

COST REDUCTION: RELENTLESS IMPROVEMENT

- At DENSO, reducing costs and improving quality are intrinsically linked
- Finding more cost-efficient ways to manufacture new and existing products is an enduring DENSO theme

ENHANCING QUALITY AND REDUCING COSTS IN TANDEM

For DENSO, making cheaper products is not a goal in itself. But developing cost-competitive products that meet the needs of society and automakers, while adhering to our commitment to “Quality First,” is. For us, improvements in cost and quality go hand-in-hand.

We are employing a number of approaches to reduce costs: standardization of parts; smaller, lighter components with greater functionality; modularization; shorter development times; and streamlined manufacturing processes. At the earliest stages of the product development process, we bring together design and production engineers to make sure all

these approaches are adhered to and realized, because creating products that are more cost competitive is a vital consideration right from the birth of a new product. It is this kind of approach that allows us to achieve one of the holy grails of the automotive component industry—reducing costs and enhancing quality at the same time—another clear DENSO difference.

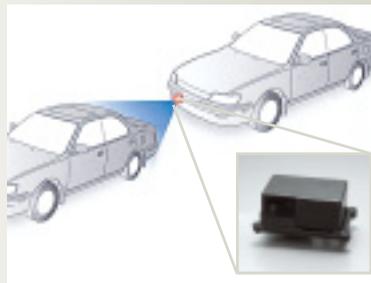
COMPONENTS: SMALLER, LIGHTER, MORE FUNCTIONAL

This year saw the launch of a whole range of new components that are smaller, lighter, and more functional than their predecessors, and consequently cost less to produce. Our family of heat exchange

components—evaporators, condensers and heater cores for air conditioners, and radiators for engine cooling—is one example. New versions of all these components were launched in the past year, all with enhanced heat-exchange efficiency, and all boasting improvements in weight and width reductions of between 20% and 40%*. Because all these products are essentially built around the same basic structure: flat, compressed tubing with internal and external fins for maximum heat-exchange performance, we were able to apply advances in functionality and design across this entire range. The result? All these DENSO heat-exchange components are now class-leaders in weight and size in their respective product categories.

The latest version of our laser radar for adaptive cruise control (ACC) systems is another example of how we are seeking to design components that are smaller, lighter, and more functional. Launched in January 2003, this radar, which provides distance data on obstacles such as preceding vehicles, is 50% lighter than previous components, thanks to the increased use of plastic, while size has been reduced by 30%. Despite these reductions in size and weight, the DENSO-developed wide-angle collecting lens in the radar is now capable of detecting obstacles over a wider horizontal plane than any other rival product on the market.

LASER RADAR
FOR ACC SYSTEMS



* Comparisons made on the basis of identical performance.

FUEL INJECTOR
(UC-TYPE)



MANUFACTURING: THE CONSTANT SEARCH FOR A BETTER WAY

DENSO production engineers help devise production techniques at the earliest stages of the design and development process, advising design engineers on how to create components that are simpler to manufacture. This approach, born out of years of manufacturing experience, leads to products that are both lower in cost and higher in quality.

One example of how we are doing this is our latest UC-type fuel injector, which we began delivering to customers in September 2002. By moving to a hollow needle valve, we achieved overall weight reductions, while improvements made to magnetic circuits resulted in industry-leading fuel injection responsiveness.

These changes were made possible by valuable contributions from production engineers. They were able to realize the hollow needle valve concept, despite cost issues and significant problems presented by precisely manufacturing the guide section on the valve to allow it

to slide smoothly within the valve seat. Our production engineers overcame this hurdle by turning the problem on its head: incorporating the guide section in the valve seat, instead of the valve itself. This resulted in a simplified needle valve that is both cheaper and easier to manufacture.

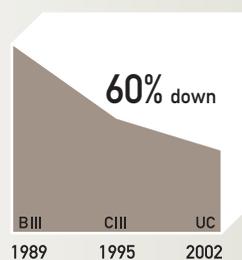
Employing a unique DENSO-designed ultra-precise injection nozzle, this fuel injector is capable of delivering a fuel spray of 50-micron particles, finer than any rival components on the market. A finer fuel spray means more efficient combustion, resulting in a

lower volume of residual hydrocarbons in exhaust emissions.

Despite the highly advanced machining techniques needed to realize the improvements to the needle valve and nozzle, our latest fuel injector components are now made using significantly fewer production processes—approximately 30% less than the previous CIII-type fuel injector. And thanks to a streamlined production process, we successfully reduced capital expenditure by approximately 30%. More strikingly, compared to the BIII-type, a fuel injector two generations before this latest component, production processes and capital expenditure have been reduced by 60% and 70% respectively. This is leading to quality improvements too, due to the likelihood of fewer production errors in a streamlined and simplified manufacturing process.

INCREMENTAL FUEL INJECTOR IMPROVEMENTS

MANUFACTURING PROCESSES



CAPITAL EXPENDITURE

