Asian Review of Mechanical Engineering
ISSN: 2249 - 6289 Vol. 8 No. 1, 2019, pp. 21-27

Design, Analysis and Fabrication of Hydraulic Scrap Baling Machine

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Abstract **- There are several industrial production processes that involve mechanical machining of cast parts by various operations such as turning, milling, and drilling. Metal Chips, especially of aluminum, mild steel and cold-rolled carbon steel, etc. The collection, storage, and transportation of metal chips are an important aspect in the process of recycling. This project focuses on the compaction and creation of metal chips bales for ease of storage as well as handling and transportation of metal chips. Efforts have been taken to ensure an efficient waste management system in shop floors, with minimum use of space and energy when it comes to disposing of metal chips formed during machining processes. The large space required to store the chips as loose chips have a large surface area. The scope of the project is limited to the design, analysis, and fabrication of scrap baling machine. A Baling press machine is a machine in which a loose scrap is converted into in the form of 8-12 kg bundle. In this machine, we adopt a square bundle rather than circular shape and square bales acquire less space as compared to the round bales.**
Keywords**: Hydraulics, Scrap Baling, Steel Scrap, Pascal's Law**

I. INTRODUCTION

Nowadays, the development of economy and society is facing the exhaustion of primary resources and the crisis of traditional energy. The green economy and circular economy has become a new trend of global sustainable development [1]. As a kind of important energy-saving and emission reduction and renewable resources, scrap iron and steel have received great attention [2-4]. It has a very important practical significance that the scrap iron and steel resources had been effectively exploited and used to save resources and protect the environment.

At present, the scrap ratio in the iron and steel industry of developed countries had increased to more than 40-50% [3, 4]. In China, by contrast, it only maintained at a very low level of 14-23%. So the utilization of steel scrap had become a long-term strategic policy for the reform and development of the iron and steel industry in China [3, 4]. The scientific classification processing of steel scrap and the scrap concentrate steelmaking which has yet to be resolved had become an important issue in the metallurgical industry.

In recent years, although the sort and measure of scrap steel processing equipment are increasing, the requirement of social development has not been satisfied in China. The backward equipment in the iron and steel scrap processing had stood in the way of the iron and steel production enterprise stepping forward. It is a vital reason also that the increase in scrap ratio was restricted in the iron and steel industry [4]. Meanwhile, with the development of economic modernization, kinds of scrap steel became more and more, such as large structures, containers, waste planking and so on, which is difficult to process. So larger processing capacity and range of working limits were proposed to be used in the scrap processing equipment [4]. In a developed country, oil-hydraulic scrap baling press is developing towards large-scale which has reached more than 1500 tons for processing capacity. Therefore, it is one of the effective ways that sustainable development in the iron and steel industry will be promoted by the development of large-scale, automated, high-efficiency scrap processing technology and equipment.

All in all, both processing method of steel scrap and the mechanical equipment for processing steel scrap is not as advanced as that in developed countries [3]. The steel scrap in China is still mainly processed by manpower and simple mechanical device. Moreover, additional encouragement for investment in scrap steel industry would be beneficial [3]. The needs for heavy oil-hydraulic scrap baling press had existed in the domestic market, combining with the real situation in China.

II. THEORY

Mechanical manufacturing processes are major of two types one is additive manufacturing and another is subtractive manufacturing. Subtractive manufacturing is the most widely used manufacturing process. In this method, the material is removed from a block or bar provided to get the desired shape and size with controlling its dimensions. this method consists of different processes like turning, facing, boring, milling, etc. these processes are carried out on different types of pieces of machinery like lathe machine, CNC machine, VMC machine, milling machine, drilling machine, etc. these all machines removes material into the chip forms. The chips formed in different processes having different nature in terms of shape size and length etc. the scrap chips is the major waste product produced in every mechanical manufacturing industry

A baling machine is a device used to compress materials into a bale form which is easy for storage, transport, and