Computational Design And Analysis of Scrap Compression Machine

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Abstract- *The pneumatic compression machine has gained a large amount of importance in last few decades. This importance is due to its accuracy and cost. This convenience in operating the pneumatic system has made me to design and fabricate this unit as my project. This unit, as we hope that it can be operated easily with semi-skilled operators. that is even a pressure of 6 bar is enough for operating the unit. The pressurized air passing through the tubes to the cylinder, forces the piston out whose power through the linkage is transmitted to the punch. The work piece thus got is for required dimensions and the piece can be collected through the land clearance provided in the die. The die used in this is fixed such that the die of required shape can be used according to the requirement. This enables us to use different type dies resulting in a wide range of products. According to the work material the operating pressure can be varied. The scrap collected from various industries can be recycled and reused for different purposes, the transportation of the metal scrap is difficult for industries because of the weight and shape is irregular with use of scrap compression machine helps to reduce the shape and weight of the scrap as it compresses using pneumatic compressor according to the shape of the die and after compression it is easy to load in the trucks to transport and with the reduction of size and weight more number of scraps can be loaded in a truck.*

Keywords*:* Pneumatic, Compression, Scrap, Recycle, Reuse

I. INTRODUCTION

The press is the compressing machine tool designed to shape or compress metal chips by applying mechanical force or pressure. The metal is formed to the desired shape without removal. The presses are exclusively intended for mass production and they represent the fastest and more efficient way to form a sheet metal into a finished product by using auto feed mechanism. Press tools are used to form and cut thin metals. Press tools operation can be simplified to a few simple operations involving a punch a die. Recycled metals are becoming increasingly important as industry responds to public demands that resources be conserved and the environment be protected. Change in technology, such as increased use of electric arc furnaces in steel making have been important contributors to this response.

There are Numerus types of presses in engineering field, which are used to fulfill the requirements. We are interested to introduce pneumatic system in presses. The main function of pneumatic press is to form or cut thin sheet metals or non metals using pneumatic power. In this project we have use danon metal sheet for simple application. This machine objective is to reduce the wastage of scraps also with low of cost so it can be also used by small scale industries, according to the weight and size the machine can be scaled and can be applied to use the machine. Hydraulic machine will be much powerful than the pneumatic but in such cases it will also increase in cost too.

The essential demands of modern waste management are to reduce the total amount of waste arising and to reuse and recycle as much of the waste as possible. In many fields of recycling, it is difficult to meet these requirements because the recovered products are often of reduced quality and hence value.

Fig.1: Metal frame cutting

II. RELATED WORK

ManarE.AbdulRaoufetal(2010)[17]observedthatScraptyresa ndusedlubricating oils represent together growing environmental problem because they are not biodegradable and their components cannot readily be recovered. In the present investigation, the thermochemical recycling of mixture of old tyres with waste lubricating oil by pyrolysis and the value of the products obtained have been studied.

Pratima Meshram et al (2014) [29] the analyzed that the problems and the prospect of the studies of their recycling

technologies especially focused on the hydrometallurgical and pyrometallurgical processes have been put forward. The future avenues in spent battery recycling are also discussed with respect to the directions of research needed for their sustainable utilization and environmental management.

Erfan Abbasi et al (2017) [37] Observed that the progressive wear due to abrasive, adhesive and oxidation wear was observed in both blades. In NiCrVMo-steel blades, spalling and crack propagation from surface/subsurface white etching layers mainly caused the severe wear. However, spalling due to delamination wear and crack propagation from severely deformed subsurface layers was the dominant severe wear mechanism in CrB-steel blades.

JirangCUIetal(2010)[19]Literaturesurveyshowsthatnewlydev elopedtechniques such as laser induced break down spectroscopy (LIBS) and solid state recycling provide promising alternatives in aluminum scrap process. Compared with conventional remelting and subsequent refinement, solid state recycling utilizing compression and extrusion at room or moderate temperature can result in significant energy savings and higher metal yield.

Hiroki Hatayama et al (2012) [24] The results of these investigations show that the introduction of electric vehicles leads to a decrease in the demand for cast alloys, which generates 6.1 Mt of unrecyclable scrap in 2030. The results also indicate the effectiveness of scrap sorting in the future: if scrap sorting is carried out for end-of-life vehicles, it mitigates the generation of unrecyclable scrap and reduces the primary aluminum requirement by15–25%

Hajime Ohno et al (2015) [34] Analysing the data, it was found that sorting ELV-dSS by parts can result in a significant recovery of AEs; more specifically, a 10-fold saving in AEs was achieved by sorting exhaust parts. The recoverable mass of AEs from sorted ELV-dSS was found to correspond to 8.2% of the annual consumption of AEs in Japan, as virg in resources in EAF steel making. ELV-dSS sorting was found to be significantly effective in the conservation of AE resources

M.Samuel (2003) [10] Experimental results obtained show that the direct technique for recycled aluminium provides high productivity and about 80% green density (before sintering).In addition the new technique very slow air pollution emission and metal saving as compared with conventional method.

