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# IMPROVEMENT REGARDING TT AUTO COMPONENT

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**ABSTRACT**

**In TT autocomponents industry we observe the operations and find some points where we can improve production rate and customer satisfaction by using sensors. These sensors will detect correct position of the battery container and transmit signals to the power button of machine. By this process machine will not start if the battery container is not placed properly. The global automotive battery market size was valued at USD 48.71 billion in 2016. The market is expected to witness significant growth over the coming years owing to rapid expansion in automotive industry. The objective of project is to increase production rate and deliver quality products to the costumer. Using methodology by placing sensors on punching machine we can detect the correct position of the battery container.it helps to drill holes on proper side and minimize wastage.**

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## I. INTRODUCTION

TT Autocomponent Pvt. Ltd. is a plastic moulding industry placed in chakan MIDC in pune. It is established in 2006. It is small scale industry which produces battery and supplies to different vendors. It supplies its products to EXIDE and SF SONIC companies.

In the TT AUTOCOMPONENT PVT LTD. manufactures battery casing by using of injection moulding machine .There are main SEVEN departments are follows,

- Office
- Storeroom
- Raw material department
- Quality department
- Production department
- Maintenance department
- Tool & diedepartment

In this company we have observed various departments and find some problems which can affect company production and loss regarding to company. For these problems we have suggested some solutions to the company, problems and detailed solution is discussed given below.

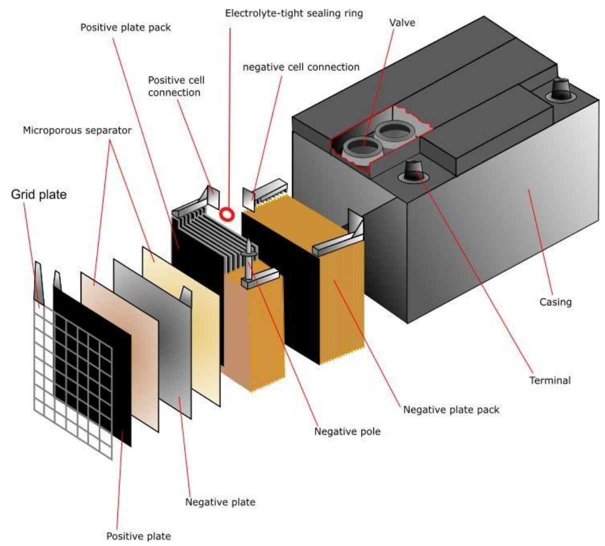


Figure 1.1: Detailed View of Battery

The lead acid battery is the most used battery in the world. The most common is the battery used for motor vehicles for engine Starting, vehicle Lighting and engine Ignition, however it has many other applications (such as communications devices, emergency lighting systems and power tools) due to its cheapness and good performance.

It was first developed in 1860 by Raymond Gaston Planté. Strips of lead foil with coarse cloth in between were rolled into a spiral and immersed in a 10% solution of sulphuric acid. The cell was further developed by initially coating the lead with oxides then by forming plates of lead oxide by coating an oxide paste onto grids. The electrodes were also changed to a tubular design. To solve defect occurring in sheet metal die/punch while operating for long time and improving its life span.

**Problem statements:** We observed various problems in various departments in company they are

1. Wrong Punching of hole on battery container.
2. Maintaining 5s.
3.Customer complaint comes frequently due to vent stopmissing.

