

THE INSIDE STORY OF HOW AN IRS MADE FOR MUSTANG WON LE MANS

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HENDERSON, NV – Just over a year ago, members of the original Shelby American crew that developed the iconic prototype "R" Model GT350 made headlines in the Ford Performance world . That first Shelby GT350R development team reunited to celebrate the 50th Anniversary of the car's first race victory and to build a one-of-a-kind '65 Mustang race car the way they would have a half-century earlier if they had the opportunity to do exactly what they had wanted. Indeed, the Original Venice Crew (OVC) of Peter Brock, Ted Sutton and Jim Marietta had teamed up again on a "new" 1965 Shelby GT350R, but this time developed with an IRS <https://www.youtube.com/watch?v=lrcoU5AovV0> that was originally designed for the first Ford Mustang but later found its way on the Ford GT40s that won Le Mans!

Surprisingly, the project revealed that even many well-versed Mustang fans had no idea that an Independent Rear Suspension (IRS) was developed way back in 1962 for the very first Mustang. So our friends at FordPerformance.com felt it's time that the inside story be told of just how close Mustang came to having an IRS from the very beginning.

To that end, we'll need to turn back the clock. As the swinging 60's dawned, Ford Motor Company was saddled with a dowdy product image that was in desperate need of what is now called a "makeover." The original 1950's sporty two-seat T-Bird had grown into a four-place luxu-tourer. Ford's plain-Jane econocar, the Falcon, had originally sold well, but now was slipping. And the Edsel, a name that became synonymous with failure, was breathing its last after a three-year run. To make matters worse, General Motors had introduced a sexy new version of their Corvair called the Monza, with bucket seats, a four-speed and even a turbocharger now available!

Forty-three-year-old Ford Chairman and CEO Henry Ford II wanted to breathe new life into Ford's product image, and turned to his 36-year-old right-hand man, Lee Iacocca (who had succeeded "Whiz-Kid" Robert McNamara as Ford president), to make it happen. Spurred by his product planning guru Hal Sperlich, Lee formed the "Fairlane Committee," which met after hours at a now-razed hotel called the Fairlane Inn (about a mile down the road from Ford World Headquarters), to dream up cars that would fit in a new "Total Performance" theme at Ford. In May of 1962, the committee authorized a small group, headed by Roy Lunn, an expat Englishman, to build a concept car to be shown in front of college kids at Watkins Glen on October 7th. The car was given the name "Mustang," but probably should have been called "Serendipity" for the many fortunate coincidences that later fell into place.

Iacocca liked the concept drawing but it was really just that – a drawing. When Lunn and his team tried to fit the intended powerplant – an inline four-cylinder motor from an English Ford – under the mid-engine roadster's deck line, it was too tall. Before McNamara had left Ford to serve in the Kennedy administration, he had commissioned a V-4 engine and transaxle to be used in a new and even cheaper Falcon replacement, a stodgy front-wheel-drive compact to be named the Cardinal (later known in Europe as the Taunus). Iacocca cancelled that project, correctly anticipating a more sporty, stylish

swing to the market. Not only did the orphaned V-4 fit under the Mustang Concept's deck cover, but the transaxle was just what was needed for the aft engine layout. (The V-4 later found success when the Ford Taunus was launched in Germany.)

Ford had a group of designers and engineers just waiting for something exciting to happen. One of them was another talented expat, this time a German named Klaus Arning, who was head of Advanced Suspension Design and who had patented a radical independent rear suspension design way back in 1958. He assigned this special design to Ford, as it incorporated anti-squat geometry and a slight four-wheel steering capability. The unique design found its first home in the Mustang I, and it fit and worked perfectly in the mid-engine tube-framed car.

Instead of a conventional front radiator, for reasons of convenience in packaging and to save time, Mustang I used side-mounted radiators with air scoops behind the doors. These, of course, became the signature side sculpture on nearly every production Ford Mustang since. The project team made the Watkins Glen reveal deadline, mostly by sleeping in the shop for the last six weeks. This forced the blue-collar guys and the white-collar guys to talk to each other, which was pretty unheard of at the time, and probably ensured the success of the project.

The team held their collective breaths as Dan Gurney took the Mustang I Concept up to 120 MPH around the Glen, on what was supposed to have been a slow cruise. It created a sensation, and validated the need for a fresh, new, sporty Ford product lineup.

