

TITAN ITALIA	Marketing Information	<i>RTF</i> <i>08/02/02</i>
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WHEEL AND TYRE RANDOM FITTING

The aim of this document is to give a practical example of what happens when mounting a tyre & wheel assembly at random and how efficient is to match mounting.

This document is obviously intended for being circulate to customer's engineers, since it is quite difficult, in some cases, to make the subject immediately clear.

THE PROCEDURE

Let's take a wheel, with its own radial run outs and first harmonic value, and a tyre with its own characteristics of geometrical disuniformity.

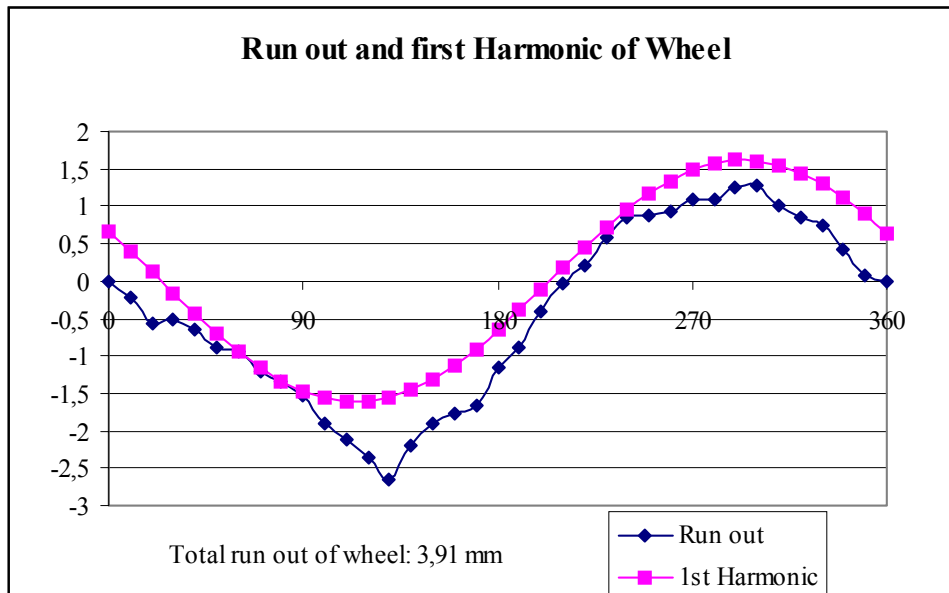
We will first mount them matching the tyre and the wheel and after we will rotate the tyre Vs the wheel to show what happens or what could happen if the matching is done in a "clever" way or at random.

THE WHEEL

The wheel has the following characteristics:

TIR=3.91 mm

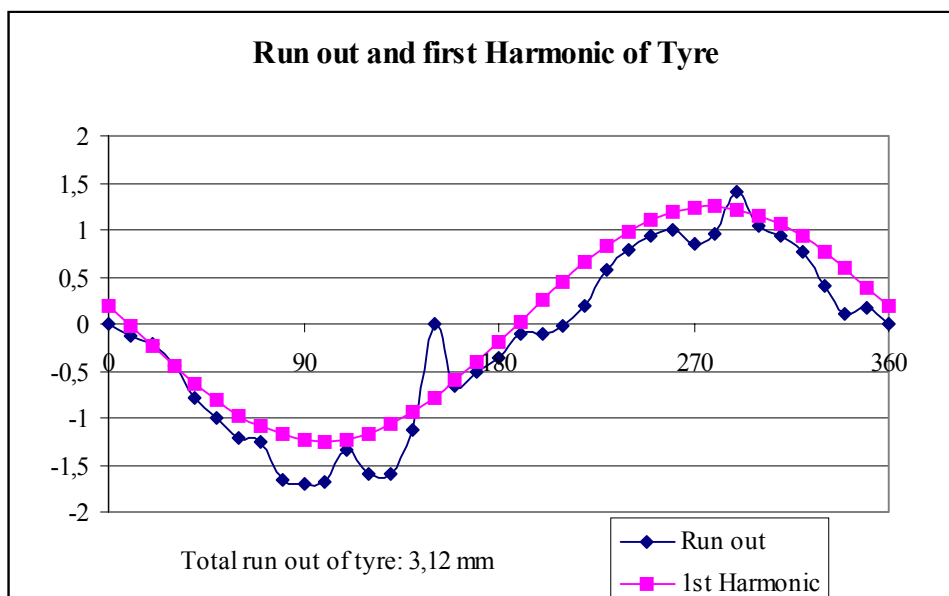
1st Harmonic high spot =1.6144 mm located at 290°

