

**“Analysis & Reduction of Line Side Assembly Inventory with Special
Reference Neosym Industry Limited**

Dr.(Prof) Yogendrakumar Deokar,
(Assistant Professor-ZES-ZCOER-Dept. of Management)
Mr. Sagar Gosavi
(PG Student of ZCOER-)

ABSTRACT

Neosym is a leading Gray & S.G. Iron casting, manufacturing company in India, Serving automotive, Agriculture, Earthmoving and Engineering Industry. The group has presence in various industries, such as Automobiles, Building Products, Automotive Components, Cement, Writing and Printing papers, Engineering Works, Software Development etc.

Key Words- Line Side Assembly, Iron casting, Automotive Components

▪ **Organization:** Neosym Industry Limited, Pune.

▪ **Importance:**

Neosym is a leading Gray & S.G. Iron casting, manufacturing company in India, Serving automotive, Agriculture, Earthmoving and Engineering Industry. The group has presence in various industries, such as Automobiles, Building Products, Automotive Components, Cement, Writing and Printing papers, Engineering Works, Software Development etc.

▪ **Objective:**

▪ **Learning from the project:**

▪ **Methodology adapted :-**

▪ **Conclusion :-**

- Reduced the assembly line side inventory for the model area sub assembly by 49% by maintaining 10kg quantity of parts per bin.
- Arranged the whole warehouse according to 10kg quantity of parts per bin
- Reduced the space in the warehouse by replacing 75 bigger bins (43150 type) into smaller bins (32150 type).By doing this more 38 smaller bins can be accommodated.

Introduction and Rationale of the Study

Introduction to the title

“Assembly Line Side Inventory Reduction”

In Neosym Industry Limited there are two main assembly lines and beside two main lines there are two sub-assembly lines i.e. one on left hand side and other is right hand side. Each line contains several workstations. At each workstation 2 bin systems is followed. Each workstation is carrying a huge amount of inventory and there is no standard criteria have been set for how much inventory is stored in the bins. The presence of unnecessary work in progress can also be an indicator of an unreliable supply chain, lack of proper production planning, excessive manual labour required in the production process. Excess WIP ties up cash for a certain period of time which could be generating higher returns elsewhere in the organization. So firstly we indentified one model area i.e. sub-assembly for assembly line side inventory reduction.

Rationale of study:

In pune plant as there are several lines containing several workstations and each workstation follows the two bin system. So they are carrying huge amount of wip inventory. This project has helped to reduced the wip inventory for the one workstation which is the model area sub-assembly .Firstly we worked on the model area only but we can use the same process for the other workstations also as they are using the two bin system.

INDUSTRY PROFILE

Overview of the Industry

Introduction

Manufacturing has emerged as one of the high growth sectors in India. Prime Minister of India, Mr Narendra Modi, had launched the 'Make in India' program to place India on the world map as a manufacturing hub and give global recognition to the Indian economy.

Investments

With the help of Make in India drive, India is on the path of becoming the hub for hi-tech manufacturing as global giants such as GE, Siemens, HTC, Toshiba, and Boeing have either set up or are in process of setting up manufacturing plants in India, attracted by India's market of more than a billion consumers and increasing purchasing power.

Major Players:

1. John Deere:

John Deere is the brand name of Deere & Company, an American [corporation](#) that manufactures [agricultural](#), [construction](#), and forestry [machinery](#), [diesel engines](#), [drive](#)

[trains](#) (axles, transmissions, gearboxes) used in heavy equipment, and lawn care equipment. In 2017, it was listed as 105th in the [Fortune 500](#) America's ranking and was ranked 407th in the [global](#) ranking. The company also provides financial services and other related activities. Deere & Company is listed on the [New York Stock Exchange](#) under the symbol DE. The company's slogan is "Nothing Runs Like a Deere", and its logo is a leaping [deer](#), with the words 'JOHN DEERE' under it. The logo has been used by the company for over 155 years

2. CNH Industrial:

CNH Industrial is a global leader in capital goods that implements design, manufacturing and distribution, commercial and financial activities in international markets. They employ more than 63,000 people in 66 manufacturing plants and 53 research and development centers in 180 countries. CNH Industrial's global presence and broad reach mean that we can capitalize on opportunities for growth and pursue our ambition to become a leader in our sectors. Through their 12 brands we make the vehicles that keep agriculture and industry growing. From tractors and combines to trucks and buses, as well as powertrain solutions for on-road and off-road and marine vehicles, they design, produce and sell machines for work.

