LUCIEN TILKENS

The Man Who Revolutionised Motocross Suspension

In the 30 year history of International motocross there are really only two or three significant "milestones" that actually changed the face of the sport as we know it today.

One of those must be that period in the mid-fifties when a lanky Englishman named Brian Stonebridge (later tragically killed in a car crash) began to regularly beat the hefty 500cc four-strokes of the period with his spindly little 200cc two-stroke Greeves. Stonebridge and

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Greeves did more than any of the early two-stroke pioneers to hasten the death of the competitive four-stroke. (Though Bengt Aberg and Yamaha have proved last year that a four-stroke revival might be on the cards, the two-stroke is still the ultimate moto-cross machine today).

Another milestone was undoubtedly the 1973 Belgian 250cc Grand Prix at Wuustwezel, just north of Antwerp. Hakan Anderssen won the race for Yamaha (and went on to clinch the World title that year). He won the race using a chassis that, before the event, was almost written off by the so-called 'experts' as just another gimmick.

The 'gimmick' was Yamaha's Grand Prix debut of the monoshock suspension system invented by Belgian engineer, Lucien Tilkens. Compared to the normal suspension systems of the day it certainly looked strange. The rear end of the machine appeared to have a rigid frame. Until you looked closer and saw that this whole sub-frame pivoted and was controlled by an immensely long single shock absorber that ran from beneath the seat right up to the steering head.

The Wuustwezel course was a good test of suspension. Most of it consisted of small, but closely-spaced ups and downs that never gave the suspension a chance to stop working overtime.

At the end of the race, the Yamaha of Anderssen was such a convincing winner that by the time of the next Grand Prix, all of the other competing manufacturers had hurriedly made attempts at increasing the travel of their rear suspension!

Tilkens theory in beginning the monoshock design was that too many manufacturers were spending all of their time in searching for horsepower and that this was simply making the big two-strokes of the day unrideable.

He theorised that it was not the actual horsepower that was making the bikes such beasts but the fact that poor suspension was preventing this horsepower from being transmitted to the ground in a

THE MONOSHO

controllable manner.

And that is why Tilkens invention of the monoshock suspension system is such a milestone in motocross history. The appearance of the monoshock forced all manufacturers to revise their suspension systems. This in turn allowed them to use the horsepower at their disposal and has since allowed them to go on and extract even more power from the engines. Every motocross rider today owes Lucien Tilkens a vote of thanks. It was his introduction of the monoshock chassis that forced all manufacturers to think of handling rather than horsepower and this has upgraded the overall performance of motocross machinery in general.

With the monoshock being patented by Yamaha, other manufacturers had to search for different ways to upgrade their suspension but the result was the same...better handling motocross machines able to use more horsepower than ever before. Since then, Yamaha have applied their monoshock principle to road racers, trials machines and even dual purpose street/dirt bikes such as the popular DT range. The monoshock is here to stay!

Lucien Tilkens and his cheerful wife Maria live in a large, immaculate house close by the Grand Prix road race course at Zolder in North East Belgium.

On just about any working day of the year, Lucien disappears right after breakfast down a tiled staircase to his workshop beneath the house and usually stays there at his drawing board or amongst his modern engineering machinery for anything up to 16 hours!

Lucien designed the house (and actually built a good part of it) and an integral part of his design was the cellar workshop. A driveway around the side of the house sweeps down below ground level to the large double doors of the workshop which is crammed with the kind of equipment that would make any machinists mouth water.

Lucien has always been an engineer and an inventor. For 17 years (from 1951 to 1968) he was a teacher at a technical college near Liege and in 1951 proved his inventive capabilities by coming up with one of the first machines capable of harvesting sugar beet from the ground.

In addition (and like many Belgians) he has always been a big fan of motocross racing.

"In thirty years of marriage Maria and I have probably not missed more than about a dozen big motocross races in Belgium" says Lucien.

"In fact, I've missed more since working for Yamaha than in all the years previously. I'm too busy in the workshop now!"

His enthusiasm for motocross and his penchant for engineering and development also meant that he was for many years on the technical committee of the Federation Motocycliste Belgique, resigning that position in 1971 when he felt that it was not possible to be involved with Yamaha on a commercial basis and still remain an impartial committee member.

