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OCCUPANT SAFETY SYSTEMS

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INTRODUCTION OF OCCUPANT SAFETY SYSTEM

The time immediately preceding an accident and the period in which it actually occurs can be as brief as the blink of an eye. Within this diminutive time span our sensors and processing systems provide powerful performance in the service of occupant safety. For example, they decide within milliseconds whether life-saving measures such as airbags and seatbelt tensioners need to be triggered.

OPERATION PRINCIPLE OF THE OCCUPANT PROTECTION SYSTEM:

The occupant protection electronics optimizes the protection of vehicle occupants against injuries in collisions, as well as in case the vehicle rolls over. The occupant protection system from Bosch consists of peripheral sensors and an intelligent centerpiece – the airbag control unit. Based on the sensor signals, it detects the strength and direction of a collision and can activate the restraint mechanisms in the vehicle, for example seat-belt pretensioners and airbags, as required for maximum occupant protection.

With increasing electrification, automation, connectivity and new interior concepts, innovative passive safety systems will continue to play a major role in the future. These megatrends in the automotive industry pose

interesting questions and challenges for occupant protection. The vision of accident-free mobility will always remain in focus.

SYSTEM COMPONENTS

AIRBAG CONTROL UNIT

The airbag control unit detects and evaluates the severity of an accident and then triggers the appropriate restraint systems. Information is supplied to the unit by as many as six crash sensors. This includes acceleration sensors and a rotational speed sensor.

PERIPHERAL ACCELERATION SENSOR

The peripheral acceleration sensor (PAS) from Bosch provides information on direction and level of impact by measuring accelerations during a crash in one spatial axis. In addition, Bosch provides a two-channel peripheral acceleration sensor, the PAS enhanced, that can record longitudinal and lateral vehicle accelerations. The optional installation of this sensor can further improve the performance of the airbag system as it provides additional acceleration information on the longitudinal direction of the vehicle.

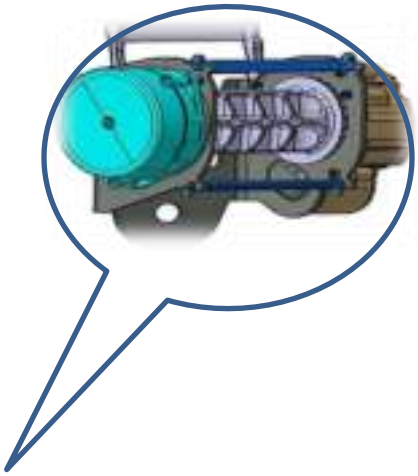
PERIPHERAL PRESSURE SENSOR

Unlike the front of the vehicle, the side has a limited crumple zone. To ensure enough time for the activation of the restraint system following an impact, the airbag control unit must decide in less than five milliseconds whether a deployment is required based on the type and severity of the crash. The peripheral pressure sensor (PPS) from Bosch provides a cost-effective and high-quality solution for this purpose.

SEAT BELTS(SBS):-

The standard 3 point seat belt system consists on a shoulder and lap belt which are connected to a buckle, retractor and anchor. The retractor allows the webbing to be pulled in and out as the occupant places the belt on or off. The buckle allows for the easy attachment of the belt by the occupant.

PRETENSIONER:-



A pretensioner is designed to retract some of the webbing of a seatbelt the instant a collision occurs, tightening the seatbelt to restrain occupants quickly and reducing the amount they are thrown forward in a moderate or severe frontal crash.

EMERGENCY LOCKING RETRACTOR

The Emergency Locking Retractor (ELR) allows the driver seat belt to freely extend and retract with occupant movement, yet locks the belt during a sudden stop or upon impact. The Automatic Locking Retractor (ALR) makes it possible to secure a child seat without using a seat belt locking clip.

SEAT MOUNTED SELF ALIGNING ELR

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BUCKLE :-

The buckle is the piece of the seat belt system that secures and releases the tongue, which is attached to the webbing. The buckle is designed to hold the tongue firmly and allow the seat belt to be fastened and unfastened with very little force.

HEIGHT ADJUSTER:-

Height adjustable suspension is a feature of certain automobile suspension systems that allow the motorist to vary the ride height or ground clearance.