3. Kalyani Forge:

Kalyani Forge Ltd - located in the automotive hub of Pune is an ISO TS 16949, ISO 14000 & OHSAS – 18001 certified engineering company with an expertise in metal forming built over deep experience. We are trusted supplier of forged,

machined and assembled products for a variety of customers in industries like automotive, construction, power generation, marine, railway, and industrial goods. Our forging capabilities include hot, warm and cold forging & in-house heat treatment as well as machining.

ORGANIZATION PROFILE AND BUSINESS OVERVIEW

Introduction

Neosym Industry Limited (Formerly known as The Indian Smelting & Refining Company Limited - ISR) is a part of C.K. Birla Group. The C.K. Birla Group is one of the India's leading business houses with a combined group turnover of USD 1.6 Billion, total employees strength of 20,000 and global presence across 5 continents.

The group has presence in various industries, such as Automobiles, Building Products, Automotive Components, Cement, Writing and Printing papers, Engineering Works, Software Development etc. The group also has presence outside India in US, UK, Singapore, Kenya, Nigeria, UAE etc. The Group has strong commitment to philanthropy and is running educational institution even internationally reputed Higher Technical Institutes, Medical Institutes.

Neosym is a leading Gray & S.G. Iron casting, manufacturing company in India, Serving automotive, Agriculture, Earthmoving and Engineering Industries since more than 40 years.

Neosym manufactures all grades of Grey & S.G Iron casting, conforming international standards, quality & grade, to meet Indian and International auto giants.

Neosym is exporting machined casting to various countries like UK, USA, Germany, France, Italy & Southeast Asia.

Quality Certifications:

Quality initiatives and has been awarded with various ISO certifications, such as:

ISO 14001:2004

OHSAS 18001:2007

ISO 9001:2008

EN 16001:2009

ISO 50001:2011

Research and Development

Extensive testing is carried out on the products designed and developed in R&D centre which includes bench testing of components. Performance and reliability tests are also done keeping in mind the actual working conditions. We are a team of committed professionals driven by a single goal – to put technology into the

hands of farmers, allowing them to maximize productivity and profitability. Our tractors not just meet but exceed the requirements of our customers.

Industrial Operations

Engine Assembly and Testing

Makino Machining Centre

Mazak Machining Centre

CED (Cathodic Electro Deposition) Paint shop

Final Assembly and Testing

Continuous Focus on Quality

Neosym Ltd team strives, with a spirit of dedication & teamwork, to establish the best international quality standards of customer satisfaction and infused with the core values & guiding principles worldwide. All production staff and workers are technically qualified, and many of them have been trained to ensure international standards of quality and productivity.

Outline of Problem/ Task Undertaken

Assembly line side inventory means WIP i.e. “work in progress”. A more production oriented definition is that WIP are partly finished products that are currently in the production process.

In Neosym Industry Ltd there are two main assembly lines and beside two main lines there are two sub-assembly lines i.e. one on left hand side and other is right

hand side. Each line contains several workstations. At each workstation 2 bin systems is followed.

Problems:

1. There are no any standard criteria set for the quantity of parts that should be stored in bins on line.
2. There are some parts in bins on the lines which are small but heavy in weight. When the quantity of 1st bins gets over then worker has to go to store for replenishment. At the time of replenishment he has to lift that bins which is heavy in weight. So it is ergonomically difficult for the worker.
3. Some of the bins contained excess inventory.
4. When the worker came to store for replenishment of parts or material then each time he has to physically take the parts from the bins in the store to empty bin. Each time he has to measure the quantity of parts that he is taking by using the weighing scales and then he has to inform the storekeeper about the quantity of parts he took. So that storekeeper will minus that stock from the system.
5. There are many parts in the bins on assembly line side which are small like nut, bolts, and washer. they are stored on assembly line side in large quantity (more than 3000) which may lasts more than 9-10 months or even more (depending on the type parts).So there is a huge amount of wip inventory.
6. In the warehouse there are so many small parts which are kept in bigger bins (43150 type) unnecessarily instead of that, that parts can be stored in

smaller bins easily(32150 type).So bigger bins unnecessarily blocking the space in the warehouse.