Early in his days as a motocross spectator, Lucien and Maria became friendly with the Geboers family, whose son Sylvain was to become one of the best racers in the world, riding for CZ and Suzuki factory teams.

Knowing that Tilkens was an engineer, the Geboers family persuaded him (without much trouble!) to help in the preparation of Sylvain's racing machinery...at that time being big four-strokes like BSA, Lito and Matchless thumpers.

At the same time he began to help another up and coming young motocrosser, a personable young Belgian by the name of Roger De Coster!

As well as high school duties, Lucien also had a small factory making steam cleaning equipment and agricultural machinery such as the sugar beet harvester. After the factory had closed down in the evenings, Lucien and the young riders used to wheel in the motocross machines and work would begin all over again!

By the end of the nineteen-sixties, both Geboers and De Coster were riding for CZ. The Czechoslovakian factory had developed a 400cc machine that was proving really difficult to ride due to its brutal engine power and most riders preferred the less-powerful but more manageable 360cc version.

Tilkens, however, was already thinking that the answer to this "unrideability" problem might lie in the suspension rather than the engine power.

His idea was that a stiff rear section, controlled by a single shock absorber, would eliminate the twisting and flexing that the normal twin shock absorber and swinging arm system went through when too much horsepower was applied.

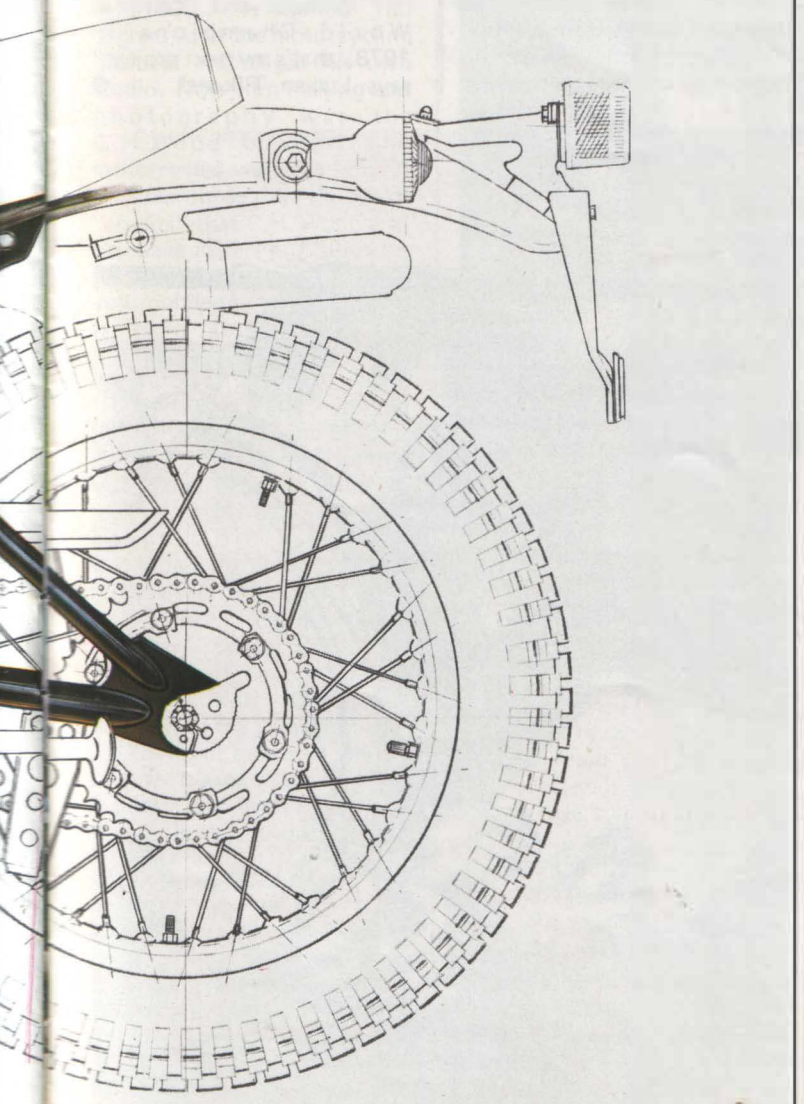
Both Sylvain and Roger were professional motocross riders with a living to earn. They couldn't afford to experiment if failures meant that their income suffered.

