International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 04 | Apr 2020 www.irjet.net p-ISSN: 2395-0072

Job Handling Mechanism using Air Spring Balancer

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Abstract- This process is discussed about job handling mechanism on shop floor considering material handling process. This process is very important aspect on a flexible manufacturing system. Where raw material and finished product are delivered from one place to another or from machine to product place. The starting time of any process is affected by the ability of the material handling equipment to conduct timely delivered from one place to another, therefore job handling process on shop floor is important to increase in production rate. We take the case where the flexible manufacturing system is consisted of more than one number of machines; each has the capability of various jobs by various method of manufacturing. Jobs are dispatched based on longest processing time rule and then allocated to machine which has minimum load. The material handling equipment has pickup and delivery priority rule when handling multiple equipment on shop floor.This paper will analyzed the job handling phenomenon on shop floor which is affected to the increasing production time and reducing the man power in industry.

Key words: Flexible manufacturing, raw material, Shop floor, Dispatched, pickup and delivery.

1. INTRODUCTION-

Today's manufacturing companies trying to improve their performance and quality of product in a globalized, interconnected and volatile market environment. Traditional approaches of dedicated production lines cannot deal with changes related to the market such as increase in product time, product demand, and Product changes. Therefore it is required to change the manufacturing style and adapt new market strategies for improve production time and for flexible manufacturing.

In high volume manufacturing such as automotive and the introduction of automation and information and communication technologies (ICT) on the shop floor, supported by digital manufacturing tools, has led to more flexible production system which are capable to dealing with the volatile market demands and having a mixed product flow.

A modular and modified manufacturing system that is able to deal with and increased number of product verities, high performance operations and flexible machines as well as it is required to material handling equipment to improve production time and reducing man power.

2. METHODOLOGY-

2.1 Constructional details-

1. Air spring balancer
2. I beam
3. I beam trolleys

1. Air spring Balancer

ENDO Spring Balancers by Conductix-Wampfler area valuable addition to your assembly line. They support heavy tools with cable tension equal to the weight of the suspended tools, which makes them seem virtually"weightless". As the tool is repositioned the balancer extends or retracts the support cable to follow the tool's movements.

Constant tension on the cable is accomplished with a spring motor and a tapered drum.The assembler has the flexibility to reposition the tool, while experiencing comfortable operation and less fatigue. Similar to a Balancer is the Retractor, which does not have a tapered drum. The tension on the cable increases as the cable is extended.

Features in spring balancer

1. Closed body and covers prevents industrial accident by preventing ingress of fingers inside the assembly.

2. To prevent the wear of body by wire rope.

3. Vertical axis spring adjustment will facilitate adjustment of spring tension from ground level.

4. Safety lock pin locks the drum pulley in the event of spring failure and thus prevent the fall of costly equipment and injury to the operator from falling load.