Task Undertaken:

1. Setting the standard criteria for the parts that should be stored in bins on assembly line.
2. Maintaining the weight of the each bin in a way that it is ergonomically easy for worker to lift it.
3. Limiting the excess WIP inventory.
4. Maintaining the whole warehouse according to each bins should not contain the parts more than 10kg (because ergonomically it takes more efforts to lift the bin containing more than 10kg).
5. Reducing the worker's efforts when he goes to store for replenishment of parts at the time of counting of parts of with the help of weighing scales.
6. Replacing some bigger bins (43150 types) which are unnecessarily blocking the space in the warehouse into smaller bins (32150 types).so that more smaller bins can be accommodated.

Objectives:

1. To reduce the efforts of the workers on assembly line for lifting the bin.
2. To limit the excess WIP inventory.

3. To set the standard criteria for the parts that should be stored in bins on assembly line.
4. To save the money tied up with excess WIP inventory.
5. To arrange the whole warehouse in such a way that the weight of each bin should not exceed more than 10kg.

Analysis and findings

- Neosym Industry Limited there are two main assembly lines and beside two main lines there are two sub-assembly lines i.e. one on left hand side and other is right hand side. Each line contains several workstations. At each workstation 2 bin systems is followed. Two-bin inventory control is an inventory control system used to determine when items or materials used in production should be replenished. The two-bin inventory control method is mainly used for small or low-value items. For example, when items in the first bin (working stock) have been depleted, an order is placed to refill or replace these items. The second bin is supposed to have enough items to last until the placed order arrives. The first bin has a minimum of working stock and the second bin keeps reserve stock or remaining material. Bin cards and store ledger cards are used to record the inventory.
- In the store there are two areas i.e. Supermarket area and High Rise area. In supermarket area there are generally small parts which can accommodated in

bins are stored and in high rise area cage bins are there which contains generally bigger parts which cannot store in bins and excess inventory.

- There are total 2374 parts in Supermarket.
- For Reducing the worker's efforts, limiting the excess WIP inventory and Setting the standard criteria for the parts that should be stored in bins on assembly line what we did is we setup the whole supermarket according to 10kg setup i.e. each bin should not contain more than 10kg of weight of parts and at the same time bin should not be overloaded. If the bin is full and weight of the bin is less than 10kg then it is okay but bin should not be overloaded.

Following are the Excel Sheets showing the various data and the data before implementation of 10kg weight of supermarket and after implementation of 10kg weight of supermarket and how it resulted in the reduction in wip inventory.

Table: Details of Line Side Inventory Before& After Implementation

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
1	140046	WASHER, BELLEVILLE, LOCK M12X27 ZNM	32150	400	800	2.60	2,083.10	300	600	2.60	1,562.33
2	12164911	NUT, M12X1.25 8 ZND	32150	500	1000	9.59	9,593.40	300	600	9.59	5,756.04
3	140013	ARRUELA 4 ES 14. 02	32150	100	200	0.62	124.52	50	100	0.62	62.26
4	140229	WASHER	32150	500	1000	3.90	3,901.32	300	600	3.90	2,340.79
5	338206	WASHER	32150	500	1000	4.32	4,322.08	300	600	4.32	2,593.25
6	412649	WASHER, BELLEVILLE	32150	300	600	0.64	383.44	200	400	0.64	255.63
7	120100	BOLT, M6X20 FULL 8.8 ZND	32150	500	1000	0.72	716.66	300	600	0.72	429.99
8	322357	WASHER, BELLEVILLE, LOCK M6X14 ZNM	32150	300	600	0.44	261.31	300	600	0.44	261.31
9	9706755	NUT, M6 CL 8 ZND	32150	500	1000	1.30	1,302.54	300	600	1.30	781.52
10	322358	WASHER, BELLEVILLE, LOCK M8X18 ZNM	32150	500	1000	0.92	917.39	300	600	0.92	550.44
11	9706690	NUT, M8 CL 8 ZND	32150	300	600	0.62	369.77	200	400	0.62	246.51

