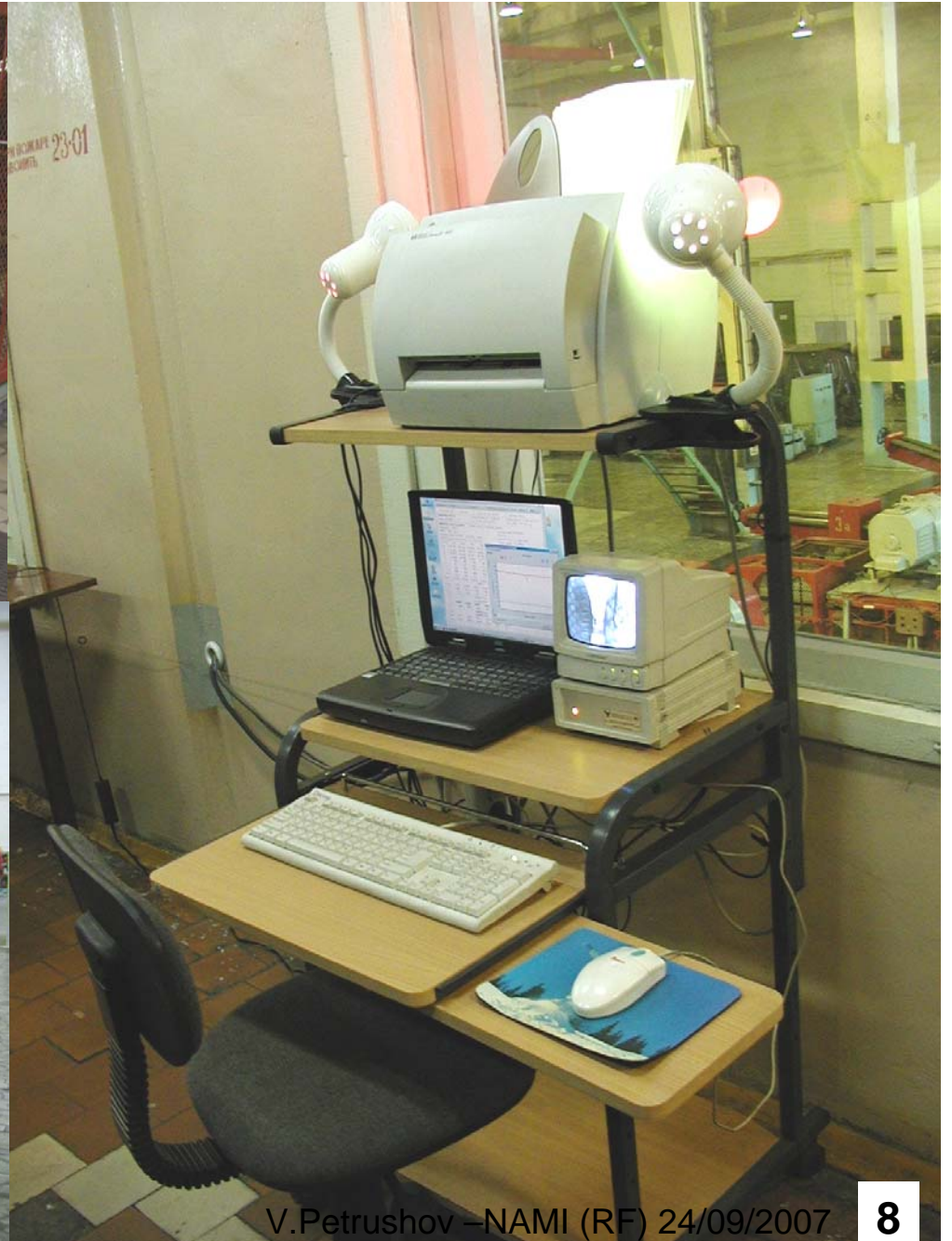
# Measurement kit mounting on standard test machine