4. Colour variations.

## II. LITERATURE SURVEY

**Olivier Saint-Pea, Michel Tuleta, Robert Davancensa, Franck Larnaudiea, Pierre Magnanb, Philippe Martin-Gonthierb, Franck Corbiereb, Pierre Belliotb,"**Research-grade CMOS image sensors for remote sensing applications"
Imaging detectors are key elements for optical instruments and sensors on board space missions dedicated to Earth observation (high resolution imaging, atmosphere spectroscopy...), Solar System exploration (micro cameras, guidance for autonomous vehicle...) and Universe observation (space telescope focal planes, guiding sensors...). This market has been dominated by CCD technology for long. Since the mid-90s, CMOS Image Sensors (CIS) have been competing with CCDs for consumer domains (webcams, cell phones, digital cameras...). Featuring significant advantages over CCD sensors for space applications (lower power consumption, smaller system size, better radiations behaviour...), CMOS technology is also expanding in this field, justifying specific R&D and development programs funded by national and European space agencies (mainly CNES, DGA and ESA). All along the 90s and thanks to their increasingly improving performances, CIS have started to be successfully used for more and more demanding space applications, from vision and control functions requiring low-level performances to guidance applications requiring medium-level performances.
**Jan-Friedrich Ehlenbröker, UweMönks, and Volker LohweginIT,"Sensor defect detection in multisensory information fusion,"**
In industrial processes a vast variety of different sensors is increasingly used to measure and control processes, machines, and logistics. One way to handle the resulting large amount of data created by hundreds or even thousands of different sensors in an application is to employ information fusion systems. Information fusion systems, e.g. for condition monitoring, combine different sources of information, like sensors, to generate the state of a complex system. The result of such an information fusion process is regarded as a health indicator of a complex system. Therefore, information fusion approaches are applied to, e.g., automatically inform one about a reduction in production quality, or detect possibly dangerous situations. Considering the importance of sensors in the previously described information fusion systems and in industrial processes in general, a defective sensor has several negative consequences. It may lead to machine failure, e.g. when wear and tear of a machine is not E2detected sufficiently in advance.
**Min-WoongSeo, Keita Yasutomi ,Keiichiro Kagawa and Shoji Kawahito,"A Low Noise CMOS Image Sensor with Pixel Optimization and Noise Robust Column-parallel Readout Circuits for Low-light Levels"**
A low noise high sensitivity CMOS image sensor (CIS) is developed for low-light levels. The prototype sensor contains the optimized 1-Mpixel with the noise robust column-parallel readout circuits. The measured maximum quantum efficiency is approximately 60% at 660nm, and the long-wavelength sensitivity is also enhanced by a large sensing area and an optimized process. In addition, a low dark current of 0.96pA/cm2 at 292 K, a low temporal random noise in a readout circuitry of 1.17erms, and a high pixel conversion gain of 124μV/e- are achieved. The implemented CMOS imager using 0.11 μm CIS technology with a pinned photodiode has a very high sensitivity of 87V/lx·sec that is suitable for the scientific applications such as medical imaging, bioimaging, surveillance cameras, and so on.
**Syed SibghatullahQuadri1, Syed Sameer2, PathanJawwad Khan3, Shaikh Shoeb4,"Paper**
**Daniel Bebiano and Sadek C. A. Alfaro, "A Weld Defects Detection System Based on a Spectrometer,"**
Improved product quality and production methods, and decreased production costs are important objectives of industries. Welding processes are part of this goal. There are many studies about monitoring and controlling welding process. This work presents a non-intrusive on-line monitoriment system and some algorithms capable of detecting GTAW weld defects. Some experiments were made to simulate weld defects by disturbing the electric arc. The data comes from a spectrometer which captures perturbations on the electric arc by the radiation emission of chosen lines.

## III. METHODOLOGY

**Project Overview:**
**Company Details:**
Name of company : TT Autocomponentpvt.ltd
Name of Business : Manufacture / supplier
Company product : Battery container, lead, Blind plug, Handle, VCC.
Machine availability : Injection moulding machine-80 ton, 120 ton, 150 ton.

**Case Study Area:**

The case study area is in the company. Various machines are studied and find problems related to this company and the solutions are adopted after studying various factors the proper solution is finalized.

***Injection Moulding machine:***

The injection molding process is increasingly being used in the manufacture of complex net shaped parts of industrial and domestic electronic and electrical appliances. Designers are taking advantage of improvements in the process capability and engineering materials by consolidating multiple parts and functions into complexparts.

Injection moulding uses a ram or screw-type plunger to force molten plastic material into a mould cavity; this solidifies into a shape that has conformed to the contour of the mould Injection moulding consists of the high pressure injection of the raw material into a mould which shapes the polymer into the desired shape Moulds can be of a single cavity or multiple cavities. In multiple cavity moulds, each cavity can be identical and form the same parts or can be unique and form multiple different geometries during a single cycle. Moulds are generally made from tool steels.Many steel moulds are designed to process well over a million parts during their lifetime and can cost hundreds of thousands of dollars to fabricate.

Figure: Injection Moulding Machine

***Equipments of Injection Moulding:***

Injection moulding uses a ram or screw-type plunger to force molten plastic material into a mould cavity; this solidifies into a shape that has conformed to the contour of the mould. It is most commonly used to process both thermoplastic and thermosetting polymers, with the volume used of the former being considerably higher. Thermoplastics are prevalent due to characteristics which make them highly suitable for injection moulding, such as the ease with which they may be recycled, their versatility allowing them to be used in a wide variety of applications, and their ability to soften and flow upon heating. Thermoplastics also have an element of safety over thermosets; if a thermosetting polymer is not ejected from the injection barrel in a timely manner, chemical crosslinkingmay occur causing the screw and check valves to seize and potentially damaging the injection moulding machine. Injection moulding consists of the high pressure injection of the raw material into a mould which shapes the polymer into the desired shape. Moulds can be of a single cavity or multiple cavities.

In multiple cavity moulds, each cavity can be identical and form the same parts or can be unique and form multiple different geometries during a single cycle. Moulds are generally made from tool steels, but stainless steels and aluminium moulds are suitable for certain applications. Aluminium moulds are typically ill-suited for high volume production or parts with narrow dimensional tolerances, as they have inferior mechanical properties and are more prone to wear, damage, and deformation during the injection and clamping cycles; however, aluminium moulds are cost-effective in low-volume applications, as mould fabrication costs and time are considerably reduced Many steel moulds are designed to process well over a million parts during their lifetime and can cost hundreds of thousands of dollars to fabricate. When the rmoplastics are moulded, typically pelletised raw material is fed through a hopper into a heated barrel with a reciprocating screw.