TYPES OF SEAT BELTS:-

- Three-point belts
- Belt-in-Seat (BIS)
- Five-point harness
- Lap
- Belts
- Shoulder belts
- Automatic seatbelts

THREE-POINT BELTS

The three-point seatbelt is probably the most common type we see these days. For this, we thank the Swedish carmaker Volvo-the industry leader in safety. In 1959, an engineer at Volvo named Nils Bohlin invented the three-point seatbelt. The company decided that their invention was too crucial for the greater good of all drivers and passengers that they opened the patent. This meant that any other carmaker could use their design free.

BELT IN-SEAT (BIS)

The Belt-in-Seat (BIS) is a three-point harness with the shoulder belt attached to the seat itself, rather than to the vehicle structure. The first car using this system was the Range Rover Classic, which offered BIS as standard on the front seats from 1970.

FIVE-POINT HARNESS

A 5-point harness has five attachment points designed to restrain your child at the shoulders and hips, which are the most rigid parts of their body. If there is a crash, the car seat harness transfers the forces of the crash to these rigid points of the body and into the seat.

LAP

A lap sash seat belt is just a fancy way of describing a seat belt that combines a strap over the thighs with a diagonal strap across the chest and over one shoulder. Lap sash seat belts are commonplace in all new cars these days.

BELTS

A seat belt (also known as a safety belt, or spelled seatbelt) is a vehicle safety device designed to secure the driver or a passenger of a vehicle against harmful movement that may result during a collision or a sudden stop.

SHOULDER BELTS

Shoulder harness-safety belt systems prevent serious head, neck, and upper torso injuries in what may be relatively minor accidents 1n terms of aircraft damage, and they can prevent irreversible or fatal injuries in more severe accidents.

AUTOMATIC SEATBELTS

The Auto belt is a kind of seat belt in the automobile system in which the seat belt will be closed automatically after starting the car . The seat belt will be designed in such a way that it will be worked automatically after injecting the fuel engine . The car will not be moving without seat belt.

AIR BAGS(IRS):-

DRIVER AIRBAG

The driver's airbag is made up of several components. A cylinder filled with gas, the steal housing, airbag pack and the vinyl airbag cover. When the airbag module receives a deployment signal the igniter switch starts a chemical reaction which then inflates the airbag pack in fractions of a second.

PASSENGER AIRBAG

Airbags are balloon-like devices that expand when a car experiences a collision, providing a cushion of air that prevents a person bashing their face on the dashboard or steering wheel and suffering concussion, disfigurement or worse. Airbags are usually fitted in the front seats.

SIDE AIRBAG

Side-impact airbags or side-torso airbags are a category of airbags usually located in the seat or door panel, and inflate between the seat occupant and the door. These airbags are designed to reduce the risk of injury to the pelvic and lower abdomen regions.

KNEE AIRBAG

Knee airbags usually deploy from the lower dashboard and are intended to distribute impact forces to reduce leg injuries. They may also help reduce forces on an occupant's chest and abdomen by controlling lower body movement.

CURTAIN AIRBAG

Curtain airbags are activated in side impact crashes, for example t-bone crashes, or collisions with trees and poles. They deploy from the top of the door rails above the side window and work by providing cushioning between the driver or passenger's head and the window.

AIRBAG PARTS:-

A typical air bag system consists of an air bag module (containing an inflator or gas generator and an air bag), crash sensors, a diagnostic monitoring unit, a steering wheel connecting coil, and an indicator lamp. These components are all interconnected by a wiring harness and powered by the vehicle's battery.