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
12	426210	KEY	32150	400	800	83.04	66,433.55	50	100	83.04	8,304.19
13	353308	NUT, PREV TORQUE, ALL MTL M6 8 ZND	32150	500	1000	0.54	543.00	300	600	0.54	325.80
14	378243	WASHER	32150	500	1000	0.44	435.51	300	600	0.44	261.31
15	140045	WASHER, BELLEVILLE, LOCK M10X22 ZNM	32150	500	1000	1.30	1,297.44	300	600	1.30	778.47
16	378244	WASHER	32150	500	1000	0.65	648.77	300	600	0.65	389.26
17	100037	NUT, PREV TORQUE	32150	500	1000	2.32	2,316.57	300	600	2.32	1,389.94
18	100016	NUT	32150	300	600	1.25	751.23	200	400	1.25	500.82
19	140016	WASHER M886588445	32150	500	1000	0.17	166.89	300	600	0.17	100.13
20	140018	WASHER, 13.5 X 24 X 2.5 MM CST ZND	32150	500	1000	1.08	1,084.08	300	600	1.08	650.45
21	87569934	INDICATOR	32150	200	400	15.15	6,058.84	100	200	15.15	3,029.42
22	378246	WP 16 ES1402	32150	400	800	2.39	1,912.57	100	200	2.39	478.14
23	412066	NUT, PREV TORQUE, NON-MTL M16 8	32150	350	700	4.96	3,470.75	280	560	4.96	2,776.60

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
		ZND									
24	43127	BOLT, M8X25 FULL 8.8 ZND	32150	200	400	1.55	619.03	100	200	1.55	309.51
25	140103	WASHER	32150	300	600	2.90	1,738.65	200	400	2.90	1,159.10
26	370002	RING,25MM REG EXT RET PHC	32150	300	600	1.65	989.46	300	600	1.65	989.46
27	47874723	BUSHING, DRIVE	32150	600	1200	15.15	18,176.52	500	1000	15.15	15,147.10
28	87646730	BRACKET, ZN YCR5 STD	32150	200	400	25.15	10,061.65	170	340	25.15	8,552.40
29	378245	W12 ES14.02	32150	300	600	0.87	523.16	300	600	0.87	523.16
30	412126	NUT, PREV TORQUE, NON-MTL M12 8 ZND DIN	32150	600	1200	2.95	3,538.58	300	600	2.95	1,769.29
31	9839232	WASHER	32150	500	1000	11.99	11,986.02	450	900	11.99	10,787.42
32	47603163	INDICATOR	32150	220	440	20.59	9,059.39	200	400	20.59	8,235.81
33	84056877	DISC	32150	50	100	50.49	5,049.02	45	90	50.49	4,544.12
34	84058860	SENSOR	32150	40	80	893.94	71,515.31	10	20	893.94	17,878.83

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
35	336266	NUT, M6CL8 PLN	32150	300	600	0.41	244.64	200	400	0.41	163.09
36	412105	NUT M108 PLN	32150	500	1000	1.31	1,310.47	300	600	1.31	786.28
37	308761	BSS08.8P M8X25 86512405	32150	600	1200	4.77	5,727.66	500	1000	4.77	4,773.05
38	86629542	NUT, P/T ALL MTL M8 8 ZND	32150	500	1000	1.08	1,084.08	220	440	1.08	477.00
39	445395	RIVET, POP	32150	500	1000	1.89	1,890.95	200	400	1.89	756.38
40	140182	WASHER, 5.5 X 18 X 2 MMCST ZND	32150	500	1000	0.65	648.77	300	600	0.65	389.26
41	86508568	BOLT, M6X16 FULL 8.8 ZND	32150	500	1000	0.56	555.49	300	600	0.56	333.29
42	412479	BOLT, M8 X 35 8.8 ZND	32150	500	1000	3.03	3,029.70	300	600	3.03	1,817.82
43	100015	NUT, REPLACED BY 9706690	32150	500	1000	1.01	1,009.90	300	600	1.01	605.94
44	86624184	WASHER, 9X16X1.6 MMCST ZND	32150	300	600	1.77	1,060.41	200	400	1.77	706.94
45	180062	RAKE	32150	100	200	139.95	27,990.18	20	40	139.95	5,598.04
46	170045	KEY	32150	240	480	40.80	19,581.99	210	420	40.80	17,134.24
47	378243	WASHER	32150	500	1000	0.44	435.51	300	600	0.44	261.31

