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Mechanical engineering - A boon for food industries

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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.

Keywords: Mechanical Engineering, Boon, Food Industry, Processing

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 *engine'er* (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.

Hence the definition of Mechanical Engineering has been defined in 19th Century as "*Mechanical engineering is the discipline that applies engineering, physics, engineering mathematics, and materials science principles to design, analyze, manufacture, and maintain mechanical systems*". It is one of the oldest and broadest of the engineering disciplines.

And as the Mechanical Engineering has already been defined in a proper manner in current era, the word "Food" is still literal from the evolution time and still is literally meant as any substance consumed to provide nutritional support for an organism. Food is usually a plant or animal origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals. In order to acquire the food from either animal or plant, human being was in need of a proper medium which certainly had driven them to invent axe, knife, etc. which comes under the basics of Mechanical Engineering. Thus it is obvious that Mechanical Engineering is a field which had been associated with the humankind in general from the day of evolution and seems to be a boon for the Food Industry in particular.

In modern era, the advancement of Mechanical Engineering coupled with different branches of

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engineering had yielded a result of very high quality of food along with enhanced quantity of production. Various tools and techniques had been employed now a day for processing the food in the Food Industry.

Material 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

Further advancement and development took place over and

over the year and method of ploughing reached to a new horizon by using cattle and the mechanical tool called plough. This method is famous as Ox-drawn Ploughing method. A picture of such era is depicted below:



Ox-drawn Ploughing

Further advancement took place and tractor had replaced the cattle used for ploughing. A detail picture of modern way of ploughing is depicted below:

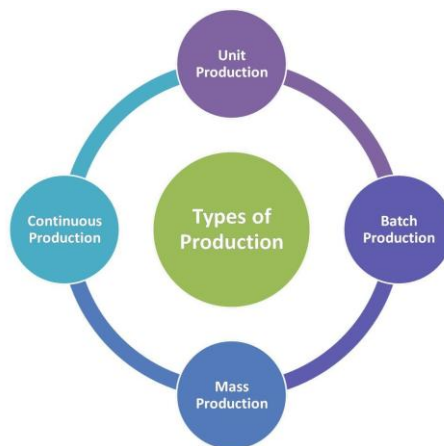


Modern way of Ploughing depicting advancement of Mechanical Engineering

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

We shall stress each type of production in Food Industry with some example.

- **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.

Food Serving and Distribution

After the food being processed, it comes to serve the food for human being. Serving can happen on a stall, in the restaurant or anywhere from where a consumer can obtain. Some food is easy to deliver by hand only but some food need miles to travel in order to reach the consumer. This travelling had again been easy after the industrial revolution and the advancement of Mechanical Engineering. This advancement enables human being to taste the worldwide cuisine at the comfort of their home.

A vast global cargo network connects the numerous parts of the industry. These include suppliers, manufacturers, warehouses, retailers and the end consumers. Wholesale markets for fresh food products have tended to decline in importance in urbanizing countries, including Latin America and some Asian countries as a result of the growth of

supermarkets, which procure directly from farmers or through preferred suppliers, rather than going through markets.

Discussions

Historically, humans secured food through two methods: hunting and gathering and agriculture. Today, the majority of the food energy required by the ever increasing population of the world is supplied by the Food Industry. In order to fulfill the requirement of food industries with less human effort, the Mechanical Engineering serve along with other engineering branches. This in turns help Food Industry from basic to final level of processing a food for serving humankind. As the world is growing day by day, advancement is taking place in Mechanical Engineering from Axe to Robots and ongoing. This advancement helps Food Industry to improve their status qualitatively and quantitatively both. The area covered by Mechanical Engineering from production to serving level of Food Industry is very vast and a very tiny portion had been dealt in this paper.

Although more extensive research and development is needed for the utilization of Mechanical Engineering in the Food Industry and also for the advancement of Mechanical Engineering itself

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 Food Industry*".

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