AIRBAG MATERIAL:-

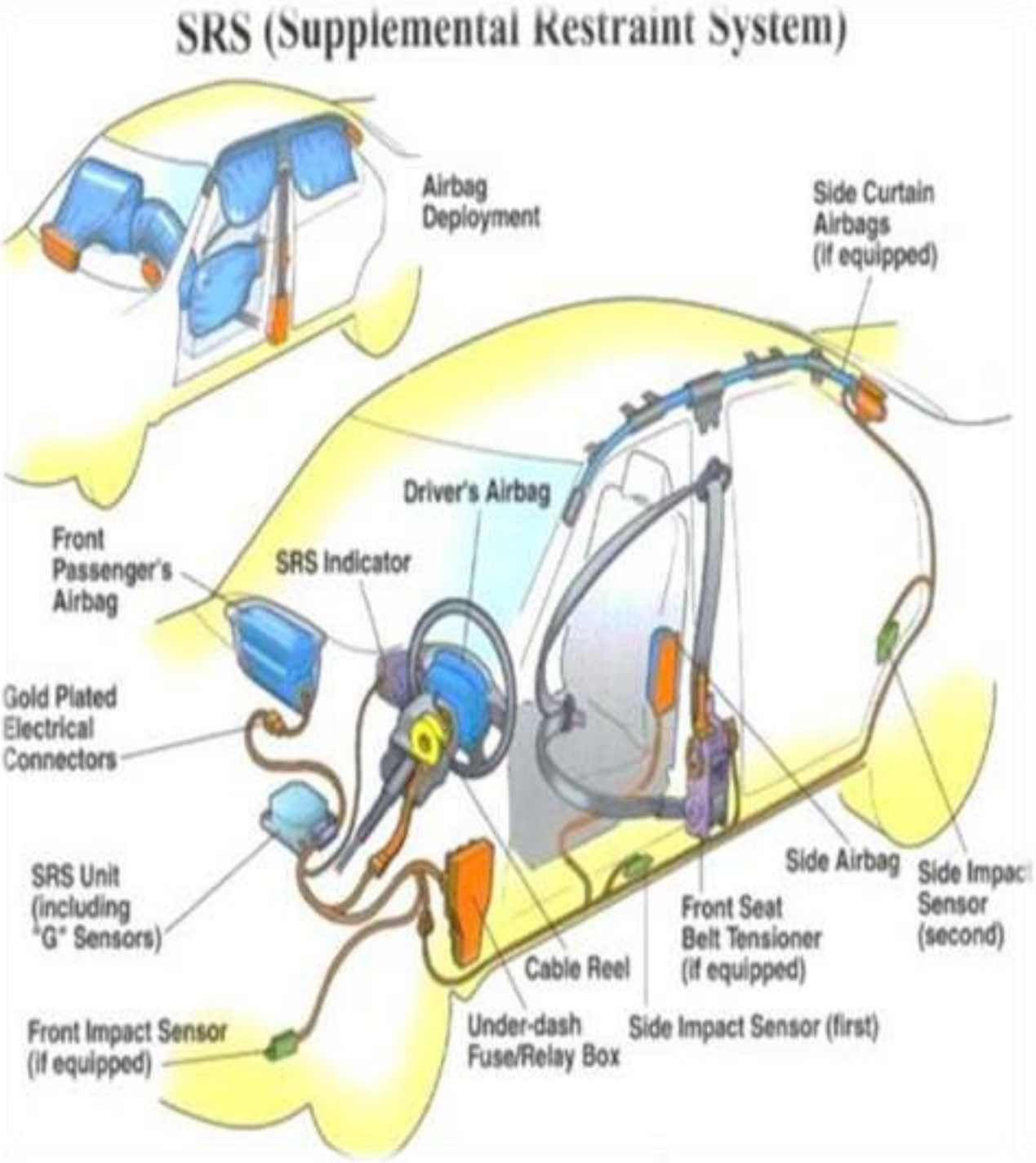
Fabric Rolls

Airbag Seat Belt Sewing

Airbag Inflator

Airbag folding cover

Clockspring


SRS (Supplemental Restraint System)
Airbag Deployment
Side Curtain Airbags (if equipped)
Driver's Airbag
Front Passenger's Airbag
SRS Indicator
Gold Plated Electrical Connectors
SRS Unit (including "G" Sensors)
Front Impact Sensor (if equipped)
Cable Reel
Under-dash Fuse/Relay Box
Side Impact Sensor (first)
Front Seat Belt Tensioner (if equipped)
Side Airbag
Side Impact Sensor (second)

ROLE OF MECHANICAL ENGINEERING IN AGRICULTURE

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ABSTRACT

Mechanical Engineering in Agriculture and Food Industry is a part of the new discipline called agro-technical which indeed serves as a boon for the industry. The history of Food goes back and found in almost all history after evolution of the earthly world and also predate before the existence of this world which can be found in mostly religious manuscript with the first person created in heaven. And thus the history of Mechanical Engineering goes back and relate to the human who were in need of food for their survival at that time. Hence it is obvious and clearly visible that the mechanical engineering is one of the most ancient branches of engineering discipline and had served the mankind from the day of the existence of world up to this day. Since then, a new development is going on and on in the field of mechanical engineering which in turn propels its advancement impact on the food industries. This paper will hence therefore deal with the author personal experience with the day to day world movement from past to present in the field of Mechanical Engineering focused on the food Industries.

