

# A Comprehensive Review in Innovation of Food Processing Equipment

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## Abstract:

As a change in consumer preferences increase, there is a need for the innovations and differentiations. In this modern era, we are in searching of some advanced technologies to make our life much easier. The recent studies have shown that the number of innovations has been emerged in food industry. The innovation strategies need to be based on the ease of utilisation, Profitability, amount of power consumption etc. Mixing, Cooling and Heating are the key steps in the processing industry. Here the complexity of the heating and cooling process is reduced and compressed as a single machinery where the uniformity of cooling and heating is achieved. Mixing operation along with the scrapper is the key tool in the food processing to ease the process. Designing an equipment in such a way is promising to suffice the consumer needs, thereby increasing the profitability. We have presented a few list of innovation it has uniqueness in the different aspects such as convenient, maintenance, fabrication cost and energy consumption.

**Keywords** —Innovation, food processing equipment, food industry, design a mixer disparted with scraper tool, wasser cooler with TEG module, spiral dough with Bluetooth H6C0, conveyor belt with extra pulley, shell and tube plate heat exchanger.

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## I. INTRODUCTION

Innovation in the food industry is the action that combines technological innovation with social and cultural innovation. Innovation can be done entire food system, including production, harvesting, primary and secondary processing, manufacturing and distribution. It has long been recognized that the innovation process involves the interlocking actions of diverse organizations, institutions, and people. Especially when major technological innovation is being proposed, initiated, adopted, and implemented. The ultimate innovation is a new or improved consumer product and service. Innovations can be focused in one area of food technology, for example process engineering, product formulation, food qualities or consumer

needs. Food industry innovation strategies need to be based on the total technology in the food system and concerned not only with the technological changes but also with the social and environmental changes. In order to be most useful and generalizable, an industry focus must attend to the theoretical concerns of this research area. In particular, four lingering issues appear to be central to any theory of organizational innovation. These issues need resolution and integration regardless of thematic approach. First, what is the stimulus or motivation for innovation? Performance gap theories appear to be the most frequently discussed in this regard. Second, how does one reconcile the apparent contradictions in the literature concerning the relative importance of market stimulus (Utterback, 1974; Von Hippie, 1976) versus technological opportunity or push (Mowery &

Rosenberg, 1979; Utterback& Abernathy, 1975) within the context of the performance gap theories? The question that remains is how the need to close a performance gap is translated into innovative action rather than some other strategy. Third, once the need for innovation as a strategic choice has been recognized, what capabilities are necessary for action? The results obtained on large organization innovations (Moch& Morse, 1977), which suggest a slack resources proposition, and theories on the importance of concentration of specialists (Hage, 1980) seem important here. Fourth, how do the strategic policy and structure of an organization as influenced by the organization's environment enter into an integrated theory of the innovation process? These are the four issues that are subsequently addressed in the course of developing propositions for testing and interpretation of the results of this study. At present, equipment manufacturers drive innovation in food production equipment. These innovations include a small change in the existing models. These incremental changes include better temperature control and air flow, less energy use through a combination of different energy sources and better heat conduction, improved cleanability and ergonomics. The transference of technology to the products is realized in the different steps of their process of development. However, it is observed that in national companies, that transference happens in a very reduced way, and it leads to the improvement of the already made products, fitting them to the local market needs, to the supplier's structure and to the available production process (AMARAL, 2005). Mueller et al. (1979) have found that the large percentage of innovations (44 percent) among food processor customers are from small food equipment suppliers. The productivity of food processing companies was found to be very positively affected by these innovations, even though the food industry is very mature and capital-intensive (Abernathy, 1978). It is not surprising that several studies have found that mergers and joint ventures between small and large firms occur primarily for innovating purposes (Globerman, 1975; Hlavacek, Dovey, & Biondo, 1977; Owen, 197). The paper analyses technological challenges specific to each of them and shows how they can be

managed with innovation. It then goes to describe possible future advances based on current and future trends in science and technology.

## **II. INNOVATIVES IDEA**

### **1. Designing of mixer imparted with scrapper tool.**

The scrapper is an indispensable tool. The use of scrapers in batch mixing operations helps improve product homogeneity and heat transfer efficiency. However, there are cases wherein scrapers are not recommended such as in the processing of abrasive applications or highly viscous, sticky materials. The Bowl Scraper is used in conjunction with the beater or Wire Whip agitator. The Bowl Scraper is easily attached to the mounted bracket when required; while the agitator is mixing the product the scraper is continuously scraping the entire inside of the mixing bowl. The Bowl Scraper is used in conjunction with the beater or Wire Whip agitator. The Bowl Scraper is easily attached to the mounted bracket when required; while the agitator is mixing the product the scraper is continuously scraping the entire inside of the mixing bowl.

## **BENEFITS/SOLUTIONS**

### **Supports Food Safety**

- Minimizes direct contact with batter/product during mixing by eliminating hand scraping
- Improved Sanitation
- Easy to remove arm for thorough cleaning and sanitation procedures
- Reduces Labour
- Eliminates the task of stopping mid batch to laboriously
- Scrape product from inside of bowl
- Reduces Recipe Time
- No more stopping during mixing time
- Most recipes can have multiple steps reduced by use of the bowl scraper
- In most cases, reduces time required for initial incorporation of ingredients

- Increased Productivity
- With reduced labour time and recipe time, more time can be scheduled for additional batches and/or other assignments
- Provides Product Consistency
- Continuous scraping provides more consistent product
- Results, batch after batch
- Durability
- Urethane elastomer scraper is replaceable and attaches
- To sturdy, long life, stainless steel wiper arm
- Easy to Use
- Effortless, continuous scraping with simplistic one step procedure to remove for cleaning and replacement
- specifications
- must be used with stainless steel bowls
- Not for use with heavy dough products such as bread and pizza dough.

