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AUTOMOTIVE MECHATRONICS

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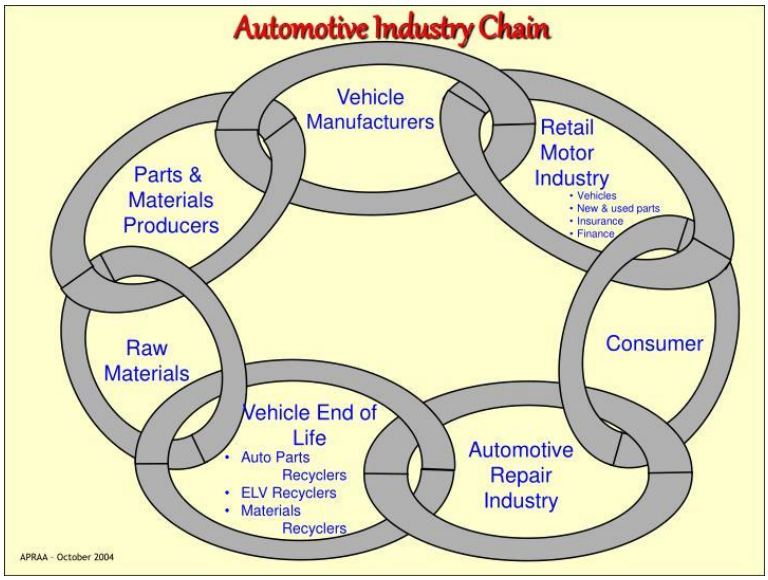
ABSTRACT

In automobile engineering, mechatronics is being used to design, with emphasizing the contributions of mechanical, electrical, computer, and control engineering groups. As automakers look for opportunities to differentiate their offerings, the design teams collaborate on new uses of emerging technologies to meet elements of consumer demand. Most automotive innovations consist of significant advancements in systems made possible through the integrated electronics and complex information processing. Such mechatronic systems in need of the simultaneous design of mechanical, electronic and information executing subsystems to achieve the required cost of the automotive production. The motive for the use of mechatronics is discussed, as well as the most important technical challenges of the mechatronics approach. Mechatronic solutions for various automotive purposes are presented. Drivers of the future development of mechatronics in the automotive manufacturing department are being discussed.

Keywords: Automotive Industry, Automotive Control, Control System Design, Chassis Management, Engine Management, Human And Machines Interface.

I. INTRODUCTION

In the past and in the coming future, most of the innovations of the automotive systems based on electronics. These innovations are rarely pure electronic systems for the transformation and communication of information such as mobile phones or the navigation system, but most of them are closely linked to the mechanical parts of the system. The three main mechanical subsystems of a car, the chassis system, the propulsion system and the interior system, are all undergoing a massive transition from primarily mechanical systems with some electronic control to highly integrated mechatronic systems that would not work without electronic control.



Despite that decline from the original, however, business experts say the epidemic only exacerbates digital development within the automotive sector. This is not the first, or perhaps the last disruption ever seen by a car company. Some hope that the company, especially the car service providers, will find an abundance in the old financial crisis. The directives received from the 2008-2009 financial crisis ensured that car dealers were better prepared, more resilient, and more resilient. Now, car manufacturers are facing a shortage of semiconductor chips, which is contributing to automotive production. Overall, the continuous disruption of operations and service delivery chains significantly expanded many of the business core and technical aspects within the automotive industry.

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As Runge (2001) points out, an increase in the number of jobs over time will require more space using conventional technology. This is in stark contrast to the declining amount of space available to implement these activities. It is only through the use of mechatronic integration as a means of integrated implementation where such programs can be integrated into vehicles. Apart from the space, the cost is one of the major limitations for the development of an efficient car. As can be seen from Schooner - 2000, which shows the average cost of an electronic controlled actuator before attempts to assemble mechatronic, electrical components are 50% of the total value. Within this allocation, 50% of electronics costs are mainly related to equipment components such as cooling, housing, circuit board, connectors and cables. One purpose of mechatronics is to reduce the cost of parts associated with electrical equipment by properly integrating it with other components.