Upon entrance to the barrel, the temperature increases and the Van der Waals forces that resist relative flow of individual chains are weakened as a result of increased space between molecules at higher thermal energy states. This process reduces its viscosity, which enables the polymer to flow with the driving force of the injection unit. The screw delivers the raw material forward, mixes and homogenisesthe thermal and viscous distributions of the polymer, and reduces the required heating time by mechanically shearing the material and adding a significant amount of frictional heating to the polymer. The material feeds forward through a check valve and collects at the front of the screw into a volume known as a shot. A shot is the volume of material that is used to fill the mould cavity, compensate for shrinkage, and provide a cushion (approximately 10% of the total shot volume, which remains in the barrel and prevents the screw from bottoming out) to transfer pressure from the screw to the mould cavity. When enough material has gathered, the material is forced at high pressure and velocity into the part forming cavity. The exact amount of shrinkage is a function of the resin being used, and can be relatively predictable. To prevent spikes in pressure, the process normally uses a transfer position corresponding to a 95–98% full cavity where the screw shifts from a constant velocity to a constant pressure control. Often injection times are well under 1 second. Once the screw reaches the transfer position the packing pressure is applied, which completes mould filling and compensates for thermal shrinkage, which is quite high for thermoplastics relative to many other materials. The packing pressure is applied until the gate (cavity entrance) solidifies. Due to its small size, the gate is normally the first place to solidify through its entire thickness. Once the gate solidifies, no more material can enter the cavity; accordingly, the screw reciprocates and acquires material for the next cycle while the material within the mould cools so that it can be ejected and be dimensionally stable.

***Mould:***

Mould or die are the common terms used to describe the tool used to produce plastic parts in moulding. Since moulds have been expensive to manufacture, they were usually only used in mass production where thousands of parts were being produced. Typical moulds are constructed from hardened steel, pre-hardened steel, aluminium, and/or beryllium-copper alloy. The choice of material to build a mould from is primarily one of economics; in general, steel moulds cost more to construct, but their longer lifespan will offset the higher initial cost over a higher number of parts made before wearing out. Pre-hardened steel moulds are less wear-resistant and are used for lower volume requirements or larger components; their typical steel hardness is 38–45 on the Rockwell-C scale. Hardened steel moulds are heat treated after machining; these are by far superior in terms of wear resistance and lifespan. Typical hardness ranges between 50 and 60 Rockwell-C. Aluminiummoulds can cost substantially less, and when designed and machined with modern computerised equipment can be economical for moulding tens or even hundreds of thousands of parts. Beryllium copper is used in areas of the mould that require fast heat removal or areas that see the most shear heat generated. The moulds can be manufactured either by CNC machining or by using electrical discharge machining processes.

***Mould design:***

Primary components, the injection mould (A plate) and the ejector mould (B plate). These components are also referred to as moulder and mouldmaker. Plastic resin enters the mould through a sprueor gate in the injection mould; the sprue bushing is to seal tightly against the nozzle of the injection barrel of the moulding machine and to allow molten plastic to flow from the barrel into the mould, also known as the cavity. The sprue bushing directs the molten plastic to the cavity images through channels that are machined into the faces of the A and B plates. These channels allow plastic to run along them, so they are referred to as runners .The molten plastic flows through the runner and enters one or more specialised gates and into the cavity geometry to form the desired part.

Figure : Mould Cavity

The amount of resin required to fill the sprue, runner and cavities of a mould comprises a "shot". Trapped air in the mould can escape through air vents that are ground into the parting line of the mould, or around ejector pins and slides that are slightly smaller than the holes retaining them. If the trapped air is not allowed to escape, it is compressed by the pressure of the incoming material and squeezed into the corners of the cavity, where it prevents filling and can also cause other defects. The air can even become so compressed that it ignites and burns the surrounding plastic material.

To allow for removal of the moulded part from the mould, the mould features must not overhang one another in the direction that the mould opens, unless parts of the mould are designed to move from between such overhangs when the mould opens (using components called Lifters).

## IV. CONCLUSION

On the basis of all the information gathered and fulfilling the industry need for the project till now we can conclude that customer satisfaction is the much bigger and one of the most important parameter to be taken under consideration. As working for an automobile industry we learned how the time, cost, accuracy and efforts are important. If investing a little now is going pay later then it is a right move likewise tool used is if coated before the actual implementation on the machine. Though process is well known but it has its own limitations related to complexity. The production rate of company increased and costumer complaints are minimized. The colour variation in container of battery is regulated by using dosing unit and the number of rejection are controlled. The ventstop missing problem is inspected at the time of manufacturing.

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