During the thrash to complete the car, a young engineer named Chuck Carrig was toying with the idea of using a computer to do the various iterations of suspension geometry. Suspension layouts in the 60's were done full-size by taping velum drawing paper to large tables and carefully plotting all the curves in pen and ink. Each design took days.

Arning liked Carrig's idea for his unique IRS, and authorized the use of the only computer at Ford World Headquarters at the time, an IBM 704 vacuum-tube machine which occupied a whole room in the company's payroll department (see photo).



Engineers back then said they didn't need computers because they had slide rules. Carrig wrote a program using punch cards in the Fortran language, which is the ancestor of most modern engineering languages. In a 2007 interview, Chuck said, "Klaus asked if I could develop a program for the four-link independent rear suspension – not only a printout but also graphs of wheel motion. Nobody could even figure out how to lay it out on a drafting table because it was too complicated. It required a three-dimensional approach not conducive to two-dimensional drafting layouts. They gave me a time commitment that was almost impossible – in weeks, not months. It was a challenge to me, personally.

"The computer was very slow by today's standards, something like 40,000 operations per second (now computers at Ford are in the trillions per second). Interestingly, I developed the general approach for calculating the four-link IRS on a Friday evening on the back of several bar receipts at the Brass Rail in Detroit. It took several intense weeks to actually develop the program, though. I'd drop the cards off in the evening and pick up the results on the way to my office in the morning."

That first program became known as PG 1493, which is the grandfather of all suspension programs since. It could plot the X-Y-Z coordinates of the ball joints, wheel center, ground contact point, toe angle, caster angle, and other suspension properties through the entire range of motion. This "killer app" became the basis of all suspension programs to this day, and was key to Ford's world-beating racing effort to follow. Bob Riley of Riley Technologies, who started his career at Ford, still swears by 1493. The 82-year-old said, "I still show up for work every day. I like the old program because it plots a curve, not just spits out a bunch of numbers."

Riley Tech is now run by his son, Bill, and Chip Ganassi had won the Rolex 24 at Daytona in a Riley car, running a modified Ford EcoBoost motor (see photo).



The apple doesn't fall far from the tree, as they say.

But back to the 60's. If you were Henry Ford II in charge of an almost unlimited corporate check book, the fastest way to position your company as a performance leader would be to buy the epitome of sporty cars, Ferrari. There had been rumors that Ferrari might be open to suitors, so a pack of lawyers and accountants was sent to Modena, Italy, to arrive at a sale price for the exotic automaker. The agreed figure was \$18 million, a huge dowry in 1963, but that May Enzo Ferrari suddenly announced that Ford was not "worthy" of owning Ferrari, and the June wedding was off.

Henry was insulted not only on a professional level, but also on a personal level. Several of the Italian media had made fun of Ford's "fat" cars. Henry decided to hit Enzo where it would hurt the most: beating him at Le Mans. When he called his *de facto* racing team, led by Jaques Passino, Ford Director of Special Vehicle Activities, into his office to announce the new plan, someone asked Henry II, "What is the budget?" The Duce reportedly said, "Just do it!"

Fortunately, or serendipitously, Eric Broadly had introduced his Lola GT at the London show in January of 1963. It certainly wasn't capable of beating Ferrari as it sat there, but it was a good basic design, and more importantly had a mid-mounted Ford small-block V8 as motive power – something revolutionary in English car design at the time. Broadly was always short of money and was happy to hear from Ford, whose newly formed race team would soon descend on his car in the hope of turning it into a Le Mans racer.



Check out the photo of Klaus taking one of the first GT's home, complete with its skinny tires, wire wheels, euro plates, and questionable aerodynamics. By April of 1964 the new FORD GT 40 was ready to be introduced at the New York Auto Show. The body had been massaged in the Ford wind tunnel, and the suspension had been reworked on the now perfected PG 1493.

And oh yes: 1493 was also being used in another rush project, the development of an IRS for the soon-to-be-introduced production '65 Mustang, taking the name of the two-seat concept car. Its first tests by Shelby were done at Riverside in February of 1964 (see photo).

