WIN! KAWASAKI's REGISTRABLE KLX450R

australasian DIRT BIKE

FIRST LOOK
- 2008 HUSKYs
- 2008 KTMs

OFF-ROAD CHAMPS
OUR TOP 10 BUSHMEN

INTERVIEW
BEN TOWNLEY
KIWI KID CLAIMS AMA SX TITLE

ADVENTURE
ADB's SEVEN DEADLY SINS TOUR

PROJECT
HONDA CRF450R
The ultimate 450cc MXer

PICTORIAL
MX NATS
& the Chad effect

HOWTO
PASS SMOOTH
... with Dan Reardon

KLX450R
GOOD ENOUGH TO BEAT YAMI's WR450F?

TECH
- BEARING CARE
- OFF-ROAD TYRES

Issue #234 JULY 2007

TYRED OF THE SAME?

WORDS BY MARTIN CHILD

Bikes have improved greatly over the past century, but has tyre technology kept up?

Tyres have been around (pun fully intended) for 162 years now. Of course, we've come along way, baby, since the first tyre – which had an outer layer of smooth leather and six 'mini' inner tubes keeping it up. Getting a puncture in that lot ensured you'd be fixing it the whole weekend, and gnarly hillclimbs were still the preserve of man and beast, not machinery. Fast-forward some 43 years and John Dunlop's patent for the earliest form of the pneumatic tyre that we rely on heavily for everyday transportation.

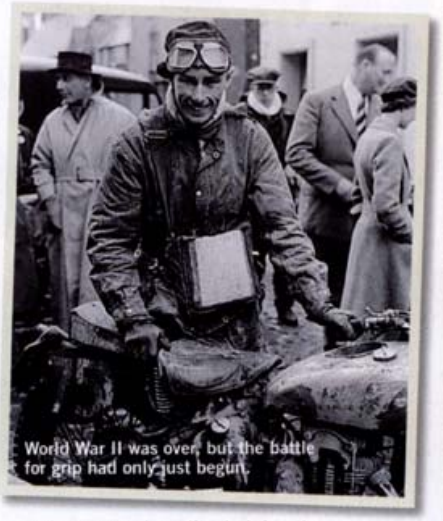
For us off-roaders, tyres sprouted 'knobs' just after World War II. Those dashing chaps in their tweed caps and baggy trousers would rip their BSAs and Triumphs around flat-track courses, tyres uniform in a five-wide, flat-topped block pattern. Looking at a modern trials-tyre, you could be mistaken for thinking that not much has changed. The layout of the knobbies was all about drive, not cornering.

It wasn't until the mass-production of off-roaders in the late '60s and early '70s that the block pattern changed – to one of more spacing and less uniformed layout, more akin to what you find on a modern dirt bike. This improved cornering potential and stability under braking and helped keep up with ever increasing engine power and torque.

But that was three decades ago, when bikes had drum brakes and forks like drinking straws. Surely we can't still be using similar knob patterns? That'd be a joke, (and you know how we disapprove of knob jokes here at *ADB*...).

Truth is, off-road motorcycle tyres aren't at the cutting edge of any of the big companies' new-design wishlist. We're small-fry in the tyre marketplace and with outside influences like the cost of raw rubber tripling in the past six years, coupled with the fairly static retail pricing, means that it's a case of 'not broken – no fix.' A case of re-defining, rather than re-inventing.

Big leaps have been made, however, in the production process. New technology has ensured the tyres are produced with increased consistency and quality, helping the companies keep their production costs down whilst still showing healthy profits.

