

Power of Integrating Each Single

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We can see the keywords, "eco, green, and earth-friendly," in the newspaper, TV, and elsewhere every day. Also in the inaugural address of U.S President of this year, he stated his environmental policy, "We will harness the sun and the winds and the soil

to fuel our cars and run our factories." Hence, the technology that responds to the environment is necessary for future product development. Through the whole life cycle of products including material, design, manufacture, logistics, and disposal, we must create high-quality, eco-friendly, and competitive green products.

As for our engine control unit (called EFI-ECU) that the AE Group works on, a quarter of a century has passed since its mass production began in 1983, and its cumulative production now exceeds 20 million units. I would like to thank our senior associates and all involved staff for their integrating each efforts. The EFI-ECU is the electronic equipment that precisely calculates optimum amount of fuel injection and ignition timing in accordance with the condition of engine, and cleans the exhaust emission. The EFI-ECU is therefore an environmental contribution product. In 2006, we commercialized the equipment for hybrid vehicle control (called HV-ECU) as another environmental contribution product, following EFI. The HV-ECU offers good fuel consumption, clean exhaust emission, and smooth driving by precisely calculating and controlling the output torque of the engine and driving motor of a hybrid vehicle.

The EFI-ECU and the HV-ECU are classified in the category of the power train in the automotive industry. They relate to "run", which is one of the significant functions of a car, so called "run, turn, and stop," so their quality is considered most important. For these products, the integration of right parts, right software, and right monozukuri is specially required. The most important issues for commercialization are that each work process is clear, high-quality work is integrated along the policy of $\Sigma 0=0^{(1)}$, and preventive action

(1) It is an activity for quality improvement in which each and every person in the Fujitsu Ten group achieves 0 defect individually to result in total 0 defects.

is front-loaded, and all activities to avoid defects are completed before mass production. In the design and manufacturing site, optimization, standardization, and visualization must be done in all processes from input to output, and activities for brushup must be made every day.

Comparing the first model of the EFI-ECU with the latest HV-ECU, we can see the variation and evolution of car electronics during a quarter of a century. At first, an 8-bit microprocessor was used, but now 32-bit microprocessor is mainstream. We have improved the quality level dramatically while the operation speed is increased by 100 times and memory size is increased by 200 times due to the high-speed and high-density current of semiconductors. In line with the increase of proportion of software design in product development, we have established our method by platform conception, development tool, management tool, and so forth for efficient development and design. Furthermore, in the product as a whole, we have continuously achieved a good balance between functional extension and reduction in size and weight by improving every aspect, including the miniaturization of element device to be installed in the product, evolution of high-density mounting technology, and the establishment of slim and highly-efficient production line.

On the other hand, the amount of information used in an ECU has been increasing dramatically. In the current ECU, the information required for the control is obtained by intercommunication through multiple networks among ECU's. By linking, cooperation and liaison between control functions can be fully carried out, and the range of working field is further expanded for automotive engineers. We must understand the operation of other devices interacting and coordinating with each other, and must repeat discussions with the experts including other companies from the early stage of development. Not withdrawing into ourselves, we must widen the circle of linkage, fusion, and cooperation in and out of our company. With the sophistication and progress of computerization of cars in the future, we would like to increase as many human resources as possible, who are capable enough to respond and solve any issue, so that we stay ahead of other companies.

We, who had overcome the once-in-200-years earthquake disaster, now face once-in-a-century unprecedented economic circumstances, and have been pursuing our plan to survive this crisis and grow. We all will step up our efforts of contributing to engineering development one by one so as to benefit future generations and advance to the next stage.

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