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
48	9706690	NUT, M8 CL8 ZND	32150	300	600	0.62	369.77	200	400	0.62	246.51
49	918254	HOUSING, BEARING	32150	90	180	64.17	11,551.14	60	120	64.17	7,700.76
50	918253	HOUSING, BEARING DKGRA	32150	30	60	387.41	23,244.83	5	10	387.41	3,874.14
51	384672	SEAL PLTD	32150	100	200	189.09	37,817.01	50	100	189.09	18,908.51
52	918256	WASHER	32150	500	1000	20.39	20,387.56	150	300	20.39	6,116.27
53	140045	WASHER, BELLEVILLE, LOCK M10X22 ZNM	32150	500	1000	1.30	1,297.44	300	600	1.30	778.47
54	120070	BOLT, M10X60 8.8 ZND	32150	500	1000	4.37	4,374.31	210	420	4.37	1,837.21
55	200291	RING	32150	100	200	64.17	12,834.60	60	120	64.17	7,700.76
56	140015	W6 ES 14.02	32150	500	1000	0.47	468.24	200	400	0.47	187.30
57	86508568	BOLT, M6X16 FULL 8.8 ZND	32150	500	1000	0.56	555.49	300	600	0.56	333.29
58	353308	NUT, PREV TORQUE, ALL MTL M6 8 ZND	32150	500	1000	0.54	543.00	300	600	0.54	325.80
59	418538	WASHER	32150	500	1000	4.24	4,240.86	100	200	4.24	848.17

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
60	84138796	PLATE WA	32150	150	300	17.73	5,319.63	110	220	17.73	3,901.06
61	140046	WASHER, BELLEVILLE, LOCK M12X27 ZNM	32150	500	1000	2.60	2,603.88	300	600	2.60	1,562.33
62	320607	KEY, SQUARE, 12X8X63 ROUND 5	32150	300	600	50.48	30,289.34	220	440	50.48	22,212.19
63	9706704	BOLT, M10X35 FULL 8.8 ZND	32150	100	200	3.01	602.52	100	200	3.01	602.52
64	320648	NUT	32150	300	600	15.12	9,074.58	200	400	15.12	6,049.72
65	212607	BEARING ASSY	32150	40	80	408.97	32,717.53	22	44	408.97	17,994.64
66	87520953	BOLT, M10X22 FULL 8.8 PLN	32150	500	1000	4.54	4,543.90	450	900	4.54	4,089.51
67	9850385	DICHTING	32150	40	80	449.04	35,923.04	18	36	449.04	16,165.37
68	412430	BOLT, RDH SQNK M8X16 8.8 ZND	32150	500	1000	1.35	1,353.10	300	600	1.35	811.86
69	918812	AFDICHTING	32150	90	180	269.42	48,496.49	55	110	269.42	29,636.74
70	43127	BOLT, M8X25 FULL 8.8 ZND	32150	200	400	1.55	619.03	100	200	1.55	309.51
71	300366	WASHER, BELLEVILLE, LOCK M6X12.5	32150	300	600	1.51	908.94	200	400	1.51	605.96

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
		ZNM									
72	426735	WASHER, LOCK	32150	300	600	0.64	383.44	200	400	0.64	255.63
73	412479	BOLT, M8 X 35 8.8 ZND	32150	500	1000	3.03	3,029.70	300	600	3.03	1,817.82
74	87033737	WASHER, 9 X 28 X 3 MMCST ZND	32150	500	1000	2.86	2,855.42	300	600	2.86	1,713.25
75	120100	BOLT, M6X20 FULL 8.8 ZND	32150	500	1000	0.72	716.66	300	600	0.72	429.99
76	322357	WASHER, BELLEVILLE, LOCK M6X14 ZNM	32150	300	600	0.44	261.31	300	600	0.44	261.31
77	43167	BOLT, M16X30 FULL 8.8 ZND	32150	500	1000	12.23	12,232.40	110	220	12.23	2,691.13
78	426210	KEY	32150	200	400	83.04	33,216.78	50	100	83.04	8,304.19
79	140228	WASHER	32150	500	1000	15.37	15,369.16	160	320	15.37	4,918.13
80	370026	CIRCLIP, INT REG 100MMPHC	32150	180	360	25.79	9,284.05	120	240	25.79	6,189.36
81	9837218	SUPPORT	32150	150	300	179.61	53,883.88	70	140	179.61	25,145.81
82	100016	NUT	32150	300	600	1.25	751.23	200	400	1.25	500.82
83	9706755	NUT, M6 CL8 ZND	32150	500	1000	1.30	1,302.54	300	600	1.30	781.52