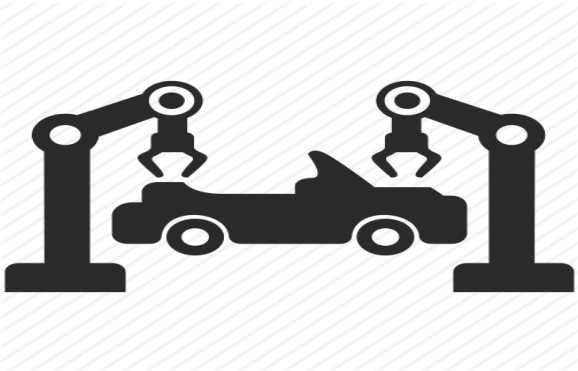
As a result, Tomika (2000) points out that mechatronics do not work very well using the electronics and mechanics feature with the help of feature factor, including, however, the combined use of multiple engineering fields for power, actuators, sensors, and speech systems. Wallace (2001) points out that the term “Mechanics” first came to use in ancient Greece to create a masterpiece of design for useful tools; in this sense "Mechatronics" may be a reflection of the modern way of designing "useful equipment" and digital technology. The object is connected in such a way that all the sub-functions of the device must be located within the most efficient way, either mechanically, electronically, or with the help of software development. Therefore, the internal capacity of client-assisted services may be substituted at an affordable cost.

Important features in automotive machinery

This collaboration is very important in the application of complex functions in a less expensive product such as cars. In this it is helpful to examine the different stages of automation and control in the automotive system (Schooner, 2002).

Functional Integration with Location The first automatic step in a mechanical system is the addition of actuators (A) to increase the power consumption or operating speed. At this stage external forces are introduced into the system. In cars, this is the current state of many seats or window opening systems.

With the goal of automated or duplicate processes, the next step often comes with adding an integrated system, based on electronics and software (E); means information management, that is, the collection, processing and / or storage of information in a system. Seat memory systems that control the space of an open seat are examples of this.



Engine Cooling Fan featuring Commutated Motor Most electric cooling fans use DC motors to detect circulating motion. One of the most expensive components of DC motors is the commutator, which is used to switch current from one coil to another depending on the rotation angle of the engine. With higher power and speed, the rider becomes much larger and makes the engine connection longer. Moreover, the losses resulting from driver resistance are not the same.

For large engine-driven cooling fans, a mechatronic solution that uses an electronic convertible engine inside a fan hub with integrated electronic components has demonstrated system system advantages: fan total system can be shortened by a few inches, allowing large areas of crash in space. the front of the car; and some fan controls and diagnostic functions can reside in fan electronics software, removing some of the complexity of the car controller. The integration of electronics into a fan motor is necessary to reduce the number of coil and cable connections, but also requires careful selection of the location of the various electronic components

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(Kaiser et al.,). Consistency must be found between the complexity of the software and the electronics must be found in the design of the voltage flange and current pulses to meet the requirements of electromagnetic interference. hardware to train motor fan flange.

How to control automatic transmission Automatic transmission requires complex control of many water-valve valves (switching different gears) and requires multiple sensors on board (measuring the correct position of the clutch and detecting temperature and oil pressure). If the control electronics are installed in a separate control unit, more signals must be transmitted between the machine / hydraulic unit and the control unit. The electrical connection is among the weaknesses of the whole system in terms of reliability, it turns out that a complete integration of electronics in the transmission component is the best solution. The electrical equipment of this application must operate at temperatures up to 150 ° C, which requires new designs and concepts.

The first method of making a flexible electronic box caused a lot of quality problems during the development phase. As mentioned earlier with the removable concept (which created these problems for the interface) and the use of mounting mechanisms to permanently integrate electrical equipment into mechanics, eventually no longer needed electrical replacement and lower production costs.

