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DEARBORN, Mich., Dec. 11 -- The 1999 Ford SVT Mustang Cobra has a new independent rear suspension, but unless you get comfortably underneath the car on a lift and get close, it's difficult to appreciate the technical elegance that went into this SLA design.

Today's SVT Mustang Cobra SLA independent rear suspension -- SLA stands for "short and long (control) arms" -- was a clever answer to an IRS question that Team Mustang had been dealing with for some time. The new design had to meet two key directives: The first was the mandate that there could be no significant changes to the chassis, fuel system, or body structure in any way to accommodate IRS; the second was that all the suspension loads had to be introduced into the chassis in areas already designed to accept those loads.

The SVT Mustang Cobra is the most popular and affordable high-performance sports coupe in America -- both of the IRS technical mandates were imposed to keep it that way.

The solid-axle suspension used to date had been an excellent performer, and the SN95 Cobra had obviously been designed to take maximum advantage of its characteristics. Eric Zinkosky, Suspension Systems/Development Engineer-Mustang Vehicle Engineering, was the Team Mustang engineer directed to make the Cobra's IRS a reality.

"What we had to do," Zinkosky said, "is package a new independent rear suspension in not only the same space as the solid-axle design, but we had to use the same suspension mounting points. We virtually 'reverse-engineered' the IRS from the known suspension hardpoints, and we had to keep everything inside the same box."

At a time when conventional wisdom often insists corporate executives and engineers think "outside the box," thinking inside a box was precisely what Team Mustang creative thinkers were forced to do. "The box" was an imaginary packaging space Zinkosky drew under the Cobra's rear end, incorporating all of the solid axle components and their range of movement. If the IRS was going to meet its cost and packaging requirements, it was inside "the box" that the new independent rear suspension would have to fit and operate.

The independent rear suspension's springs and Monroe shocks attach to the Cobra exactly where they did with the solid axle set-up. The only difference between the two systems is the addition of two bolt holes and "weld nuts" near the former Quad-Shock mounting holes. This four-bolt mounting system attaches the subframe mounting brackets to the underbody in a very secure way.

For the highest quality, the entire IRS module arrives at the Dearborn Assembly Plant pre-assembled and even pre-aligned. And it's such a match to the assembly tooling that the same machine that lifts the solid-axle suspension for V-6 and GT Mustangs also raises the IRS into place.

The components of the new IRS are unique to the Cobra except for the aluminum differential case, which is borrowed from the Lincoln Mark VIII, and the Mark VIII's wheel bearings are used. The Traction-Loc limited-slip features 3.27:1 gears (all Mustangs now have the 3.27 rear-axle ratio across the board). The differential is installed using a torque axis mounting system. The most effective mounting point to minimize movement and differential rock was determined to be slightly to the left side of the centerline, Zinkosky said, "where I already know the loads are going to be."

Thicker half-shafts minimize wind-up and improve the efficiency of Cobra's standard four-channel anti-lock brakes. Also in tune with improving the ABS, the anti-lock system's sensors are mounted inboard on the half-shaft instead of outboard at the wheels. This minimizes vibration on acceleration and enables a faster ABS response to wheelspin.

An isolated, welded tubular steel subframe provides the mounting points for the sophisticated "permanent mold" control arms, tie rods for fully adjustable toe control, [stabilizer bar](#) and differential. The permanent mold metal casting process produces aluminum lower control arms manufactured for a smooth and predictably uniform surface. This permits the piece to be designed lighter because it doesn't have to take into consideration the production variances of conventional sand casting. "We know the tolerances will be the same piece to piece, so we don't have to make the control arm thicker than it really needs to be," Zinkosky said.

There are minor changes in the stabilizer bars. Where the 1998 Cobra used 25 mm tubular stabilizer bar in the rear, the IRS deploys a 26 mm bar, and in front the 29 mm bar used in '98 is replaced by a 28 mm bar. IRS permitted higher spring rates and a stiffer car, so while the stabilizer bar changed their sizes, equivalent roll stiffness was retained.

The ride and handling characteristics of the Cobra were pretty great before -- and now are world-class in every respect. Important ride and handling benefits are derived from IRS and the modified MacPherson strut front suspension. Steering response and on-center feel are improved -- including a reduction of the turning circle to 38 feet -- critical to the enthusiast driver.

Along the way, Team Mustang made the rear track wider by 1.2 inches, uninterrupted suspension travel was increased, and weight distribution was improved. The Cobra's handling is especially refined on uneven or bumpy road surfaces and rear-end lift under hard braking is reduced.