NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581-4230
VOLUME 3, ISSUE 12, Dec. -2017

FORGING DEFECTS ANALYSIS IN SUSPENSION ARMAND FLASH CONTORL

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ABSTRACT:

The suspension arms in the process of fogging are made by deferent material and in that processes get various problems are found. In that paper list out that problem and solving flash wastage problem. And such problems are controlling analyses of suspension arm manufacturing process parameters. Different step by step such rolling process, blocking process and finishing process commonly affected by the process defects like folds or laps, cracks problem are found. Flash wastage is the problem controlling noteworthy constraint.

KEYWORDS: Suspension arm, billet length, forging process defects, Flash, Parting line.

I.INTRODUCTION:

The process of forging is concerned with the shaping of metal by application of compressive force. The process is normally performed "cold, warm, and hot" forging .This process is normally performed hot by preheating the stock to required temperature use of induction heater by radiation pyrometer use to measure technique. The main advantage of hot forging is that as metal is deformed work hardening effects are negated by the re-crystallisation process, forged part are stronger and tougher than cast or machined part made from the same material due to the reason that the hammering process arranges the micro-structure of metal which met scope microscope. The figure 1.2 shows the various processes at the different location point such as the die open and close die, plastic deformation in flattener, blocker, finisher.

II. METHODOLOGY:

This research begins with the input parameters billet length reduces and maintaining the weight of final products and controlling wastage of material to flash, process defects such as unfilled, lapse, scale pits cracks mismatch .To forging defects of suspension arm studied, parts under study in a lots size of 450 parts in each lots, then parts are inspected for forging defects as per standard operating procedure.

- Forging process set up

The forging set up consists of the various operation such as cutting of the billet to proper weight as providing standard, heating of billet in an controlled to forging temperature, pre-form in blocker and placing the per-form in finisher die to forge the component of the desired shape.

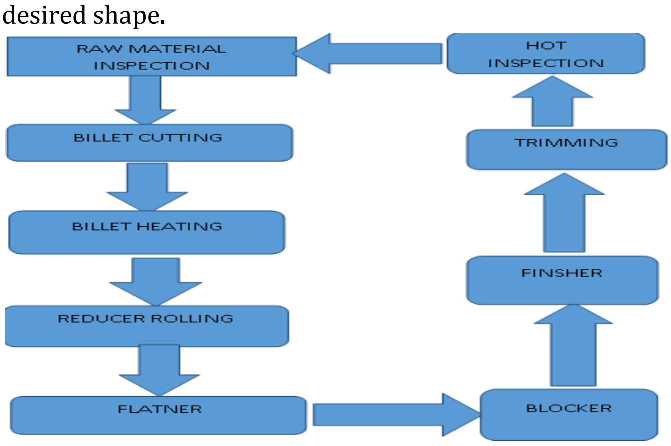


Figure 1forging process

III EXPERIMENTAL SET UP:

3.1 INTRODUCTION:

This chapter presents the detailed description of the raw materials billet length is the important parameter are used in research paper work with the suspension arm product .To record the inspected for forging defects as per standard procedure, as set for trail is recorded for statistical analysis. Objective of the study is to change the in billet cutting length, to increase the productivity of product and reduce wastage of raw material. Also increasing the production for increasing die life is the aim.

3.2 RESEARCH OUTLINE:

The steps followed in experimentation are shown in figure 2. The billet is heated in the induction furnace different section diameter and hot billet is to give final shape by using step by step process. For change by length billet size process parameter are included.

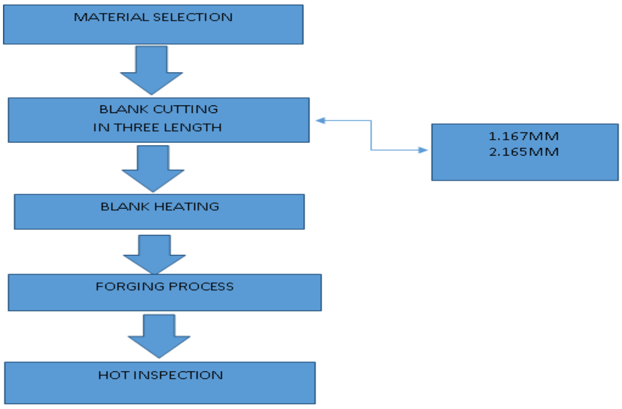


Figure 2 Steps for experimentation.

3.3 EXPERIMENTAL SETUP:

The schematic diagram of experimental setup is shown in figure 1.2.The billet form the raw material rod cut to final size and weight by the band saw. Material identification & selection by colour coding (41CR4) Brown Base and Blue line having required length and weight. The billet is heated in the induction coil having 60$\boldsymbol{\phi}$ section up forging temperature (1200-1260°c).The hot billet is then rolled by national reducing roll by get total length and cross section (266±mm).