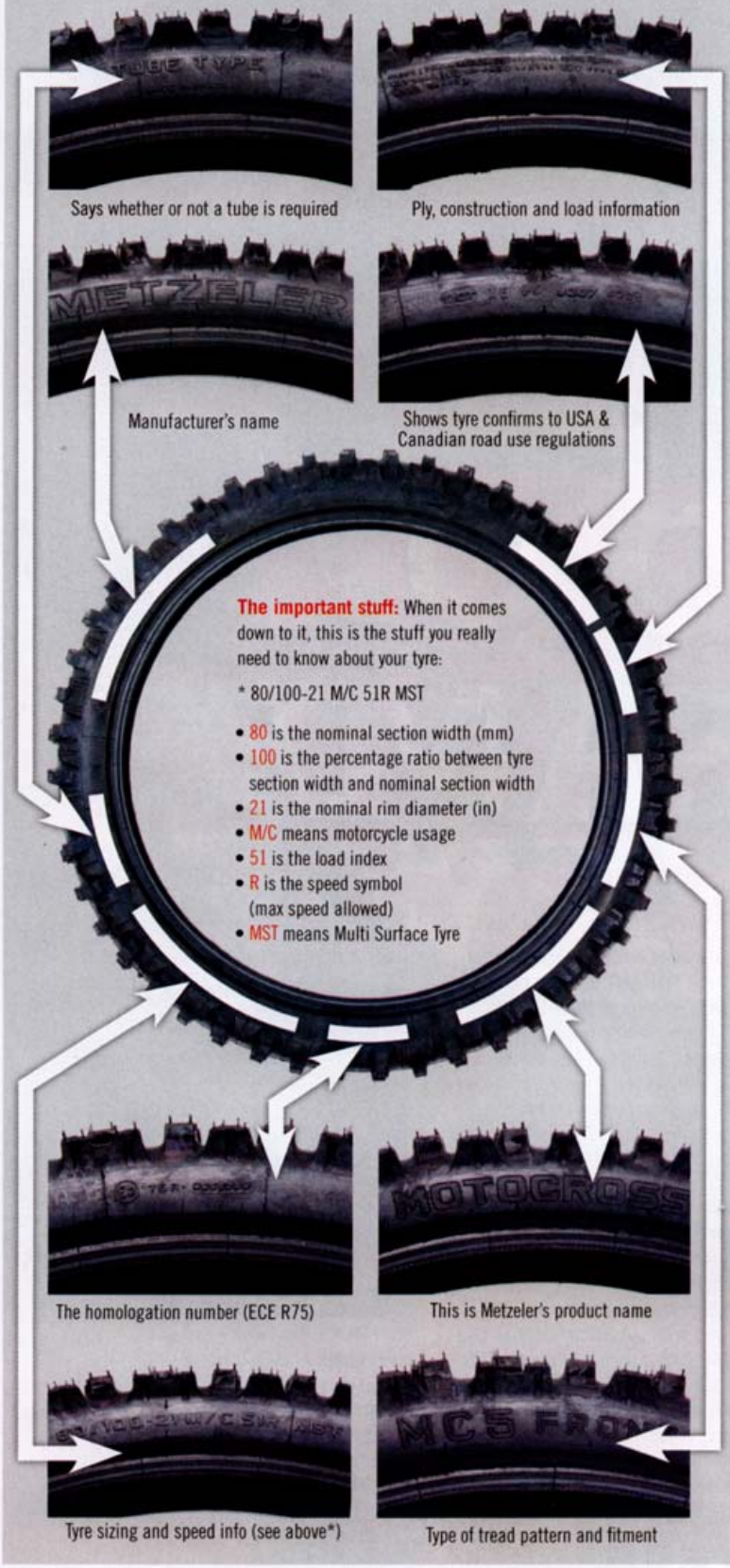


World War II was over, but the battle for grip had only just begun.

But how's a tyre built, how does the sizing work and what the hell do those numbers and letters on the side exactly mean? And who's the Australian company adding a new dimension to bush traction?

READING YOUR TYRE

Here's our quick and easy, no-fuss guide to what your tyre's trying to tell you. The following info was taken from a Metzeler MC5 front.



The important stuff: When it comes down to it, this is the stuff you really need to know about your tyre:

* 80/100-21 M/C 51R MST

- 80 is the nominal section width (mm)
- 100 is the percentage ratio between tyre section width and nominal section width
- 21 is the nominal rim diameter (in)
- M/C means motorcycle usage
- 51 is the load index
- R is the speed symbol (max speed allowed)
- MST means Multi Surface Tyre

BUILDING A TYRE IN EIGHT EASY STEPS

STEP 1: After the designs have been agreed on (and the factory set-up for production), it's time to have the moulds made. The tread pattern is formed in the outer moulds by the spark erosion process. The inner 'doughnut' is machined up on a lathe. Manufacture of the moulds is quite slow, normally about three months. The spark erosion on the outer moulds alone can take up to six weeks.

STEP 2: The base materials are the rubber, bead wires and ply material, which is normally nylon.

STEP 3: A 'green' tyre is produced first (this looks like a road-racing slick) in the 'building' machine and, depending on which denier nylon you've used, it will require one, two or three layers to reach the strength needed if you're looking for a 6-ply rating. This ply-rating is a test of load and puncture-resistance.

STEP 4: At the same time, the bead wires (can be up to 10 individual strands) are put in and formed to make the shape where the inner-tube will eventually sit.

STEP 5: Then the tread is put on. This originally takes the form of a long, rectangular strip, which is laid on the 'green' carcass. Because of the complex shapes of this Motoz tread-pattern, the normal compressed air forcing of the blocks into the moulds had to be replaced by a nitrogen process.

A cut-above. Cross-sections showing the metal beads and nylon plies moulded into the carcass.

STEP 6: Pressure and heat are used to mould and vulcanise all the parts together. Depending on which type of mould is used, the join will either be visible around the centre-circumference of the finished tyre, or as many small joins running from sidewall to sidewall.

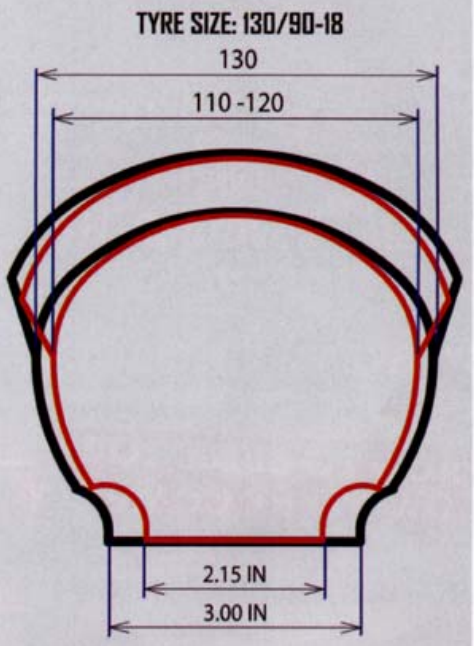
STEP 7: Extracting the formed tyre from the mould can be difficult. With the knobs gripping into the mould, it's normally down to the operator to pull the tyre free. He does this with a big hook, and the result of his handiwork can often be seen as a bulge along the bead's edge.

