

Special feature

Michelin XeoBib

Testing times for tyres

Tractor tyres have never had it so bad – they are expected to cope with heavier loads and faster speeds while still providing excellent traction and good ride comfort. Little wonder, then, that tyre manufacturers are pulling out all the stops to find ways of meeting such expectations. Peter Hill reports from Michelin's development and test centre in France on how the new XeoBib tyre came about and what it has to offer.

The sound of a screaming BMW Williams Formula 1 car at full chat on an adjoining test track – frustratingly hidden by an earth bank – is something of a distraction when trying to concentrate on the intricacies of a new tractor tyre.

So, too, for that matter are Porsche 911s, Audi A6s and high-powered Suzuki motorcycles making top-speed circuits of the oval bowl that surrounds a section of Michelin's Latax development and test centre near Clermont-Ferrand, central France.

It's a busy place, where the fruits of the design and engineering department's labours are put to practical test by drivers whose experience enables them to assess the finest detail of handling performance, stability, noise and ride comfort.

These days, of course, those madly criteria apply as much to agricultural tractor tyres as to road vehicles. Modern tractors are capable of travelling at significantly faster speeds on the road than their predecessors and more frequently have to travel longer distances by road as farms get bigger and more spread out.

One solution is to travel slower – drive at field speeds on the road and tyres could be inflated to the optimum for traction and soil structure protection. But drivers do not want to drive slowly if a tractor is capable of 50kph, they want to travel at 50kph. Which normally means inflating the tyre appropriately to the detriment of field performance.

With the XeoBib, it seems, drivers can have their cake and eat it. This tyre is capable of running on the road, carrying a decent load, at an inflation pressure of just 1.4bar (1.4psi) or less, which is more than acceptable in the field. On an everyday tractor, it will happily run at 50kph at this pressure; more remarkably, it will do the same at 65kph on speedier ones.

From the outside, the XeoBib looks little different from any other 60-series low-profile tyre. In fact, it has a decidedly squat appearance, thanks to the flat shape to the tread, and lugs that extend to the sidewalls more than most. But to the untrained eye, it otherwise looks much like any other tractor tyre.

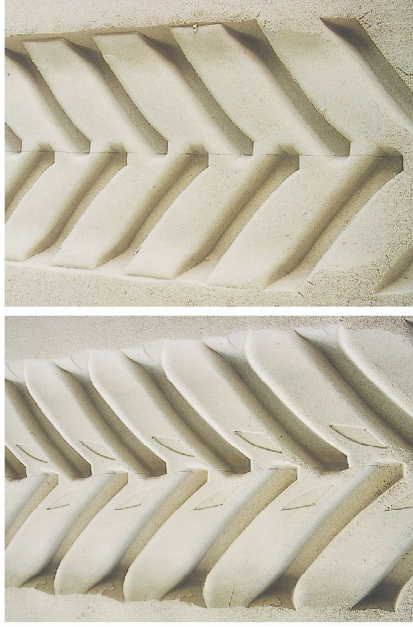
The secrets to its performance, of course, are all hidden away inside the carcass, where new rubber compounds and new structures give the XeoBib its unique performance characteristics. A key factor is the deep 'flexion zone' in the sidewall that extends almost from the bead to the shoulder area.

When the XM108 was introduced, the depth of this zone was greater than on most tractor tyres at the time; the new design extends this area so much that the European tyre & Rim Technical Organisation (ETRO) has introduced a new category and sidewall marking for the tyre – VF for Very High Flexion.

The Ultraflex technology that makes it possible to have such a deep flexion zone was first developed for Michelin's PAX 'run flat' car tyre – the result of a five-year research and development programme that absorbed a sizeable chunk of the company's €100m (€66m) annual R&D budget.

When the agricultural tyre group learned about Ultraflex, it soon became apparent that here was technology that could resolve the conflicting requirements of a tyre carrying a tractor and implement on the road to its place of work in the field.

Comparisons with a tyre of equivalent rolling



Right: Tyres run across asand pit carrying 3650kg apiece need 0.9bar (13psi) in the XeoBib (left), 1.4bar (20psi) in the XM108. Note XeoBib's shallower ruts (most obvious at the sides) and flared rather than parallel lug spacing to help push soil from the tread.