AT RIVERSIDE, CAL., MUSTANG IRS DEVELOPMENT

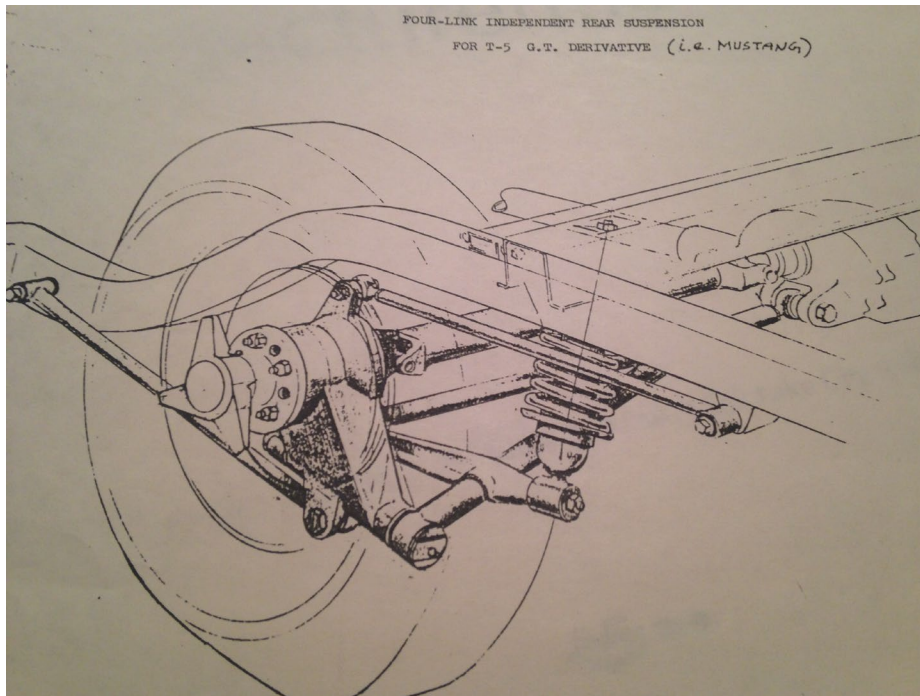
FEB. '64



FROM L TO R:

J. McQuaid, Ford
R. Ginther } Shelby American
K. Miles }
K.H. Arning, Ford

As verification that Ford had indeed intended its new Mustang to be offered with an IRS, when Iacocca introduced the Mustang to the media at the New York World's Fair in April of '64, he told the press "An independent rear suspension is in the works." (See photo of the rear suspension layout drawing.)



Of course, the Mustang IRS never made it into production, but the ability to develop a suspension system before it ever hit the track – a capability birthed by Arning’s Advanced Suspension and the Mustang I Concept car – became central to Ford’s racing efforts. When A.J. Foyt won Indy in 1967, then two weeks later won Le Mans with Gurney, a reporter asked him how he could win two big races in such different cars. Foyt is quoted as saying “They weren’t that different; they were designed by the same guys.” What he could have said was they were “designed by the same computer.”

After the Original Venice Crew built their 2015 version of a 1965 Shelby GT350R Mustang in Brock’s own shop in Henderson, Nevada, with an IRS, and previewed it at Willow Springs, Hemmings.com interviewed Brock and asked him specifically about the Mustang IRS: “Plans for Carroll Shelby’s GT350R Mustang originally called for an independent rear suspension, later abandoned for cost reasons. Do you think this would have made a significant difference in the car’s performance, and do you think that costs could have been contained to a reasonable level?”

With his reply to the reporter’s question, Brock shed new light on the reason that first Mustang never saw an IRS: “The independent rear suspension that Ford’s engineer Klaus Arning designed for the Shelby GT 350R Mustang wasn’t that expensive to produce, but it was labor intensive to retrofit on a car that had been designed to use a live axle. Time was another factor in the decision – we didn’t have enough of it. Then, the GT350R proved competitive with its original setup, and in racing when something ain’t broke, you don’t fix it.”

As any true Ford fan knows, the all-new-for-2015 regular production Ford Mustang finally came to market with a factory designed, developed and installed independent rear suspension. Klaus’ son, Ralph Arning, himself a Ford engineer who has spent decades supporting production of the Mustang, was working at the Flat Rock Assembly Plant when that very first IRS-equipped production Mustang came down the line. For both

Ralph and the Ford Mustang, some IRS DNA has been in the bloodline since that very first concept in 1962. And that makes the 6th Generation Mustang, plus the all-new Ford Shelby GT350 and GT350R – heck, even the 2016 Ford GT supercar for that matter – all the more satisfying. (See photo of Ford's Ralph Arning (left) and author Duane Carling (with casting in hand).



AUTHOR'S NOTE: RICHARD NISLEY CONTRIBUTED TO THIS REPORT

FORD PERFORMANCE PHOTOS / COURTESY RALPH ARNING & DUANE CARLING