STEP 8: The literally smoking tyre is then left to cool for five minutes. It's inflated on a post-curing jig to ensure that it retains the right shape, bringing the total process time to around 45 minutes for the Motoz tyre, whereas the larger companies can get this down to 20-25 minutes due to different production techniques.

WHEN A 130 ISN'T A 130...

The problem begins with the different testing bodies. To get an 'E' mark (to make the tyre road-legal in Europe), the measuring of the tyre's width is carried-out on a 3-inch rim. Measure from sidewall to sidewall gives you 130mm. Easy. However, there are not many off-road bikes that run 3-inch rims. Here in Oz, most bikes running 130-section tyres do so on a 2.15-inch rear rim. This obviously pulls the sidewalls closer, changing the rolling radius (and crown shape) and the section width. This can drop the 130mm-section tyre to 110mm and can affect drive and steering.

If you've heard the urban myth that section width is measured across the knobs from outside edge to outside edge, now you know the truth.

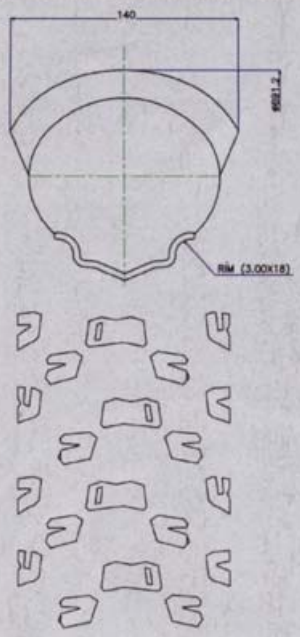


TWO HALVES TO EVERY STORY

The moulds used to create the tread are heavyweight items and, depending on the quality of construction, can last 5-20 years and cost up to $30K (US).

DESIGNING: THE FUTURE

Many tyre companies design in 2D, sending a 6-8 inch section of design to the mould-maker, which is then repeated around the circumference of the tyre. Aussie-owned Motoz have invested heavily in 3D design, allowing them to fully understand how each knob reacts when in contact with the ground.



Many tyre companies design in 2D (far left) as oppossed to 3D (centre).

Being able to rotate the design helps understand how the blocks react.

HOW TO BUILD YOUR OWN TYRE COMPANY

Motoz managing director Rick Atkinson.

Product manager Darryl Savory.

Welcome to Motoz, an Australian tyre company that has recently launched its range of unique off-road tyres into the marketpace.

Eight years in the making, Motoz is the brainchild of Rick Atkinson. There were two main reasons for starting the project. Firstly, there has never been a tyre made specifically for Australian conditions, and secondly, Rick had a mate in Thailand with a tyre manufacturing company. Handy.

As Atkinson looked deeper into tyre manufacture, he quickly realised that design left room for improvement: "Most companies design a section of the tyre in 2D, then send the drawing off to the mould-maker and wait for the result. Initially, I did the same and had varying success," he says. "We couldn't get the results we wanted using 2D design methods, so we decided to go 3D."

Sounds simple, but it took nearly 18-months working full-time with a top 3D software engineer to develop the software needed.

"We can now look at every block of rubber, at every angle, and predict just how it will react under any given condition," Atkinson explains.

Just looking at the Motoz tread pattern, it's clear that it's a break from the norm. There's not a square block in sight, and more angles than a blind man playing snooker with a cucumber. But are they different just to be different? "No, every angle is there for a reason," says Atkinson.

Another difference is the use of natural rubber, when the big companies have moved to synthetic-rubber over the last decade.

"There are advantages and disadvantages with both products. Natural rubber grips better in dry/hard terrain, has more elasticity and is more durable, but is also heavier, more expensive, less stable and not as tactile in the wet," he adds. "But for drought-stricken Australia, where the tyres get shredded, the advantages win. And we can counter some of the known disadvantages with improved tread design."

Another difference is the crown radius. This is the tread profile of the tyre and differs on every different size of Motoz tyre. "This is because a smaller-capacity bike lays down power and corners differently to a big-bore monster, and the riding style is usually different. The bigger tyres get a flatter centre section to help deal with the larger bike's torque, while the smaller tyre gets a more rounded shoulder radius to help with flickability."

> **"There's not a square block in sight, and more angles than a blind man playing snooker with a cucumber."**

If proof is needed that Motoz is forward thinking, it's this. When they submitted the designs for E (Europe) markings, they were told that their 3D designs were invalid because they're too advanced and 'Could they send the plainer 2D ones instead?' Let's just hope the carrier pigeon has delivered the 2D plans safely...■