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
84	378244	WASHER	32150	500	1000	0.65	648.77	300	600	0.65	389.26
85	412655	WASHER, BELLVILLE LOCK M10X20 ZNM	32150	500	1000	2.86	2,855.50	300	600	2.86	1,713.30
86	425093	CLAMP	32150	480	960	9.72	9,335.11	420	840	9.72	8,168.22
87	322358	WASHER, BELLEVILLE, LOCK M8X18 ZNM	32150	500	1000	0.92	917.39	300	600	0.92	550.44
88	86977786	BOLT, M6X25 FULL 8.8 ZND	32150	500	1000	0.93	929.02	300	600	0.93	557.41
89	336199	BOLT, M8X12 FULL 8.8 ZND	32150	500	1000	1.27	1,269.05	300	600	1.27	761.43
90	86629542	NUT, P/T ALL MTL M8 8 ZND	32150	500	1000	1.08	1,084.08	220	440	1.08	477.00
91	16043621	BOLT, REPLACED BY 43127	32150	300	600	1.60	957.47	100	200	1.60	319.16
92	16100811	NUT, REPLACED BY 9706690	32150	300	600	0.57	339.47	200	400	0.57	226.32
93	100020	NUT M16 8 ZND	32150	400	800	4.27	3,417.08	330	660	4.27	2,819.09
94	130007	PIN, COTTER, 4X25MM STL ZND	32150	500	1000	1.01	1,009.90	200	400	1.01	403.96
95	412066	NUT, PREV TORQUE, NON-MTL M16 8 ZND	32150	300	600	4.96	2,974.93	280	560	4.96	2,776.60

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
96	378246	WP 16 ES1402	32150	500	1000	2.39	2,390.72	200	400	2.39	956.29
97	140048	WASHER, BELLEVILLE, LOCK M16X32 ZNM	32150	500	1000	5.63	5,634.37	300	600	5.63	3,380.62
98	922841	REGELVIJS WA	43175	10	20	258.71	5,174.22	9	18	258.71	4,656.80
99	356526	WASHER, HARDENED BEARING STEEL	32150	500	1000	22.84	22,839.60	300	600	22.84	13,703.76
100	47664526	SUPPORT	32150	10	20	182.09	3,641.74	10	20	182.09	3,641.74
101	321204	FITTING, LUBE, M6X1, 16MM LG	32150	300	600	4.90	2,937.66	300	600	4.90	2,937.66
102	394674	BOLT, M16X80 FULL 8.8 ZND	32150	500	1000	17.75	17,747.06	70	140	17.75	2,484.59
103	140045	WASHER, BELLEVILLE, LOCK M10X22 ZNM	32150	500	1000	1.30	1,297.44	300	600	1.30	778.47
104	100016	NUT	32150	300	600	1.25	751.23	200	400	1.25	500.82
105	47633013	TUBE, STEEL	32150	200	400	20.49	8,195.42	150	300	20.49	6,146.56
106	9513106	SPACER	32150	70	140	25.75	3,604.96	50	100	25.75	2,574.97