Lucien, however, had a perfect test rider in the form of his son Guy, who was studying for a degree in mechanical engineering and racing motocross just for fun. He was a capable rider and was also interested in the mechanics of the competing machinery. And, without the pressure of needing to earn a living from the sport, he could afford to experiment with his father's new chassis.

So, in 1968, the first monoshock chassis was constructed, using Guy's CZ 360 as a basis. For the first three or four years Guy simply rode the bike in private training and development sessions but in 1972 Tilkens felt confident enough about his design to enter Guy on a monoshock CZ in a Belgian National race at Paal.

"The reaction of most of the spectators was to think that Guy had lost his shock absorbers" said Lucien. "But the mechanics and other riders

HOCK SYSTEM EXPLAINED



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noticed that the bike appeared to be handling really well and were quite curious about the design".

They were even more curious later in the year. Towards the end of the season, Tilkens replaced the modified CZ with a complete chassis of his own, using a Suzuki motor. In its very first race the machine won with ease!

Naturally, because of the close family connections, both Roger De Coster and Sylvain Geboers had seen the monoshock in the making. By this time they were both riding for Suzuki and word about the new-style chassis had been passed back to Japan.

Interest from big manufacturers was not long in coming and Tilkens found himself testing for Suzuki with De Coster and Geboers.

On the very same day as that test, however, Lucien got home and found a meesage asking him to call Yamaha in Amsterdam. He called them and, obviously, it was the monoshock in which they were interested.

After a series of negotiations Tilkens decided to go with Yamaha and, he says, "I have never regretted that decision".

And neither has Yamaha, for within a few months of joining the company, Tilkens had produced the monoshock chassis that took Hakan Andersson to that 1973 Belgian GP win and their first World Motocross Championship! Since then the monoshock has helped Heikki Mikkola to the 500cc Championship, Mick Andrews to big International trials wins (though he has reverted back to a system closer to the normal Yamaha production trials suspension), to World Championship road race titles and ISDT Gold Medals for the Yamaha factory.

What does Tilkens see as the advantages of the Yamaha monoshock system?

"The length of damper allows softer suspension and more rear wheel movement" he says. "Plus the rigidity of the rear sub-frame means better handling under power and the better weight transfer of the long damper, with the energy being transferred from back to front instead of up and down, means better control under braking. Now the rider has more control over the behaviour of the rear wheel, rather than it hopping up and down and forcing deflections of the front wheel from a chosen line".

"These weight transfer advantages apply as much in road racing as they do motocross and you have the advantage that it is easier to tune the characteristics of the monoshock to suit a particular circuit."

The actual design of the chassis isn't the only important difference of the monoshock system. Just as important is the design of the shock absorber.

Now the shocks are made by Yamaha (via an agreement with the De Carbon company) but in the early days Lucien made his own and his combination of gas, oil and spring as the suspension medium is still an integral part of the shock absorber's design.

Hydraulics is a Tilkens specialty and he got the idea from his shocks from a single cylinder pump that was part of the steam cleaning equipment that he was manufacturing in the sixties.

"I wanted a continuous flow of steam rather than the pulsing one that the piston of the pump was creating" he remembers "so I utilised an intermediate gas chamber to maintain a regular smooth flow. The pressure of the gas kept the steam flowing even when the piston was working against it and I simply utilised that technique to keep a smooth, regular flow of oil within the shock absorber".

With the monoshock to his credit, what is Lucien Tilkens aiming at next? There are several irons in the fire as he is retained by Yamaha as a technical advisor and experimentor on all facets of motorcycling...from motocross to mopeds.

Additionally he is lending technical support, in close collaboration with Yamaha Motor NV staff, to the Yamaha World Championship efforts in the 125 and 500cc motocross classes, where Dutchman Gerard Rond and current Champion, Heikki Mikkola will be the riders.

"Mikkola and Rond as World Champions in 1978...that's my next project" says Lucien Tilkens! ●