**THE TYRE**

Let's assure that the tyre has the following characteristics of disuniformity:

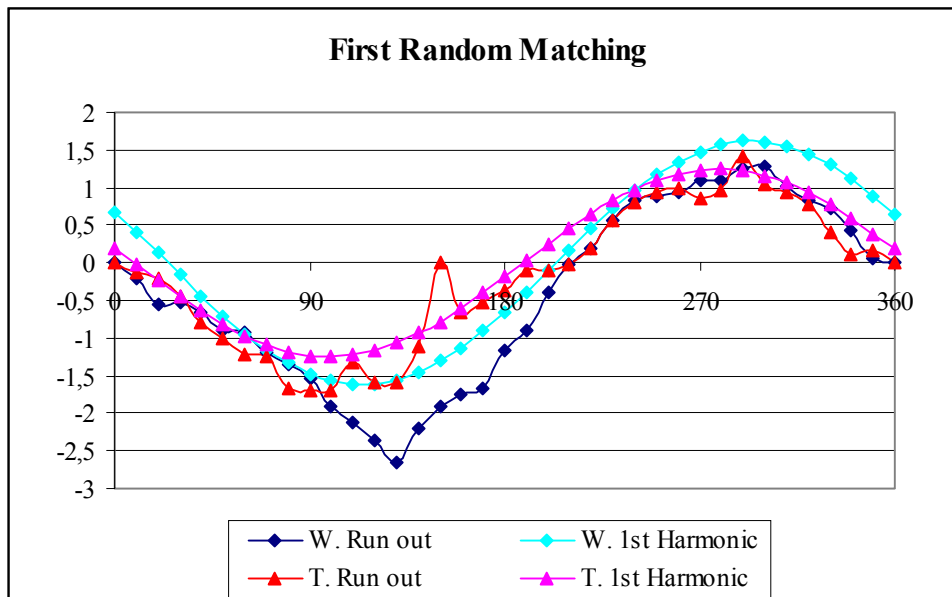
TIR=3.12 mm

1st Harmonic low spot = 1.2467 mm located a +100°

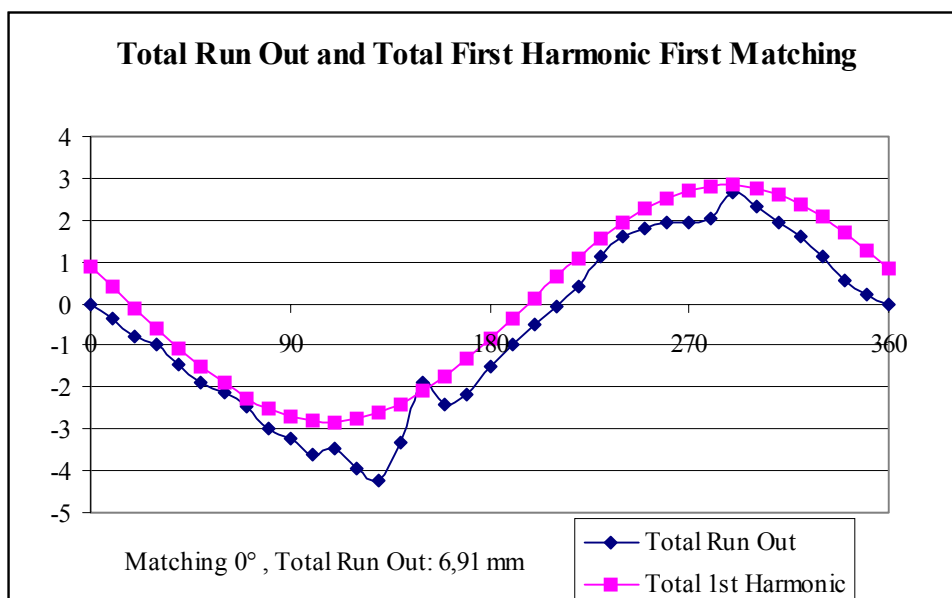


MOUNTING

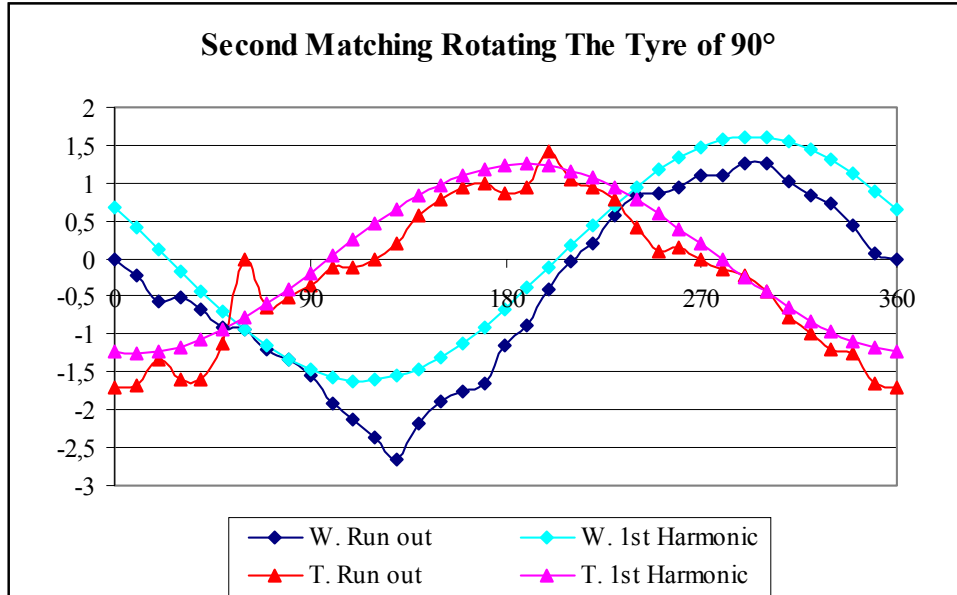