## **2.WASSER COOLER USED TEG MODULE.**

### **Existing Model:-**

Only for cooling

- ✓ It takes more electricity
- ✓ Uniformity cooling not takes place.
- ✓ Large in size.

### **Innovation in Our Equipment:-**

- ✓ Both cooling and drying of the product
- ✓ Uniform distribution of cooling the product
- ✓ Solar energy is used
- ✓ Charged battery also attached to the equipment.
- ✓ No uses of chemical like HCF, NITROGEN GAS etc.
- ✓ Monitoring the equipment
- ✓ IR sensors at used to monitoring the equipment
- ✓ LCD screen also attached to the equipment. The screen is used to display the temperature, drying time and weight of the product and input voltage.
- ✓ It Can be carried along when travelling outdoors

### **Benefits of Modification:-**

- ✓ Eco friendly
- ✓ Cost efficient
- ✓ Power can be saved
- ✓ Easy handling
- ✓ Both drying and cooling takes place
- ✓ Energy Efficiency increased by Peltier plates
- ✓ The cooler is used to store the marine products, bloods and pharmaceutical, vegetables and also dairy products like milk in small scale industry.
- ✓ It is portable system

## **3.DESIGN OF RICE PUFFING MACHINE:**

Generally, rice puffing machines operates by use of sand. Here, instead of using sand we selected salt which results in reduction of foreign particles from the prepared product. The salt is a very good heat storing agent which is also used in concentrated solar power plants where salt can store heat obtained from sunlight for long period of time. So, our idea is to design a machine operate under solar and electrical means. Salt is placed in a machine such that sunlight falls on it and gets heated up where the heat is circulated with the help of blowers in machine. This result is less power consumption and heat transfer loss.

### **CURRENT METHODS OF MANUFACTURING:**

- Hot sand puffing
- Cannon gun puffing
- Machine puffing

### **ADVANTAGES:**

- Domestic product that is compact and portable.

## **4. PORTABLE HEATING MEDIUM (PAN) BASED ON SOLENOID PRINCIPLE:**

A portable cooking utensil having self-contained heating features for cooking food without requiring gas or electric includes a handle having a chamber

for storing therein batteries, the handle projecting from a cooking body that has heating coils and cooling fan embedded within the body and the coils forming an electrical circuit with the batteries that are controlled by on/off switch mounted on the handle so that switching the switch to the on position causes food placed within the utensil to be cooked from the heat generated in the coils and then it can be cooled with the cooling fan and conducted through the body of the utensil to the food.(US20070..)

Solenoids are simple components that can be used for various applications. It is a long piece of wire which is wound in the shape of coil. When the electric current passes through the coil it creates a relatively uniform magnetic field inside the coil. The solenoid can create a magnetic field can be used to generate a linear motion with the help of a metal core. In the presence of a high frequency, eddy currents greatly increase that can be used for ovens, hot plates. The simple device can be used as an electromagnet, as an inductor.

#### **INNOVATIONS:**

- High the efficiency of the machine,
- Heating and cooling can be done in the same medium.
- Based on the product we can be cooled by using the cooling coil.
- Easily Portable.
- minimized amount of power required.

#### **5.Design of Spiral Dough Mixer and Evaluating The Application of Bluetooth HC06 and Arduino to Control it's Process**

The function of spiral dough mixer is to gently mix bread dough allowing to develop the proper gluten, structure while not over working the dough. This is achieved because the bowl of the mixer rotates as the spiral hook is spinning and kneading the dough. To make this a modernized system the connecting system(Bluetooth) is used, to access a data from the mixer. there are several types of bluetooth modules

that are designed to control various appliances. These modules are based on several specifications. Based on which they perform the operations that are related to it. One of it's specifications is that they work within a range of 45 meters and will operate 2.4 GHz frequency. Using this we are designing a home automation system which works with help of Bluetooth technology. The Bluetooth module that is used here is HC06.

#### **INNOVATION**

- combine the mechanical prototype with electronic device arduino (hardware and software) to access a data
- enable us to edit and save data

#### **ADVANTAGE**

- Easy to handle a equipment using a android platform
- Quick access of data

#### **6. COVEYER BELT**

The conveyor belt is used to carry a material from one area to another area inside or outside the industry hence this study provides design data base for the development of a reliable and efficient belt conveyor system that will reduce cost and enhance productivity while simultaneously reducing dangers to workers operating them. It is easier, safer, faster, more efficient and cheaper to transport materials from one processing stage to another with the aid of material handling equipment devoid of manual handling

#### **INNOVATION**

- Providing extra pulley that increase an efficiency of the working conveyor

#### **ADVANTAGE**

- Provide stiffness to the conveyor
- Longer work efficiency
- Simple method

## 7. DESING OF SHELL AND TUBE HEAT EXCHANGER

The heat equipment used for transfer a heat from one medium to another medium. the thickness of flanges and tube sheet alternative which increase the heat transfer rate

### INNOVATION

- By decreasing the thick of the shell tube ,the efficiency of heat transfer will increase

### ADVANTAGE

- Increase efficiency up to 10%
- Increase heat transfer of rate

### III CONCLUSION

In conclusion food processing industry is not only providing food but have certain detrimental effect on environmental and health which can be reduced by the efficient and also safe use of the resources proper waste treatment and minimal processing methods. In this equipments are specially designed for maintenance,convienent,easily used and energy consumption.It has seen significant growth and changes over the past few years, driven by changing trends in markets, consumer segments and regulations such as changing demographics, growing population and rapid urbanisation are expected to continue in the future.

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