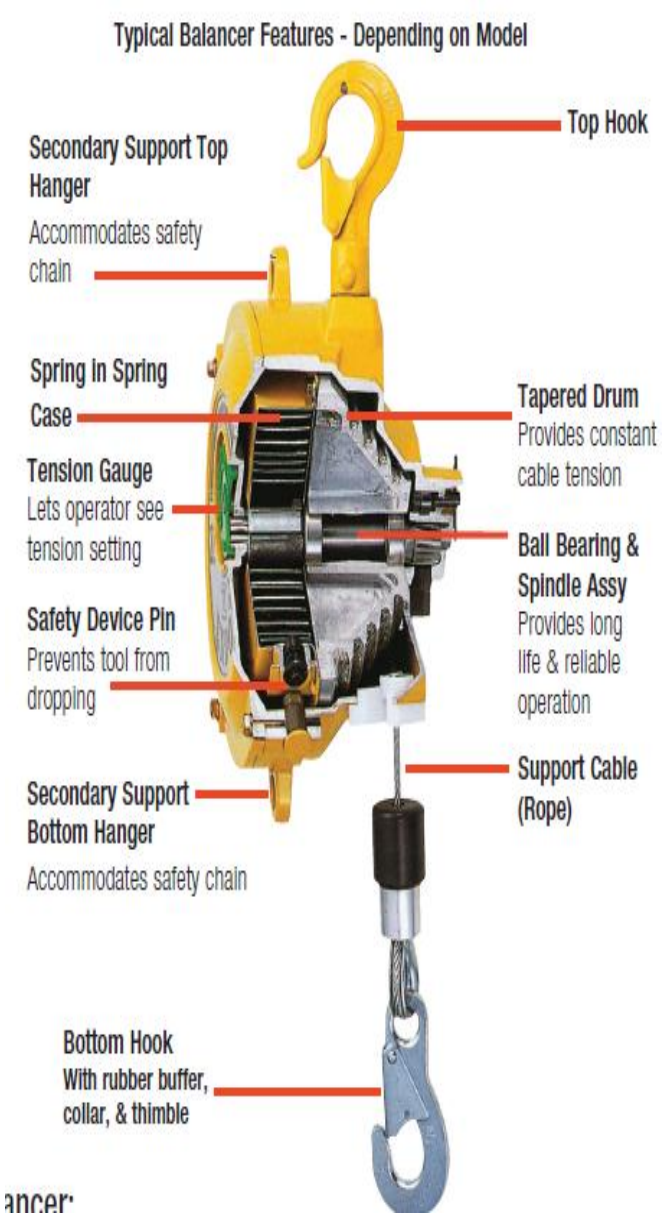

Fig-1: Air spring balancer

There are three type of air spring balancer used in industry which is namely below:

SWF Series

Capacity (kg)	Model no.	Travel (meter)	Weight (kg)
0.5-1.5	SWF-01	1.0	1.1
1.0-2.0	SWF-02	1.0	1.1
1.5-3.0	SWF03	1.3	1.6
2.2-5.0	SWF-05	1.3	1.8
4.5-9.0	SWF-09	1.3	3.9
9.0-15.0	SWF-15	1.3	4.0
15.0-22.0	SWF-22	1.5	7.5
22.0-30.0	SWF-30	1.5	7.5
30.0-40.0	SWF-40	1.5	10.0
40.0-50.0	SWF-50	1.5	10.3
50.0-60.0	SWF-60	1.5	10.7
60.0-70.0	SWF-70	1.5	11.2
70.0-85.0	SWF-85	1.5	11.6
85.0-100.0	SWF-100	1.5	11.9
75.0-90.0	SWF-90	1.5	26.2
90.0-105.0	SWF-105	1.5	26.5
100.0-120.0	SWF-120	1.5	26.8
120.0-140.0	SWF-140	1.5	27.2
140.0-170.0	SWF-170	1.5	33.5
170.0-200.0	SWF-200	1.5	33.6
1.5-3.0	SWF-03L	2.5	3.3
2.5-5.0	SWF-05L	2.5	3.7
4.5-9.0	SWF-09L	2.3	6.9
9.0-15.0	SWF-15L	2.3	7.2
15.0-22.0	SWF-22L	2.3	7.7
22.0-30.0	SWF-30L	2.3	7.7
30.0-40.0	SWF-40L	2.3	10.2
40.0-50.0	SWF-50L	2.3	10.3
50.0-60.0	SWF-60L	2.3	10.9
60.0-70.0	SWF-70L	2.3	11.4
70.0-85.0	SWF-85L	2.5	26.0
85.0-100.0	SWF-100L	2.5	26.2
100.0-120.0	SWF-120L	2.5	33.2
110.0-130.0	SWF-130L	2.5	33.5

SWA Series

Capacity (kg)	Model no.	Travel (meter)	Weight (kg)
9.0-15.0	SWA-15	1.3	5.5
15.0-22.0	SWA-22	1.5	8.5
22.0-30.0	SWA-30	1.5	8.6
30.0-40.0	SWA-40	1.5	11.2
40.0-50.0	SWA-50	1.5	11.8
50.0-60.0	SWA-60	1.5	12.3
60.0-70.0	SWA-70	1.5	12.8
9.0-15.0	SWA-15L	2.3	8.5
15.0-22.0	SWA-22L	2.3	8.6
22.0-30.0	SWA-30L	2.3	8.7
30.0-40.0	SWA-40L	2.3	11.4
40.0-50.0	SWA-50L	2.3	12.0
50.0-60.0	SWA-60L	2.3	12.5
60.0-70.0	SWA-70L	2.3	13.0