Introduction

After the evolution of human being on this great earth, the need of human being started and as it is the best saying that “Necessity is the mother of Invention”, led to human being for invention from the evolution time itself. Although at that time, it’s untraceable that people were communicating each other in which language and the word of English may or may not evolved which enable us to trace back the evolution of Mechanical Engineering in human life. But at the same time, it is traceable or can logically be defined that Human basic needs is Food, Shelter and Clothes. And in order to achieve any of the basic needs, people must had used the means of Mechanical Engineering. Nevertheless the definition or the branch of engineering had been classified in 18th Century but it was in use since the human evolution.

The term engineering is derived from the word engineer, which itself dates back to 1390 when an *engineer* (literally, one who operates an engine) referred to "a constructor of military engines. The word "engine" itself is of even older origin, ultimately deriving from the Latin *ingenium* (c. 1250), meaning "innate quality, especially mental power, hence a clever invention. And further the division of branch took place during the Industrial Revolution in Europe in the 18th century.

Materials and Methods

This article is based on author personal experience throughout his journey of life as a Mechanical Engineer along with the professional experience in Management field and the thorough observation of Food Industry from basic level to upper level. Information encrypted in this article is based on searching databases, various journals, books, articles and key words were used during writing of this paper.

Food and Its Processing

Food is derived from mainly two sources for human being, the plants and the animals. Most plant food has always been obtained through agriculture. With increasing concern over both the methods and products of modern industrial agriculture, there has been a growing trend toward sustainable agricultural practices. This approach, partly fueled by consumer demand, encourages biodiversity, local self-reliance and organic farming methods. Major influences on food production include international organizations (e.g. the World Trade Organization and Common Agricultural Policy), national government policy (or law), and war. In order to fulfill this requirement, the food industries looked forward and couple their manual way to the automation which in fact is the result of advancement of engineering field. A part from plant source food, the animal source food had also been influenced with the modern techniques for better qualities and quantities. We shall try to emphasize the effect of advancement of Mechanical Engineering over Food Industry with the help of images.

Agriculture

Agriculture is the basic of food industries and is defined as the process of producing food, feeding products, fiber and other desired products by the cultivation of certain plants and the raising of domesticated animals (livestock). The practice of agriculture is also known as "farming". Scientists, inventors, and others devoted to improving farming methods and implements are also said to be engaged in agriculture.

One of the most relevant things in agriculture is Ploughing. Ever since the plough started, it had simply started by human hand barely. The next level of ploughing was hoeing, which reflects its root to Mechanical Engineering. In this era, the soil was turned using simple hand-held digging sticks and hoes. It can be roughly termed as the 1st stage of Mechanical Engineering in Agriculture of Food Industry. Below picture depicts the Hoeing method.

Peasant in Vegetable Garden using Hoe for ploughing

Modern way of Ploughing depicting advancement of Mechanical Engineering

This modern way of Ploughing is undeniably yielding the better result of food qualitatively and quantitatively. This was just an example to depict the role of Mechanical Engineering in the agriculture field. Such an example exists in all chain of Food Industry, from raw product to finish product.

Food Processing

Food Processing can be defined as the transformation of raw ingredients into food for human consumption. This transformation takes place either manually by human direct effort or by various techniques of Engineering. There are four basic types of production in Mechanical Engineering and the food processing is acquired by any of them. The type of production is depicted below:

Basic Types of Production in Mechanical Engineering

Unit Production:

Unit Production is used when a product is produced with the labor of one or few workers and is rarely used for bulk and large scale production. It is also called *One-Off Production* or *Prototype Production.* Although this type of production is inefficient, but the quality is greatly enhanced with this type of production. This method is used in Food Industry when customers make an order for something to be made to their own specifications, for example a *Wedding Cake*. The making of one-off products could take days depending on how intricate the design is.

Batch Production:

Batch production is the method used to produce or process any product in groups or batches where the products in the batch go through the whole production process together. This method is used when the size of the market for a product is not clear, and where there is a range within a product line. Batch production is used in many different ways and is most suited to when there is a need for a quality/quantity balance. A certain number of the same goods will be produced to make up a batch or run, for example a bakery may bake a limited number of *cupcakes*. This method encompasses consumer demand.

Mass Production:

Mass production is when the product is built up through many segregated stages; the product is built upon at each stage and then passed directly to the next stage where it is built upon again. It is also called as *Flow Production* or *Assembly Line Production.* This method is used when there is a mass market for a large number of identical products, for example *chocolate bars, ready meals, canned food,* etc. The product passes from one stage of production to another along a production line.