ScottF.Sibleyetal(1995)[03]Observedthathefactorsmostinflu entialonrecycling rates are profitability, public support, organization of infrastructure, sortability, legislative support, and scrap purity. The share of supply accounted for by secondary metals is expected to surpass that of primary metals sometime in the next decade.

S.SUGIYAMAetal (2010)[18] Investigated that the design material with an intended shape, such as a character or petal shape, was manufactured using minute metal scraps. Similarly, a design material with an intended color pattern for each metal, such as red copper in a white aluminum matrix, resembling grain like wood, was manufactured by mixing two or more types of minute metal scrap. In addition, secondary design materials, which have engraved patterns on the surface of the target metal made by an electric discharge machine using the above primary design material as an electrode, were manufactured.

Jiun-Horng Tsai et al (1995) [04] The investigated thesis represents the profiles of various species of PAH from the metal scrap burning were different from those in an urban area, especially for particle-bound PAH. The amount of B(a)P in the source region was about 2-10 times greater than in the vicinity of the source region, and in urban areas caused by vehicle exhaust. Samples from the source region clearly showed mutagenicity.

A. Tuncuk et al (2012) [23] This process options with particular reference to hydrometallurgical processes were reviewed in this study. With their relatively low capital cost, reduced environmental impact (e.g. no hazardous gases/dusts), potential for high metal recoveries and suitability for small scale applications, hydrometallurgical processes are promising options for the treatment of WEEE. Since the metals are present in native form and/or as alloys, an oxidative leaching process is required for the effective extraction of base and precious metals of interest.

P. Verma, R et al (2017) [38] The present paper reports fabrication of superior steel compact using nanostructured steel powder generated from industrial steel scrap. Extra low carbon and low carbon steel powders with size of submicron were generated from industrialwastebyplanetarymillingfor5hours.Themilledpowder sarecharacterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM) and hardness.

Y. Xiao(2002) [09] The survey shows that the relationship between scrap type and its recoverable metal content can play a crucial role in industrial recycling processes. In this paper, the recyclability of different aluminium turnings has been experimentally studied. Various categories of scrap were melted at 800 C to recover aluminium metal with the protective salt flux of NaCl–KCl–Na3AlF6 under nitrogen

atmosphere. In order to understand the melting behaviour, thermo-gravimetric analysis was applied to investigate the weight loss during the melting process. recycling the selected aluminium scrap depends on scrap type, scrap size distribution, contaminant, and the ratio of surface area to body volume.

YanniXuan et al (2016) [36] This study examines changes in crude steel production, steel scrap consumption per ton steel, and steel scrap consumption from 1980 to 2012. A modified IPAT model, which can quantitatively and directly evaluate the influence level of environment, economy, population, technology and national policy on future steel production, is adopted to forecast Chinese steel production from 2010 to 2030. In 2020, the value of steel production and steel stock spercapita are expected to reach 901 million tons and 8.01 tons, respectively.

Mohan Yellishetty et al (2011) [22] This paper reports on historical analysis of the steel industry in which crude steel production trends are quantified for the period from 1950 to 2006. On the basis of this analysis, the future production of steel for the world is estimated using regression analysis. The historical analysis shows that the world steel production increased from 187 Mt to 1299 Mt in that period. In addition, the paper also reports on historical (1950–2006) steel scrap consumption and was compared with crude steel and electric arc furnace (EAF) steel production.

III. METHODOLOGY OFCOMPUTATIONAL DESIGN AND ANALYSIS OF SCRAP COMPRESSION MACHINE

Nowadays almost all the manufacturing process is being atomized in order to deliver the products at a faster rate. The manufacturing operation is being atomized for the following reasons:

1.To achieve mass production
2.To reduce manpower
3.To increase the efficiency of the plant
4.To reduce the workload
5.To reduce the production cost
6.To reduce the production time
7.To reduce the material handling

The Scrap compression machine consists of double acting pneumatic cylinder which controls the pressure in the machine, the press is the compressing machine tool designed to shape or compress metal chips by applying mechanical force or pressure. This machine helps to reduce the size and weight of the scrap, by using the pneumatic it reduces in cost wise. In addition to a great demand in this field, the system is excepted to be controlled even by semi-skilled person in a most efficient and cost effective way.