# Pilot lot of measurement kit for new deceleration method



## "Ircon-111" RR measurement system in Nizhnekamsk tyre plant (RF)





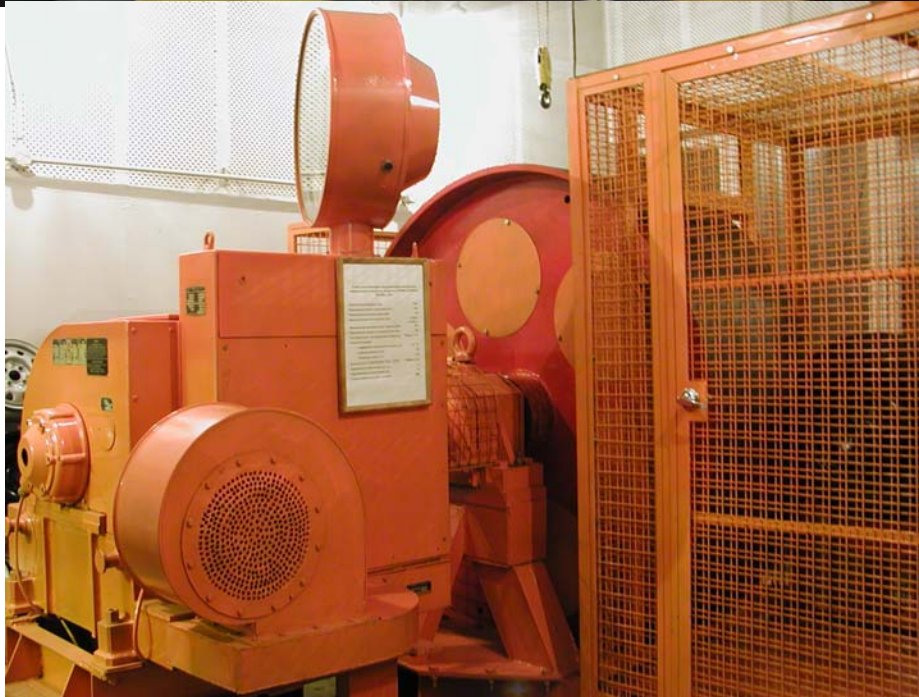
# "Ircon-111" RR measurement system in Omsk tyre plant



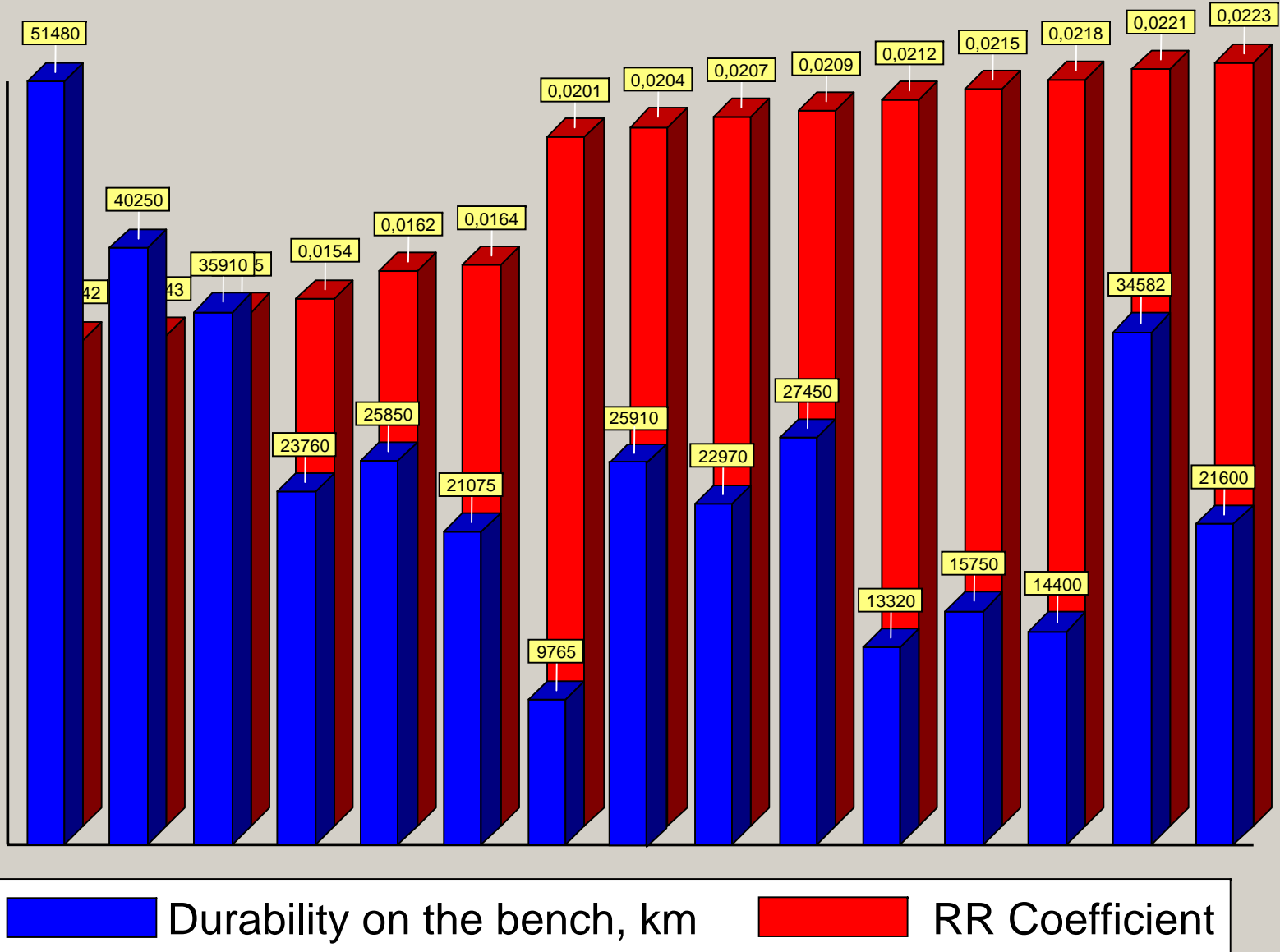
## "Ircon-111" RR measurement system in Kirov tyre plant



