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NEW SUSPENSION IS RUN AT LE MANS TEST

RIGHT & FAR RIGHT The Creuat system installed in the Dome

JAN LAMMERS' Racing for Holland team tested an unusual hydro-pneumatic interconnected suspension system on its Dome S101 LMP900 racecar at the Le Mans test day.

Josep Fontdecaba is the creator of the system and the proprietor and engineering director of Creuat Suspension Technology, based in Barcelona, Spain. Alan Lis spoke with him about it.

How did you come up with this suspension system?

"About 10 years ago I bought a road car with very, very soft suspension, which made it very unstable, so I started thinking how it could be improved. I came up with some ideas that are more or less what you see now. After we proved the theory with mathematical modelling we started building mechanical prototypes for road cars. When we saw the results we started thinking that it could be applied to any kind of car and in 1999 we filed a patent on the basic system of all these prototypes.

"In 2003 we talked with a few racing teams and they showed some interest when we explained that in theory this could be applied to racing as well."

Could you explain how the system works?

"It is very simple. In a normal suspension system a shock absorber and a spring take care of all the motion of one wheel. In our system we effectively have springs that are separately handling pitch, roll and vertical movement. This means that with our system you can adjust every movement of the body of the car separately. This is very useful on cars that have a lot of roll inertia because you can put more damping into the roll, making it more stable, without losing the ability to adjust the vertical stiffness.

"Our system allows the coupling of the front and rear axles so they can cross freely if you want them to or the system can be adjusted so they do not cross if that is what you want. In a car with a conventional suspension system when you go over a surface that is not flat and you have different loads on the wheels this can be very bad: the more roll stiffness you have, the more difficulty the car will have over irregular surfaces. With our system what we try to do is to make the roll as stiff as we want but keep the weight on the wheels equal.

"This has several advantages, not only because you have more grip but also when you hit a bump it is absorbed, reducing the effect of the bumps on the steering."

The suspension is described as hydro-pneumatic. What is the hydraulic element?

"We use oil. There are two versions of the system, you can make it mechanical or hydraulic but for competition we always use hydraulic because you have more of the spring and the damping effect. The system displaces fluid as in a conventional damper but this fluid is not only used for the damping, it also transmits forces to a central device that has gas chambers that act as springs. So, in effect, the fluid is both the damper and the spring."

Is the system easy to fit to a car, or is it necessary to make any particular modifications?

"The central device is fitted in the passenger seat area alongside the driver. You remove the springs and the dampers and put in hydraulic cylinders in place of the springs and fixed length metal rods in the place of the normal dampers, which can be done very quickly."

How do you adjust this system?

"The spring rates can be adjusted by changing the gas pressure or the volume of the gas chambers and the damping rates can be changed with adjusters like those you would click on a conventional damper. But in total you have more adjustments, because in theory you can adjust low speed and high speed for every movement separately."

The Creuat system features material knowledge, expertise and support from Corus, one of the world's leading steel producers.

The suspension was used by RIH for the first qualifying day for Le Mans 2005 but was replaced for the second day after the team opted to race with conventional springs and dampers. It is currently undergoing further development. ■