Electromagnetic Casing To Extract Metal Waste

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Abstract—You may be familiar with permanent magnet but other type of magnet called as Electromagnet can be turned on or off? Wherever it necessary. When turned on, electromagnet act just like permanent magnets, but when it turns them off, their magnetic properties disappear. Electromagnets are an important part of many electronic devices like motor, loudspeakers and hard drives. You can create a simple electromagnet by simple coil of wire and a battery. In this project reveals the usage of electromagnet in the part of pulp flowing pipelines in pulping section. We will explore whether the efficiency of electromagnet metal waste extraction in paper making process by extract the amount of staple pins extracted from pulp. In this we will make an electromagnet by winding a coil over the casing and make it energized to collect the metal waste on pulp.

Keywords—*electromagnet, coil winding, casing.*

I. INTRODUCTION

Electromagnets or magnets that use the magnetic field created by electrical current flowing through a wire, lies at the heart of many electrical device, ranging from simple things like door bells to complex machines, like particle accelerator. The strength of electromagnet various, but some electromagnets are strong enough to lift entire trains! So how does an electromagnet work? How do electric current- the movement of electric charges- make a magnet? When electric current flows through a wire, it creates a magnetic field. You can prove this to yourself with a magnetic compass. The magnetic field around a straight wire is not very strong but if the wire is wrapped in a coil, the field produced in each turn of the coil add up to create a stronger magnetic field. When the coil is wrapped in the shape of a cylinder, it is called a solenoid.

If an electromagnet consist only of coiled wire (if it has nothing but air in its middle) then the magnet will not be very strong. But if you place a piece of iron in the middle of the coil-an iron bolt, for example-then the piece of iron, called the magnetic core or iron core of the electro magnet, will make the magnetic field much stronger .this because iron is ferromagnetic. It contains lot of tiny areas, called magnetic domains that act like small magnets. As soon as the iron core is placed in the coil, the magnet domains line up with the magnetic field made by the coiled wire solenoid. As a result, the strength of the magnetic field around the solenoid greatly increases.

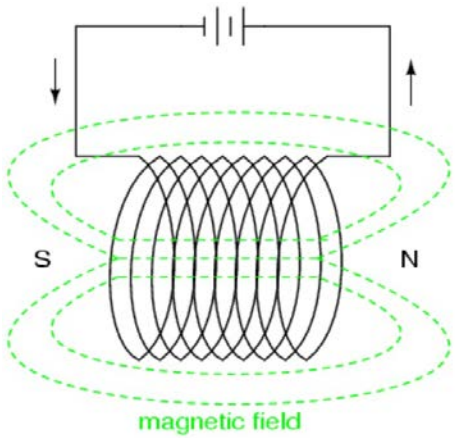


Fig 1: The green Show the magnetic field surrounding solenoid or cylindrical coil through which electric current is flowing. “N” and “S” indicate the north and south pole of the electro magnet.