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
107	9706702	BOLT, M12X50 8.8 ZND	32150	500	1000	12.12	12,117.40	180	360	12.12	4,362.26
108	390071	PIN, CLEVIS 16X45MM HTS ZND	32150	200	400	60.59	24,235.12	115	230	60.59	13,935.19
109	130007	PIN, COTTER, 4X25MM STL ZND	32150	500	1000	1.01	1,009.90	200	400	1.01	403.96
110	394674	BOLT, M16X80 FULL 8.8 ZND	32150	500	1000	17.75	17,747.06	70	140	17.75	2,484.59
111	150021	FITTING, LUBE, M10X1, 18MM HIGH DIN 7141	32150	300	600	11.37	6,824.22	300	600	11.37	6,824.22
112	87573852	BUSHING	32150	80	160	30.64	4,901.97	50	100	30.64	3,063.73
113	210055	BEARING – BALL	32150	60	120	439.95	52,794.02	50	100	439.95	43,995.02
114	322357	WASHER, BELLEVILLE, LOCK M6X14 ZNM	32150	300	600	0.44	261.31	300	600	0.44	261.31
115	86508568	BOLT, M6X16 FULL 8.8 ZND	32150	500	1000	0.56	555.49	300	600	0.56	333.29
116	47770910	GEAR	32150	60	120	156.52	18,782.24	40	80	156.52	12,521.50
117	47590972	BUSHING	32150	200	400	37.65	15,058.06	150	300	37.65	11,293.54
118	370011	CIRCLIP, INT REG 52MM PHC	32150	600	1200	6.38	7,661.73	500	1000	6.38	6,384.77

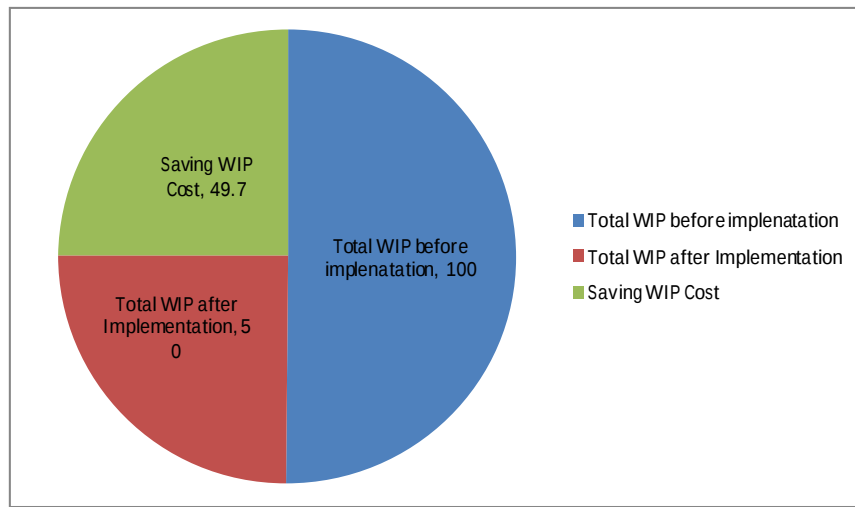
SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
119	430235	SPACER	32150	175	350	23.81	8,333.81	100	200	23.81	4,762.18
120	47604245	RING	32150	170	340	47.10	16,013.11	110	220	47.10	10,361.42
121	412185	BOLT, RDH SHT SQNK FULL M16X50 8.8 ZND	32150	500	1000	36.89	36,892.39	85	170	36.89	6,271.71
122	100020	NUT M16 8 ZND	32150	400	800	4.27	3,417.08	330	660	4.27	2,819.09
123	84072232	ROD WA	64175	15	30	78.17	2,345.05	12	24	78.17	1,876.04
124	120068	BOLT, M10X40 8.8 ZND	32150	500	1000	4.34	4,341.84	330	660	4.34	2,865.61
125	140046	WASHER, BELLEVILLE, LOCK M12X27 ZNM	32150	500	1000	2.60	2,603.88	300	600	2.60	1,562.33
126	9706693	BOLT, M12X60 8.8 ZND	32150	500	1000	7.85	7,846.15	150	300	7.85	2,353.84
127	120117	BOLT, M10X110 FULL 8.8 ZND	32150	500	1000	22.98	22,982.59	150	300	22.98	6,894.78
128	180069	SPRING, COMPRESSION	32150	200	400	18.87	7,548.42	170	340	18.87	6,416.16
129	412141	NUT, PREV TORQUE, NON-MTL M10 8	32150	500	1000	1.90	1,898.73	300	600	1.90	1,139.24