The rolled billet is placed on the blocker die to remove the scaling by using die forging of the desired shape and size and flash extension is cut by trimming and cooling by air cooling. The hot forging is cooled and heat treated to relieve the stresses induced during forging by using furnaces for annealing & normalizing.

The forged components are coning don by control bend, the cleaned by the shot blast cleaning machine by using the metal ball blast and the air blast. To check the quality of the forging parts the parts are inspected hundred percent visually by green inspection for the forging defects and ten percent with the help of vernier caliper and height gauge dimensional accuracy. After dimensional and visual inspection, crack check by MPI magnetic particle inspections by standard by ASTM.

3.4 DEFECTS IN PROCESS:

I Surface defects-
1) Burr lap 2) Scale Pit
3) Under Fill 4) Dent Mark
5) Punch Mark 6) Under Cut

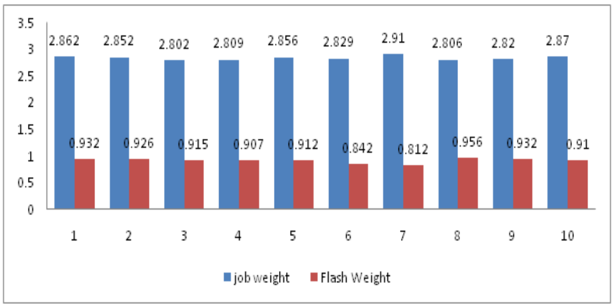
II Inspection defects-
1) Mismatch 2) Size Variation
3) Bend 4) Under Cut 5) Crack

In this experimental set up most of defects are occur in surface defects are major problem in controlling for this billet length for increasing yield ratio. Which are form by various stage in rolling, flattener, blocker, finisher. Yield ratio is increasing for controlling the wastage of material in form of flash. To reducing the weight of flash and maintaining the weight of job and the weight of cut length billet reducing.

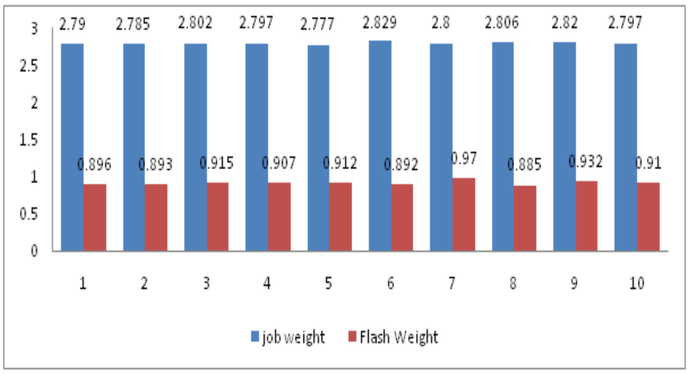
$$\textbf{Yield ratio} = \frac{\textbf{Net weight}}{\textbf{Cut weight}}$$

3.5 ANALYSIS OF DEFECTS SUSPENSION ARM SHAFT:

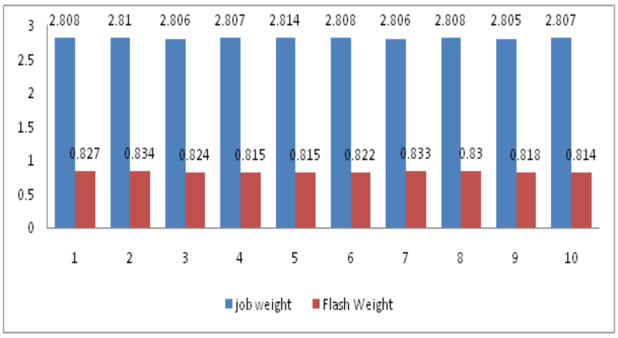
	Cut length-167	Cut weight-3.74kg
Sr No.	job weight	Flash Weight
1	2.862	0.932
2	2.852	0.926
3	2.802	0.915
4	2.809	0.907
5	2.856	0.912
6	2.829	0.842
7	2.91	0.812
8	2.806	0.956
9	2.82	0.932
10	2.87	0.91
Average	2.8416	1.931



Die- 119 Part Name-Suspension ArmCut Section-60
Cut Weight- 3.540kg
Temper range-1200-1250



Jobe Weight-165mm Cute weight-3.245kg			
Sr No.	job weight	Flash Weight	Temper Range
1	2.808	0.827	1240
2	2.81	0.834	1235
3	2.806	0.824	1250
4	2.807	0.815	1260
5	2.814	0.815	1255
6	2.808	0.822	1245
7	2.806	0.833	1235
8	2.808	0.83	1220
9	2.805	0.818	1236
10	2.807	0.814	1242
Averag	2.8079	0.8232	1241.8



3.6 ANALYSIS OF YIELD RATIO OF SUSPENSISON ARM SHAFT:

Table 3.6.1 Experimental design with output and yield ratio for suspension arm shaft.