We will now make some examples of matching, simply putting together the curves of wheel and tyre run outs and 1st harmonics.

1. Random mounting:

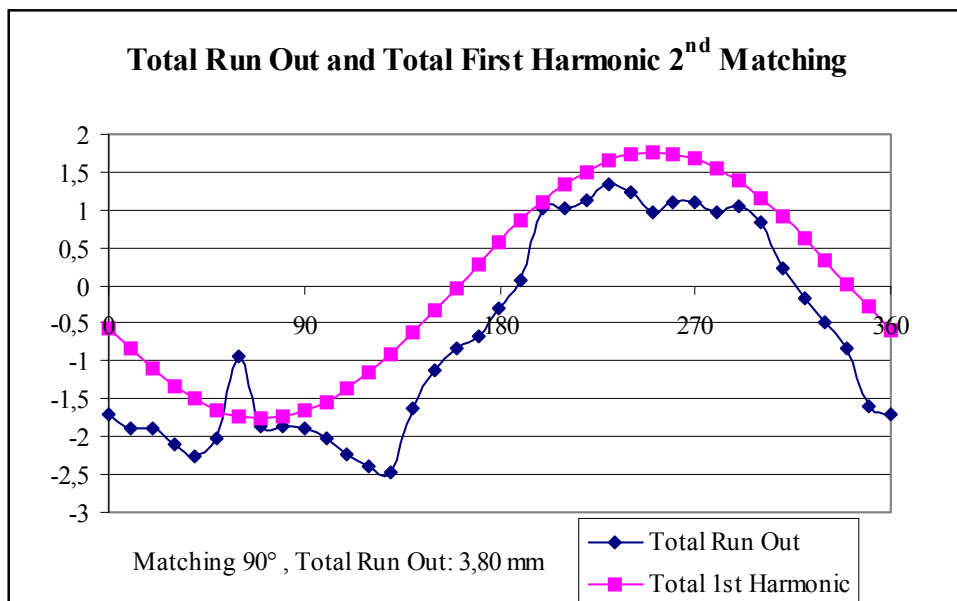
By that way the values of run out and 1st harmonic that we can see in the following diagram are generated for the mounted assembly:



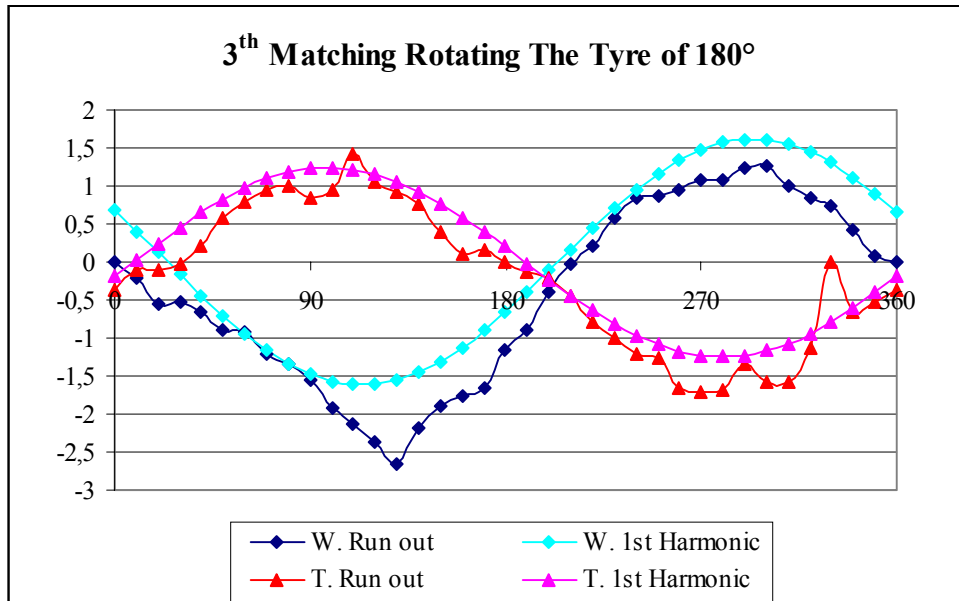
2. Tyre rotated 90° Vs the wheel



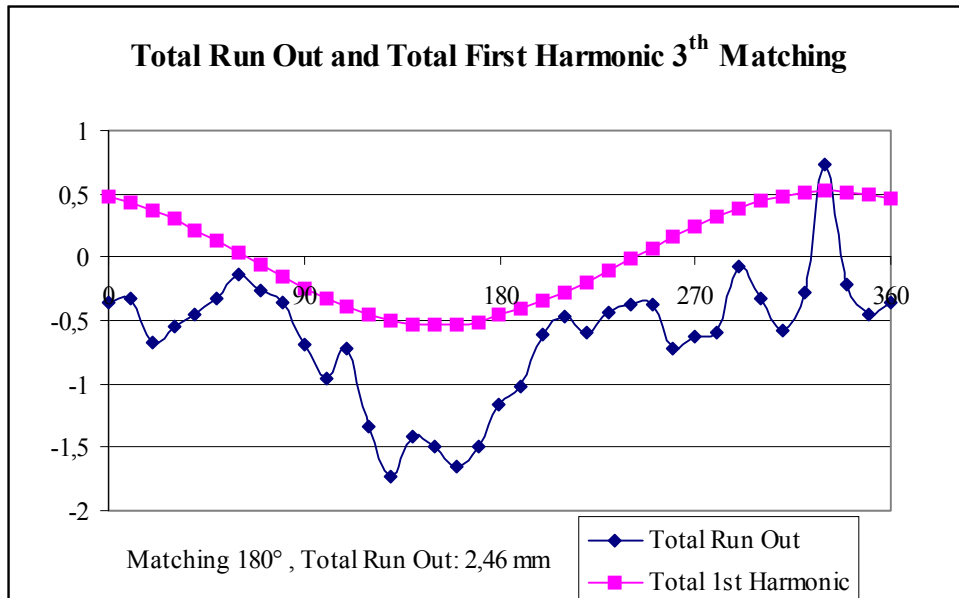
The values of run out and first harmonic of the mounted assembly are shown in the following diagram:



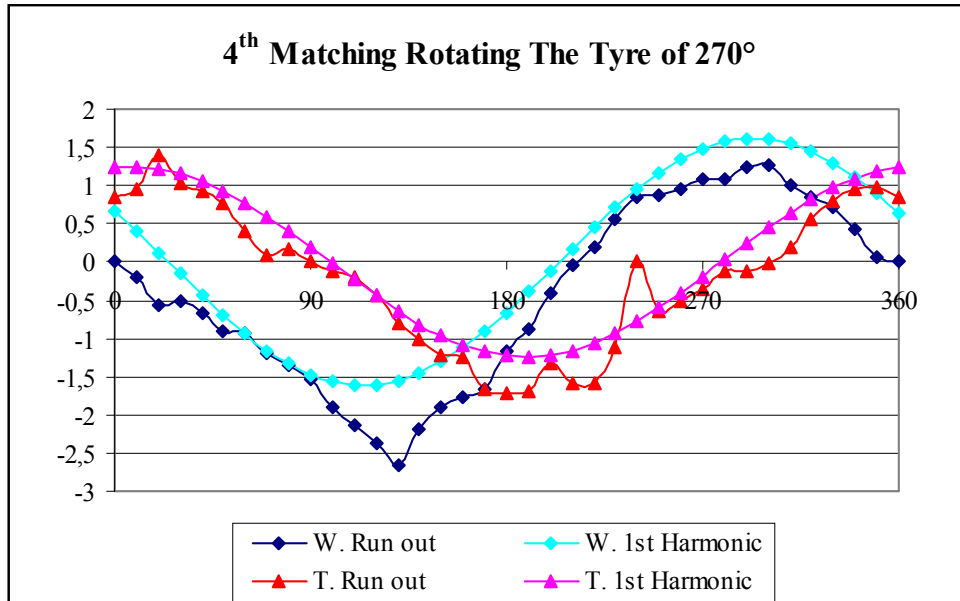
3. Tyre rotated 180° Vs the wheel:



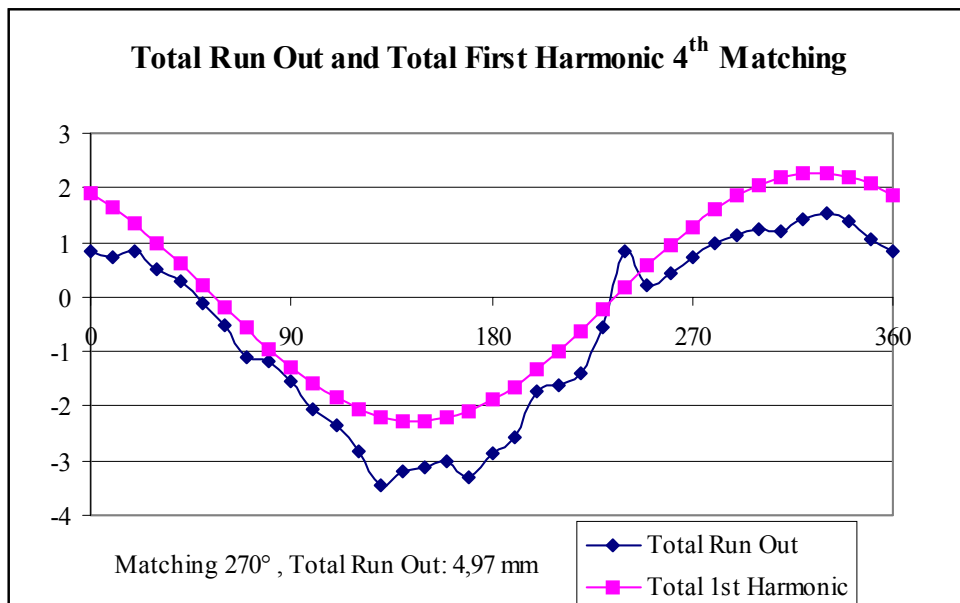
The values of run out and first harmonic of the mounted assembly are shown in the following diagram:



4. Tyre rotated 270° Vs the wheel:



The values of run out and first harmonic of the mounted assembly are shown in the following diagram:



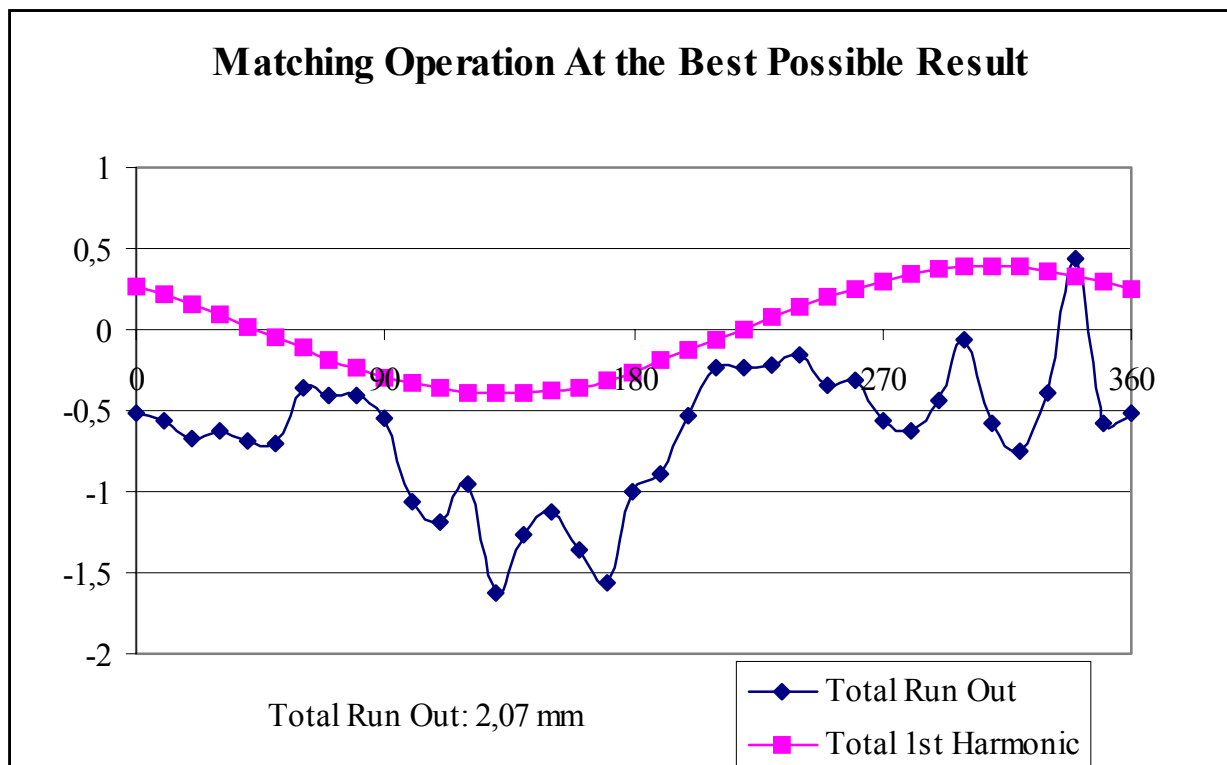
INTERPRETATION OF THE DIAGRAMS

As when matching the run outs and 1st harmonics the values are algebraically added, we can see clearly that the best assembly is obtained by rotating the tyre of 180° approx. Vs the wheel, while the worst assembly is that shown in the first diagram.