Below Right: Hand-filled layered soil pit shows advantages of XeoBib's wider and longer contact patch. It produces a shallower rut in the soft soil (left) than the more abrupt indentation affecting more layers made by the equivalent but narrower and firmer XM108. The string represents typical ploughing depth.



circumference from the benchmark XM108 range make impressive reading. For example, Michelin says that for the same inflation pressure, the XeoBib can carry a 40% heavier load; more usefully, at 50kph it can carry the same load as the XM108 using half the pressure.

Where a 630/65R38 XM108 needs 1.6bar (23psi) to cope with a particular combination of speed and load, the equivalent VF 650/60R38 XeoBib needs just 0.9bar (11psi).

The newcomer lays 24% more rubber on the ground as a result of its greater width and the fact that the lower pressure and highly-flexible sidewalls allow the tread to spread further. As a result, Michelin calculates, rolling resistance is cut by 20% and plant root-restricting compaction reduced by up to 50% in field rut depth.

Moreover, judging by surveys of the test tyres that have been used commercially on tractors across Europe, Michelin reckons that, under similar conditions of use, the XeoBib will last up to 25% longer than an XM108 or similar tyre.

A squishy tyre should also be more comfortable to ride on, but while making a squishy tyre with decent load capacity is one thing, making a squishy tyre that also gives a driver stable and predictable steering characteristics – as well as the ability to drive across slopes without the tyres deforming sideways excessively – is quite another.

Here again, Michelin engineers appear to have risen to the challenge. Far from simply matching the

performance of existing tyres in these respects, the XeoBib substantially exceeds them.

Figures alone cannot adequately convey these qualities – the only thing to do is make comparative judgements by driving or riding along on identical tractors on different tyres.

Enter identical New Holland TM130 tractors with front weights and 3m power harrows on the back. On XM108s – which remains a benchmark tyre for its type – the driver constantly throttles back to cut speed and save being bounced out of his seat over the rougher sections.

On XeoBibs? Significantly faster speeds are maintained throughout, including two circuits of the

roundabout with the passenger grimly hanging on to save being flung into an embarrassing position on the driver's lap!

Ride comfort, then, is nothing short of exceptional, ensuring not only that the driver arrives at his destination neither shaken nor stirred, but in less time too.

At 35–56kph (22mph) on XM108s, an armful of steering input is needed to entice the front tyres to shift more than 8.5 tonnes of New Holland 15-A and simulated implement into the required direction, then quick reactions to wind the lock off again as the rear end lurches in its attempt to follow.

An identical tractor on XeoBibs inflated to just 0.7bar (10psi) and 0.8bar (11psi) front and rear sails serenely through both elements of the chicane like a thoroughbred with none of the arm flailing needed before. Impressive.

In part, the tyre regains some of the stability lost due to its highly flexible sidewalls by being mounted on a rim wider than would normally be used for its size. XeoBib buyers replacing existing tyres will therefore have to stump up for a new set of rims; those buying them with a new tractor will get the wider rims as part of the option package.

The new tyre itself will inevitably command a premium over others of equivalent size. But for operators with a lot of road work, who also set high standards for performance and minimal soil impact in the field, the extra cost will be worth it.

Will it fit your tractor?

XeoBib size	Equivalent 65-series	Equivalent 70-series	Equivalent 85-series	Recommended rims for XeoBib
480/60R28	440/65R28	380/70R28	340/85R28	DW16L or W16L
600/60R38	540/65R38	480/70R38	420/85R38	DW20A
650/60R38	600/65R38	520/70R38	460/85R38	DW18L or W18L
600/60R28	540/65R28	480/70R28	420/85R28	DW23A
710/60R38	650/65R38	580/70R38	520/85R38	DW20A
600/60R30	540/65R30	480/70R30	420/85R30	DW20A
710/60R42	650/65R42	620/70R42	520/85R42	DW25A

Equivalent sizes have approximately the same rolling circumference. Wider rims are required when replacing existing tyres.

XeoBib range will cater for tractors from 80hp to 200hp – first pairing available is a 520/60R28 front and 650/60R38 rear. More are scheduled to follow this year and next.