Cutlength---- 167mm Cut weight-----3.74kg				
Sr.No.	Cutweight	Net weight	Yield ratio	%(yield ratio)
1	3.74	2.862	0.7647	76.41%
2	3.74	2.852	0.7656	76.56%
3	3.74	2.802	0.7491	74.91%
4	3.74	2.809	0.7510	75.10%
5	3.74	2.856	0.7636	76.36%
6	3.74	2.829	0.7564	75.64%
7	3.74	2.91	0.7780	77.80%
8	3.74	2.806	0.7502	75.02%
9	3.74	2.82	0.7540	75.40%
10	3.74	2.87	0.7473	76.73%

Table 1- cut weight, net weight, net weight, yield ratio relation show utilisation of cut material.

Cutlength---- 165mm Cut weight-----3.54kg				
Sr.No.	Cutweight	Net weight	Yield ratio	%(yield ratio)
1	3.540	2.79	0.7971	79.71%
2	3.540	2.785	0.7867	78.67%
3	3.540	2.802	0.7915	79.15%
4	3.540	2.797	0.7971	79.71%
5	3.540	2.777	0.7844	78.44%
6	3.540	2.829	0.7991	79.91%
7	3.540	2.8	0.7910	79.10%
8	3.540	2.806	0.7926	79.26%
9	3.540	2.82	0.7966	79.66%
10	3.540	2.797	0.7901	79.01%

Table 2- cut weight,net weight, net weight, yield ratio relation show show utilisation of cut material.

Above table 1,2,we are reducing the cut weight and cut length step by step of suspension arm, in observe that for reducing cutting length and weight of job which are increasing utilisation of material up to 86% to 87%.For reducing the waste of material in form of flash weight are reducing. Cut length and cut weight reducing 167mm to 163mm and weight 3.774 to 3.245 kg. Fig. shows the utilisation of material.

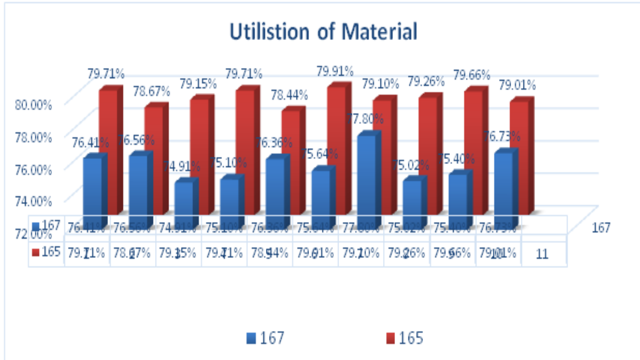


Fig. utilization of cut weight material

Cut weight	Flash weight	Job weight
Flash weight(167mm)	0..931	3.74
Flash weight(165mm)	0.8954	3.54

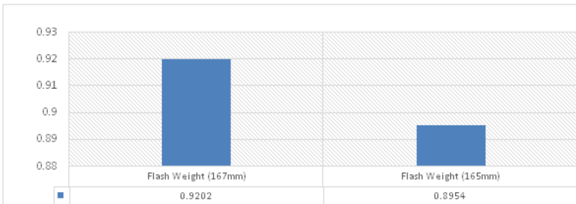
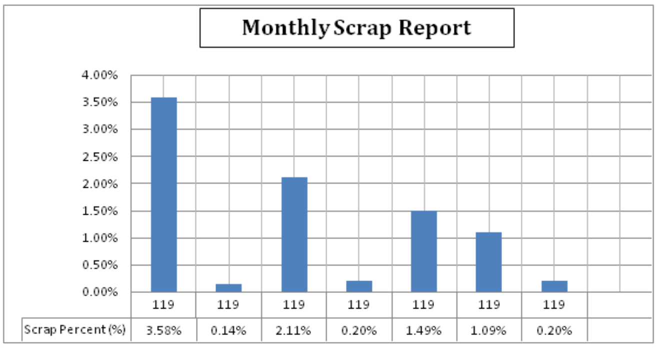


Fig. show Flash weight Reduction ratio.



CONCLUSION:

In way by experimental set up total production of rejection are reduces up 2%, rejection rate get maximum rejection to job location by operated, which for under fill or location scrap.

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