SBH Series

Capacity (kg)	Model no.	Travel (meter)	Weight (kg)
200-225	SBH-225	1.5	48.5
225-250	SBH-250	1.5	49.0
250-275	SBH-275	1.5	49.6
275-300	SBH-300	1.5	53.0
85-100	SBH-100	3.0	46.5
100-120	SBH-120	3.0	47.0
120-140	SBH-140	3.0	48.5
140-160	SBH-160	3.0	49.5

2. I Beam

I beam also known as H beam, W beam and universal beam, rolled steel Hoist.The horizontal elements of the I are flanges, and the vertical element is the "web". I beam are usually made of structural steel and are used in structural mechanism.The web resist shear forces, while the flanges resist most of the bending moment experienced by the beam. The euler-burnoulli beam equation shows that the I shaped section is a very efficient from for carrying both bending and shear loads in the plane of the web on the other hand, the cross section has a reduced capacity in the transverse direction, and it also inefficient in carrying torsion, for which hollow structural sections are often preferred.

Fig-2: I Beam section

3. I Beam Trolley

I beam trolley has been designed specially to suspend spring balancer in shop floor, assembly line for holding or loading and unloading on jobs from machines , welding gun and pneumatics tools in automobile manufacturing plants.

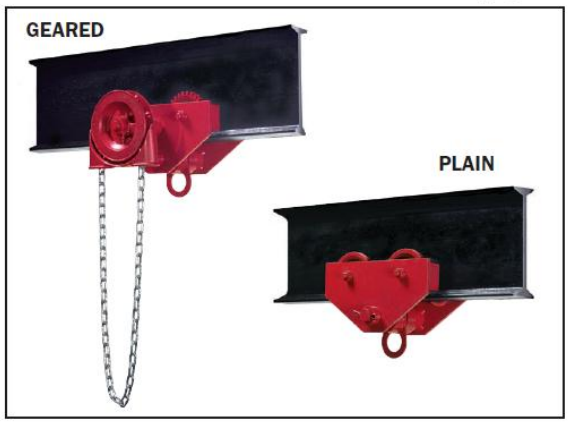

Fig-3: I Beam Trolley

2.2 Working

The two I beam section which is approximately height of 15feet fixed vertically besides the machine. One horizontal I beam section which is approximately 20 feet long placed on the vertical section by using base plate which is fixed by using nut and bolt. One 5 feet I beam section are fitted to the center of horizontal I beam by using I beam trolley and this section is perpendiculars to the horizontal I beam. This 5feet beam is moving on horizontal beam because of movable trolley. The main component of the project is air spring balancer is placed behind that 5 feet I beam section by using trolley and the movement of that spring balancer is perpendicular to the movement of I beam. The bottom hook of the spring balancer is used for holding the job and its weight handling capacity is 100.0-120.0 kg.

The movement of spring balancer and I beam section it is very easy to loading and unloading the job or raw material from machine to product place or product place to machine and because of this the more number of man power which is required for handling the job on shop floor is automatically decreases and also the production time is increases because of less time required for material or job handling.

3. CONCLUSION-

We have design the structure of job handling using spring balancer on shop floor considering material handling process. This research brought two levels of benefits on the operational level as well as strategic level. On the operational level, when worker working on shop floor it is impossible to handle heavy job from one person so more number of worker is requires so because of this research the less man power is require in industry for material handling and strategically we know when material handling time is decreases the production rate is increases so the profit of company is increases when production of company increases.

4 ACKNOWLEDGEMENT

The authors wish to thank all person of G A Steel Tech LPP-Khalapur and special thanks to Mr. Himanshu joshi for their valuable assistance in this research.

5. AUTHOR CONTRIBUTION

All of project research including data collection model setup and manuscript preparation were done by student of Suman Ramesh Tulsiani technical campus faculty of engineering, kamshet.

6. REFERENCES

[1] Eka K.A. Pakpahan, Sonna Kristina, Ari Setiawan and Evelin Merlians

Industrial Engineering, Harapan Bansga Institute of Technology, 40132 Bandung, Indonesia.

[2] Keith Jackson, Konstantinos Efthymiou, John Borton

Applied research and technology, meggitt PLC, Atlantic House, Aviation park west, Bournemouth international airport Christchurch, Dorset, BH23 6EW, UK.

[3] Specification catalog of air spring balancer

[4] Int. J. Mech. Eng. Autom. Volume 2, number8, 2015, pp. 357-364.

Received: June 28, 2015; Published: August 25, 2015