Continuous Production:

This is widely known as *Just-in-time(JIT) Production.*This method of production is mainly used in restaurants. All components of the product are available in-house and the customer chooses what they want in the product. It is then prepared in a kitchen or in front of the buyer as in *sandwich delicatessens, pizzerias,* and *sushi bars*.

Above described methods are the simple examples of Mechanical Engineering involvement in Food Processing.

CONCLUSIONS:

From the author point of view for the subject topic, it can be concluded that the vast field of Mechanical Engineering had played a vital role in the advancement of Food Industry at all level and can be summarized as "*Mechanical Engineering serve as the boon for Agriculture Industry*.

AUTOMOBILE TECHNOLOGY 2020

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TYPES OF AUTOMOBILE TECHNOLOGY 2020

- Intelligent All-Wheel Drive.
- Active Aerodynamics.
- Augmented Reality Windshields.
- Autonomous Emergency Braking.
- Connected Cars.
- Electric Vehicles.
- Fuel Cells.
- Self-Driving Cars.

INTELLIGENT ALL-WHEEL DRIVE.

By constantly monitoring wheel spin, throttle position and vehicle speed, this system automatically diverts up to 50% of the available power to the front wheels, enhancing traction and control when conditions are less than optimal.

ACTIVE AERODYNAMICS.

A set of motor parts that are designed to provide better gripping, stability, and improved braking performance at high speeds refer to active

aerodynamics. There are two purposes that active aerodynamics serve – increasing fuel economy as well as improving the car's performance (stability).

AUGMENTED REALITY WINDSHIELDS.

Powering the AR visuals are artificial intelligence and machine learning systems that turn the forward view outside the windshield into a mapped canvas with directional arrows, contextual points of interest, street names, and traffic data overlaid.

AUTONOMOUS EMERGENCY BRAKING.

Autonomous Emergency Braking (AEB) is defined as a system that constantly keeps track of the road ahead and will automatically halt the vehicle if the driver fails to take action.

CONNECTED CARS.

A vehicle that provides Internet access to all the mobile devices used by the driver and passengers. It accesses the Internet via cellular or satellite communications and provides tablet-sized screens for passengers or a Wi-Fi hotspot for passengers' own devices. See telematics and smart car.

ELECTRIC VEHICLES.

EV is defined as a vehicle that can be powered by an electric motor that draws electricity from a battery and is capable of being charged from an external source.

FUEL CELLS.

Fuel cells work like batteries, but they do not run down or need recharging. They produce electricity and heat as long as fuel is supplied. A fuel cell consists of two electrodes—a negative electrode (or anode) and a positive electrode (or cathode)—sandwiched around an electrolyte.

SELF-DRIVING CARS.

Self-driving vehicles are cars or trucks in which human drivers are never required to take control to safely operate the vehicle. Also known as autonomous or "driverless" cars, they combine sensors and software to control, navigate, and drive the vehicle.

From September through October 2019, based on literature survey more than 35,000 consumers in 20 countries to explore opinions regarding a variety of critical issues affecting the automotive sector, including the development of advanced technologies. The overall goal of this annual study is to answer important questions that can help companies prioritize and better position their business strategies and investments.

Interest in EVs continues to grow around the world

Even in the United States, where significant barriers to EV adoption remain, the number of people who most want an alternative engine in their next vehicle is growing rapidly

Interest in AVs stalled in most markets

Consumers in most global markets remain equally split regarding the perceived safety of autonomous vehicles, but China and India are moving in the wrong direction.

Consumers remain resistant to multimodal mobility

Consumers in Japan, Germany, and the United States are among the hardest to shift, as fewer than one in five people use multiple modes of transportation in a single trip.

Concerns about privacy and data security remain

Whom consumers trust the most to manage the data being collected and shared by their vehicle remains firmly up in the air, as original equipment manufacturers (OEMs) are not necessarily the logical choice.

Consumers thinking about connected vehicles

Consumers are split on the benefits of increased vehicle connectivity. Consumers in India and China are embracing the idea at more than twice the rate than consumers in Germany.

Consumers thinking about new mobility models

Global consumers are unanimous in their support for greater access to mass transit as the top method to reduce traffic congestion.

Consumers think about electric vehicle (EV) technology

Interest in alternative powertrain technology continues to expand, as fewer people want traditional internal combustion engines (ICE) in their next vehicle.

Scientist study the world as it is,

Engineers create the world that never has been.

- Theodore Van Karmant

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