Complex System Apart from integration there is the second most important aspect of automotive mechatronics: the difficulty factor. In recent developments, an increase in the number of degrees of freedom in mechanical system controls requires the initiation of the growth of actuators (A). Multi-dimensional and flexible management requires a growing sensor (S) to measure the level of abnormalities of the device itself and the surrounding environment of the device. The computer power required to control embedded (E) in data acquisition and

"smart" systems seem limitless, due to the implementation of processing complex records such as managing excess bandwidth disruption or sample thunder algorithms. It also acknowledges this, first being pushed with the help of an unusual sensory device to detect temperature and crashes - however sooner or later with the help of the search for better interaction and communication of all vehicle structures - extreme, limited speed., consecutive discussion frames (C) serve as background records within motors.

Examples of mechatronic structures in motors

In motors, a wide variety of structures exist in the process of moving from natural machinery to mechanical engineering (Daniels, 2003). Next, a few examples of typical mechatronic properties of a car are discussed.

Chassis systems

The maximum obvious improvements are seen in the chassis structures. For a few years buildings such as ABS (anti blocking system) and ESP (electronic stability program) were common in Mercedes with many different motors and features guaranteed to reduce a wide range of serious driving hazards (Lingnau, 2003). On the Mercedes SL and moreover within the E-class a new electrohydraulic brake has been installed, SBC (sensotronic brake control) recently. In day-to-day operation, electric brakes are completely removed from the electrohydraulic system and are completely controlled electronically (Stoll). The device plays many features

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that a normal brake can do, including stopping.

Base technology for mechatronics

As mentioned, mechatronic properties include actuators, sensors, electronics, and talk properties, which can be integrated into the operating system. Next, the first technical trend of addictive tools discussed swiftly.

Actuators

Actuators are used to change the position, speed or power of a mechanical device. Electromagnetic actuators, such as magnetics, valves and electric motors, are well-equipped to transmit most of the most commonly used activators. In overcrowded vehicles, more than 120 electric vehicles can be found. At high power hydraulic actuators are also widely used; air actuators are not an uncommon area for small power with limited requirements for accuracy.

Sensors

A large number of sensors have already been developed into cars (Daniels, 2002). Environmental principles to measure temperature, space, speed, acceleration, energy, pressure, oxygen content, oil quality, soft transmission factor, to name just a few examples. In the past very high sensors were used to locate certain parts of the car; now increasing understanding involves the sensation of the car's surroundings the use of radar sensors and image processing.

Driving power and barriers to future development The essence of the structures is becoming more complex as within the examples given above it is expensive and one might ask, whether this development will continue or not. Several elements. riding on those developments.

Fuel Consumption: ACEA Commitment and Combined Vehicles Some years ago, the European Automobile Manufacturers association (ACEA) issued a decision on its own on a reduced fuel line, which includes the goal of reducing CO2 emissions with the help of using 2008 to a higher level. of 140g / km, that is equivalent to taking 5.8l / 100000m or 40mpg. All European manufacturers are striving to achieve this standard waste disposal of all European vehicles recently introduced in 2008. This most effective may work using new injection modes, flexible valve time, engine shutdown though. the most efficient use of resources in line with real needs. While in Europe the focus is on developing combustion engines through mechatronics.

Car companies in the United States, Japan and Korea spend a lot of money on making hybrid cars. Electric motors, often combined with sophisticated mechanical solutions, provide engine torque support in certain driving conditions. Controlling smooth transitions between both drives is a mechatronic control function.

II. CONCLUSION

An important issue that enables you to achieve the style challenges of the future mechatronic system is wk. in the proper way of design. In Germany, a collection of VDI fragments has developed standard tips (Gaussmeter,2003) to assist within the design of advanced mechatronic systems. An important step in this process is to facilitate the exchange of part of the models between the car manufacturer and the supplier parts to predict the moral tolerance of the $ 64000 parts. As mentioned earlier, in addition the separation and communication of the package of hardware and software performance are important under the existing value limits. In short, mechatronics may be mentioned earlier as one of the key skills in the automotive industry. With mechatronics the best performance, the best use of space, the lowest variation of working areas and the smallest amount of work can be achieved. Mechatronics is a simple technology: it requires a performance-based style approach to produce a retardant with the appropriate technology available. permanent mechatronic systems, collaboration and the use of well-defined interactive tools to link to technology are the key factors to success.

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