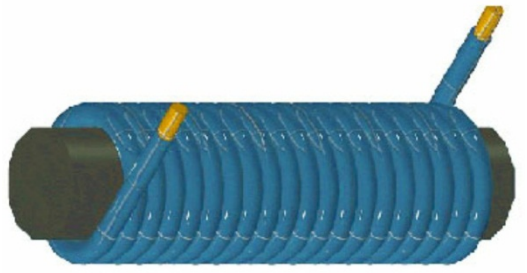
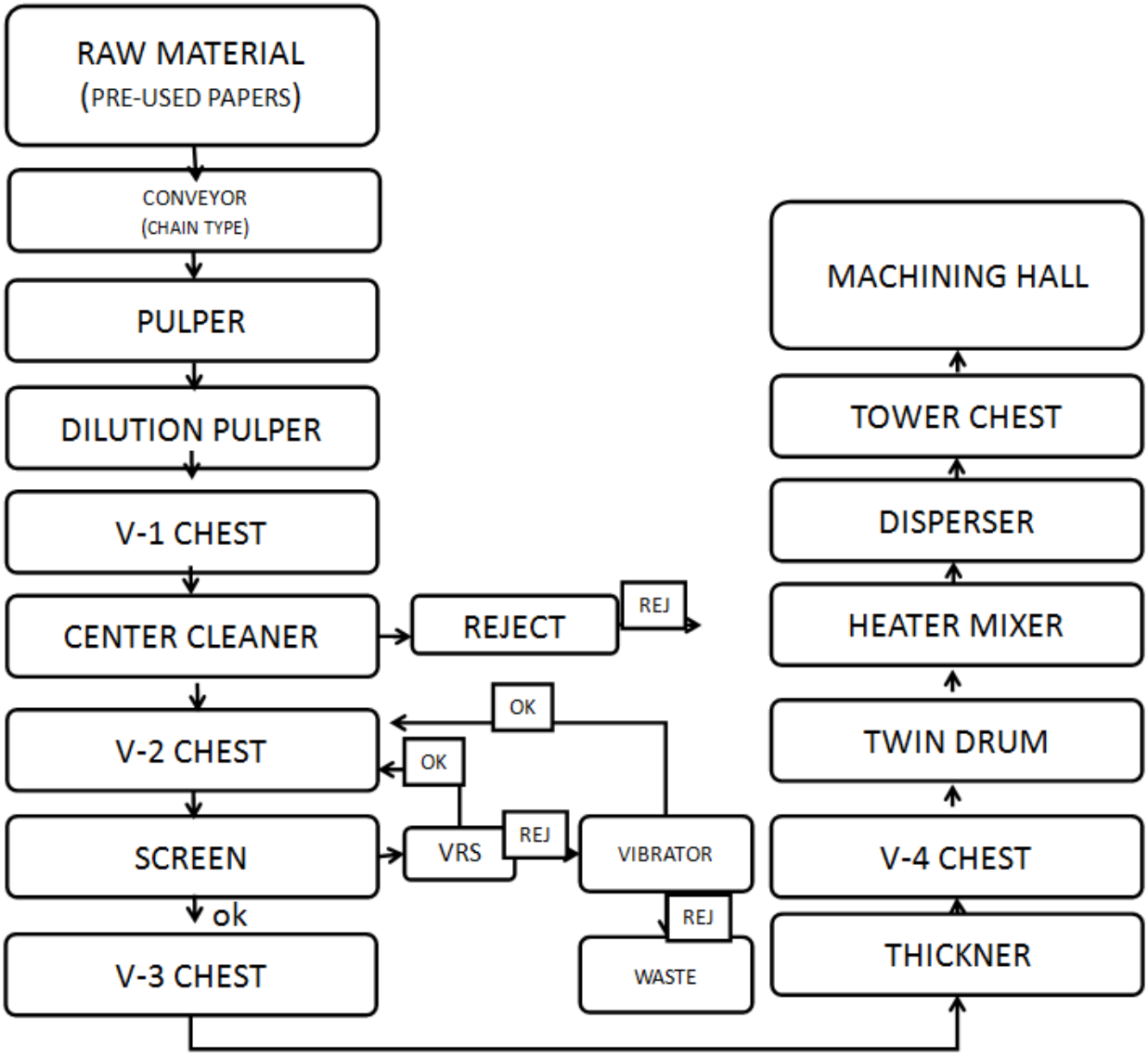


Fig 2: Insulated wire (blue) wrapped around an iron core (black). Electric current flowing through the wire creates a magnetic field, a field that is magnified by the iron core.

II. WORKING

Electromagnetic casing works on the basis of electromagnetic action in which metal having ferrous as it major concentration gets attracted to a magnet when it exposed to an electric field. The Pulp which flows from the pulper is made to flow through the electromagnetic casing in

III. PRE - PROCESSING (PULPING SECTION)



such manner that it get contacted with the coil winding wounded over the casing. While entering the casing the pulp gets electromagnetised due to the energizing of the electromagnetic coil and it gets attracted towards the winding and it is collected in to a pin collector separately wounding of coil is given only between the two flange and get insulated which makes attraction of metal impurities present in the pulp at that region due to generation of high magnetic force. Meanwhile the flanges are fastened with bolt and nuts. Thus it makes an effective process in collecting the metal impurities present in the pulp by miscellaneous parameters. The flanges are connected very oblique manner that there is no resistive to the flow of the pulp inside that chamber. Industrial power which is normally send in all sector is enough for operating this system. rubber insulation is mainly given to all the edges of the casing to avoid attraction at unwanted areas and to present heat generation at the chamber.

IV. CONCLUSION

The extraction of impurities from pulp has already been implemented in practice, but their perfection is not much as the required rate that they do not fully purify the pulp due to its dense medium and high viscosity and in so many

aspects.in our project we implemented an electromagnet casing which purifies the pulp in high efficiency. Although the process parameter is affordable we also find minor difficulties in designing the dimensions of the rubber insulation which we will improve in future. Meanwhile the process variables are very much convenient to operate of the cost parameter is affordable.

V. CALCULATION

Coil parameter calculations		
Input		
Wire diameter	1	Mm
Number of turns	1000	Nos
Casing length	300	Mm
Casing diameter	350	Mm
Rated dc current	12	Amps
Output		
Turns/winding	300	Turns/winding
Number of winding	3.333	Winding
Coil diameters	356.667	Mm
Cross section area	98052.6	Mm^2
Total length of wire in coil	1110.029	M
Resistance / meter	0.022	Ohms/m
Resistance	24.371	Ohms
Voltage at rated current	292.464	V
Power at rated current	3509.565	W

VI. DESIGN