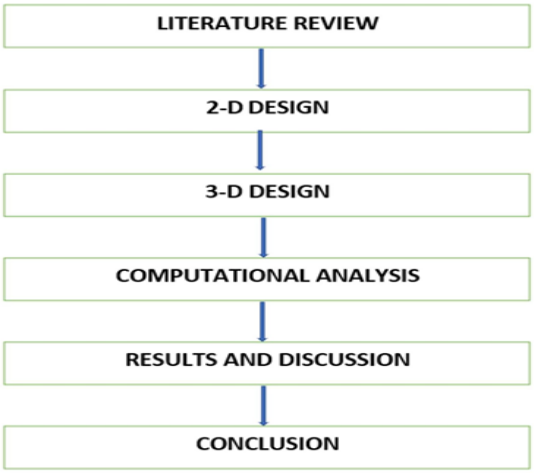

Fig.2:Flow diagram of the project

2-D drawing is given below,

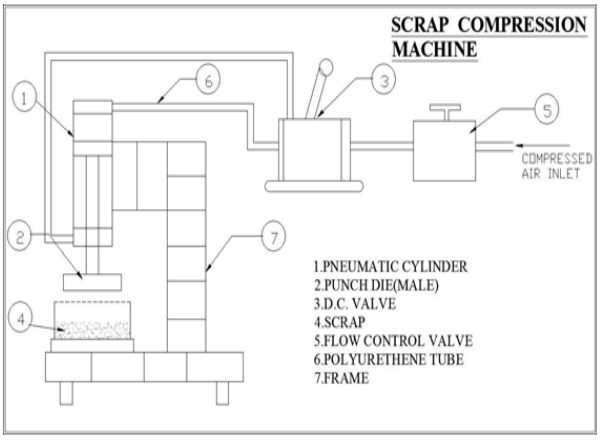

Fig.3: Overall outlet of the machine

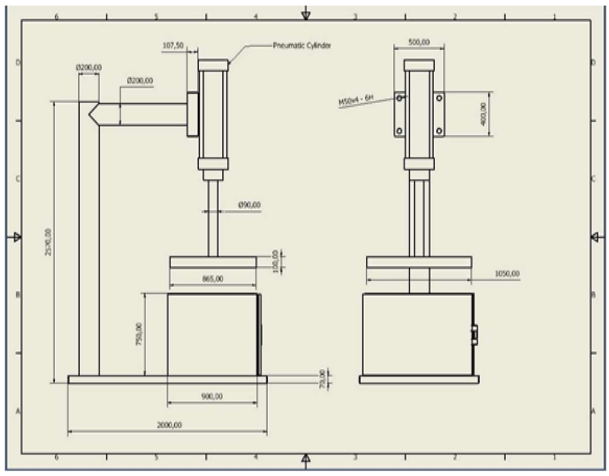

FIG.4: The drawing of the machine is done using Autodesk Inventor.

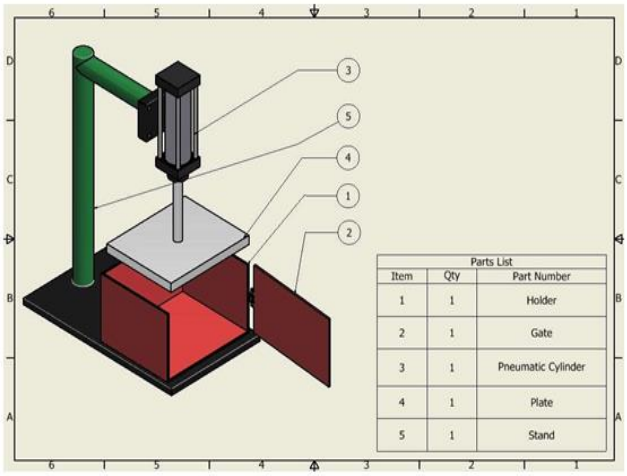

Fig.5: 3-D Model of the machine is done using Autodesk Inventor.

IV. RESULT

A good engineering base is necessary for the Development and refinement of advanced computer programming, editing techniques, diagnostic Software, algorithms for the dynamic exchange of informational different levels of hierarchy.

This project work has provided me an excellent opportunity and experience, to use my limited knowledge. I gained a lot of Theoretical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. I am proud that I have completed the work with the limited time successfully.

The **"SCRAP COMPRESSION MACHINE"** is working with satisfactory conditions. I am able to understand the difficulties in maintaining the tolerances and also quality. I have done my ability and skill making maximum use of available facilities. In conclusion remarks of my project work. Thus, I have developed a "SCRAP COMPRESSION MACHINE". By using more techniques, they can be modified and developed according to the applications.

V. CONCLUSION

In this project I have analysed the literatures and designed a 2-D and 3-D Model using Autodesk Inventor, along with the 3-D analysis in Ansys Workbench which is environmental friendly metal scrap machine. It will be very suitable for small scale industries because of its less complication to the operating nature and having less maintenance cost.

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