# NAMI Rolling resistance test machine with "Ircon-111" measurement system



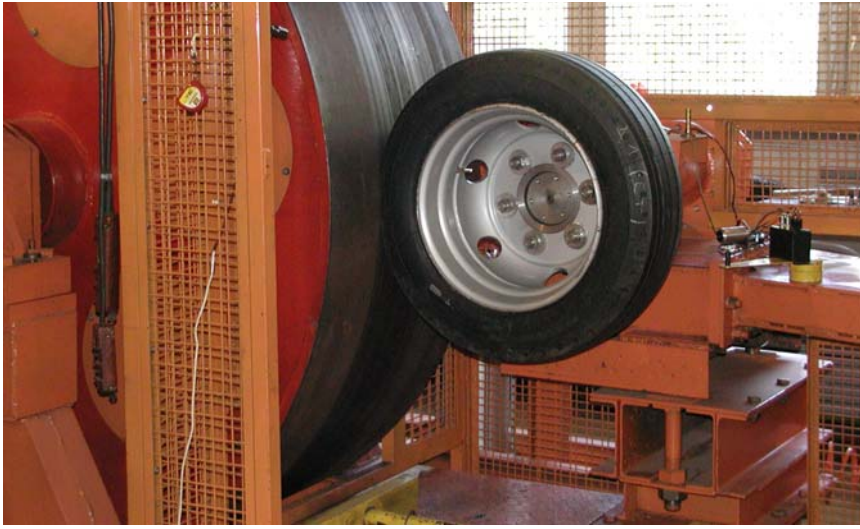
# Tyre plant lab tests: RR-Durability correlation



**2007: TYRE RR CORRELATION TESTS FOR  
REPEATABILITY AND REPRODUCIBILITY DEFINITION OF  
ISO CD 18164 AMD METHOD WAS PERFORMED.**

<b>Total number of ETRTO lot of tested tyres</b>	<b>22</b>
<b>Number of mounting of each tyre on the bench</b>	<b>2</b>
<b>Number of RR measurements at each mounting</b>	<b>4</b>
<b>Total number of measurements by basic method</b>	<b>176</b>
<b>Total number of measurements by short test method</b>	<b>176</b>
<b>Number of RR measurements by both variant</b>	<b>352</b>
<b>Repeatability / reproducibility variance ratio, %</b>	<b>0.9/1.5 (in general)</b>

**Each tyre was tested 8 times by basic and 8 times by short methods.**



## Proposal for mandatory RR grading for « summer » tyres (80 km/h)

TYPE	CATEGORY	NAMI (RF) 2002	ETRTO 2007
<b>PC</b>	A		<9.0
	B	<11.0	9.0–10.5
	C	11.0–13.0	10.5–12
	D	13.0–15.0	12–13.5
	off-range	>15	
<b>LT</b>	A		<7.5
	B		7.5–9.0
	C		9.0–10.5
	D		10.5–12.0
<b>CV</b>	A		
	B	<10.6	
	C	10.6–11.8	
	D	11.8–13.0	
	off-range	>13.0	

## 2 variants of RR standardizing.

### Regulation

(limitation of maximum RR level).

#### Shortcomings:

1. Cumbersome system of different tyre's sizes requiring an individual approach and a finding of compromise between manufacturers and consumers during long time.
2. Great inertia of properties enhancement and norm revision.
3. Limitation of manufacturer and user relation especially at perspective orders.
4. Difficulties of alternative choice of  $C_r$  and grip coefficients.

### End-user information

#### Advantages:

1. Satisfaction of consumer's rights to be informed without opportunity of any limitation in choice of tyres.
2. Consumer's opportunity to choose needed correlation between  $C_r$  and grip coefficient. (Modern end-users have got an appropriate competence for it.)
3. Elimination the necessity to introduce numerous norms due to different tyre's types and sizes.

**The Information may occurs more effective then the Regulation as a stimulus of tyre quality support.**

**RF delegation insert proposal on this matter as modification of previous and very soft for tyre industry.**



**ISO 18164 Amendment, Annex D “Deceleration method based on time-distance measuring” has 4 main features:**

- ◆ Using time-distance dependence for rolling resistance determination.
- ◆ Technology reduced to the high accuracy of time spans measurement.
- ◆ Usable and of enough accuracy moment inertia determination method.
- ◆ Simple and low cost equipment with the possibility of rolling resistance measuring on any tyre test machines and unified with the same for road tests

**One can hope that method under standardization may expand an ability to choice standard effective method of tyre rolling resistance determination at the period of RR norms introduction .**

**Thank you for your attention!**