Let us show now match the position of 1st harmonic high spot on the wheel and low spot on the tyre and make a matched mounting, simulating the best and worst matching of tyre and wheel.

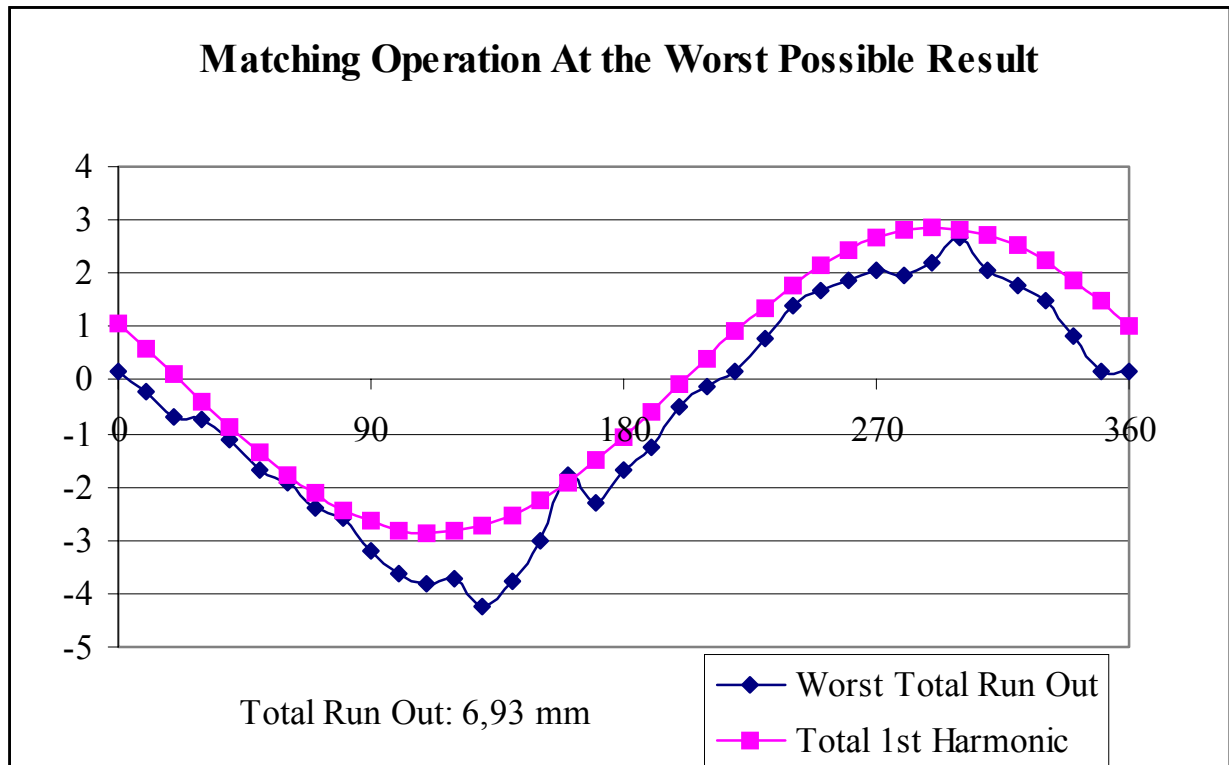
1. Best matching

That is obtained by matching the tyre 1st harmonic low spot position to the wheel 1st harmonic high spot position and corresponds to the tyre rotated 170° Vs the wheel, when making reference to the 1st random matching.



2. Worst matching

That is obtained by matching tyre and wheel 1st harmonic high spot position and corresponds to the tyre rotated 350° (-10°) Vs the wheel, when making reference to the 1st random mounting:

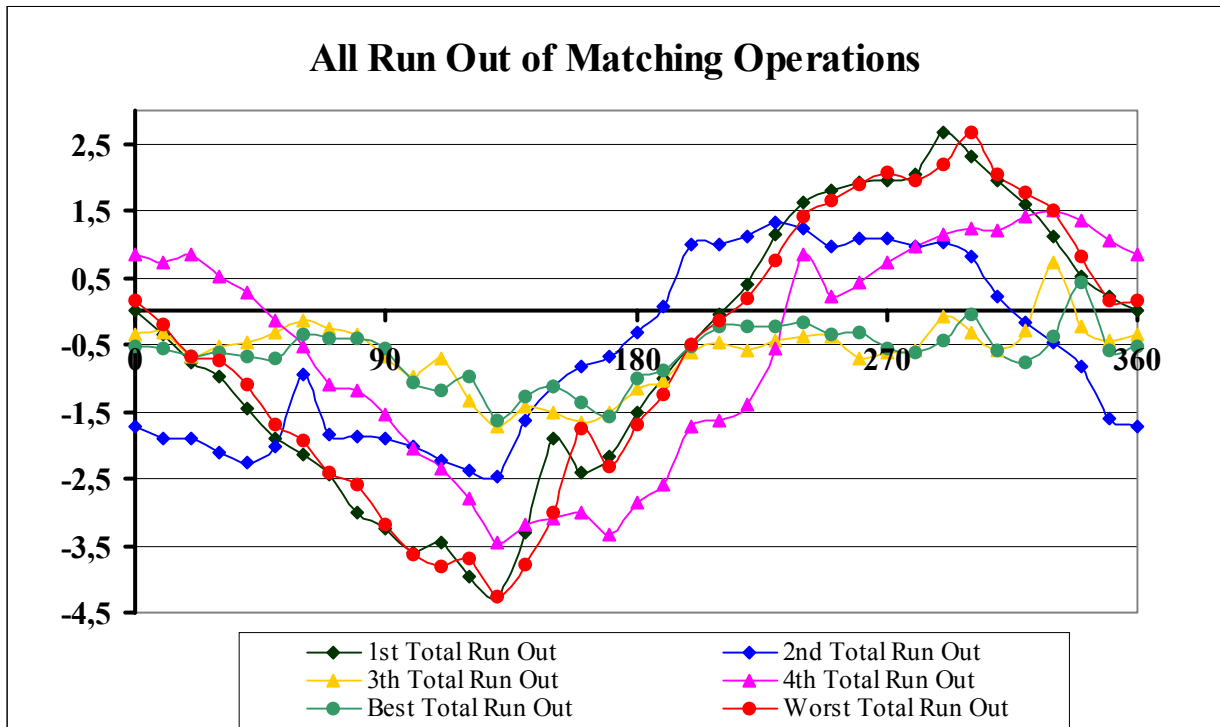


CONCLUSIONS

It is evident that improving the manufacturing process of wheel and tyre to reduce dimensional disuniformities of both components is un-useful unless the combined mounting of tyre and wheel is done.

In fact, if we match a “bad” wheel, and a “bad” tyre (that is a wheel and tyre at max specified run outs tolerances), we may obtain even better results than those obtained by mounting at random a “good” wheel and a “good” tyre (that is a wheel and tyre at the minimum achievable run out tolerances).

The diagram below shows the summary of above random and matched mountings.



The values are summarised below:

Position	Total TIR value mm	Total 1 st harmonic max value mm
1 st Random Mounting	6.91	2.83
10° (Worst Matched Mounting)	6.93	2.84
90° Random Mounting	3.80	1.71
170° (Best matched Mounting)	2.07	0.39
180° Random Mounting	2.46	0.51
270° Random Mounting	4.97	2.28

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NEW TITAN ITALIA WHEELS

For Titan Italia the previous observations have been the basis for developing a new range of wheels with values of geometrical unevenness, and therefore of first harmonic, extremely low, which are automatically marked in correspondence of the first harmonic maximum value.

These wheels matched with tyres produced, on purpose which are marked in correspondence of the first harmonic minimum value, are the best solution that can be achieved in terms of safety, comfort and strength without influencing drastically the costs.

The new range of 'High Speed Wheels' has sorted out the problem of vibrations and bouncing, allowing safe driving on road even at high speeds.

Presently it is available in the market a range of fixed wheels, front and rear, suitable for usage on agricultural tractors 80 through 300 HP.

For further information, please contact us.

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