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
		ZND									
130	9811252	HANDLE, CRANKED	32150	200	400	33.49	13,394.07	50	100	33.49	3,348.52
131	140042	WASHER, 11 X 34 X 3 MM CST ZND	32150	200	400	2.82	1,127.14	200	400	2.82	1,127.14
132	539991	SPRING, COMPRESSION	32150	200	400	84.75	33,900.54	160	320	84.75	27,120.43
133	120073	BOLT, M10X80 8.8 ZND	32150	200	400	7.84	3,134.30	100	200	7.84	1,567.15
134	86977786	BOLT, M6X25 FULL 8.8 ZND	32150	500	1000	0.93	929.02	300	600	0.93	557.41
135	308761	BSS08.8P M8X25 86512405	32150	600	1200	4.77	5,727.66	500	1000	4.77	4,773.05
136	378243	WASHER	32150	500	1000	0.44	435.51	300	600	0.44	261.31
137	84432243	HANDLE	32150	200	400	14.71	5,885.11	140	280	14.71	4,119.58
138	300367	WASHER, BELLEVILLE, 8.2X16X 0.6 CSS ZNM	32150	500	1000	1.95	1,953.59	300	600	1.95	1,172.15
139	86629542	NUT, P/T ALL MTL M8 8 ZND	32150	500	1000	1.08	1,084.08	220	440	1.08	477.00
140	322358	WASHER, BELLEVILLE, LOCK M8X18 ZNM	32150	500	1000	0.92	917.39	300	600	0.92	550.44

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
141	9706690	NUT, M8 CL8 ZND	32150	300	600	0.62	369.77	200	400	0.62	246.51
142	382975	BUSHING, 25 X 28 X 15	32150	500	1000	28.08	28,081.60	400	800	28.08	22,465.28
143	200072	BUSHING PLTD, STEEL	32150	100	200	40.11	8,021.79	80	160	40.11	6,417.43
144	378246	WP 16 ES1402	32150	500	1000	2.39	2,390.72	200	400	2.39	956.29
145	140048	WASHER, BELLEVILLE, LOCK M16X32 ZNM	32150	500	1000	5.63	5,634.37	300	600	5.63	3,380.62
146	120092	BOLT, M16X70 8.8 ZND	32150	500	1000	31.30	31,303.50	75	150	31.30	4,695.52
147	12641001	WASHER, 10.2 X 20 X 3 MM CST ZND	32150	500	1000	2.15	2,148.87	300	600	2.15	1,289.32
148	47579796	ROD	43175	48	96	70.78	6,794.57	35	70	70.78	4,954.37
149	100037	NUT, PREV TORQUE	32150	500	1000	2.32	2,316.57	350	700	2.32	1,621.60
150	922846	GEAR	32150	88	176	176.63	31,087.57	65	130	176.63	22,962.41
151	130045	PIN, SLOTTED, SPRING 5X26 HVYCST PLN	32150	450	900	1.80	1,617.57	300	600	1.80	1,078.38

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
152	84014117	DECAL, CAUTION, ROTATING HAZARD	32150	400	800	8.08	6,462.80	300	600	8.08	4,847.10
153	362786	FASTENER	32150	600	1200	7.88	9,458.08	500	1000	7.88	7,881.73
154	362785	SPRING, DIAPHRAGM	32150	350	700	2.73	1,914.43	223	446	2.73	1,219.77
155	446453	RIVET	32150	300	600	1.22	734.04	300	600	1.22	734.04
156	86512446	BSSQ8.8P M10X30 86512405	32150	500	1000	7.43	7,432.48	200	400	7.43	2,972.99
157	918255	AANSLAGRING	32150	76	152	58.78	8,934.61	50	100	58.78	5,878.04
158	84814929	FITTING, LUBE, 45 DEG, M6X1, 21MM HIGH	32150	300	600	12.85	7,711.49	300	600	12.85	7,711.49
159	9510367	MOER	32150	321	642	93.61	60,096.53	250	500	93.61	46,804.15
160	170047	FLAT KEY	32150	136	272	37.49	10,198.25	70	140	37.49	5,249.10
161	411961	PLAIN-WASHER	32150	500	1000	33.39	33,389.91	70	140	33.39	4,674.59
162	100034	JN P M30X1.5	32150	233	466	34.43	16,043.65	100	200	34.43	6,885.69
163	412066	NUT, PREV TORQUE, NON-MTL M16 8	32150	300	600	4.96	2,974.93	280	560	4.96	2,776.60

SR NO	PARTNO.	PARTDESCRIPTION	BIN TYPE	BEFORE				AFTER			
				1 BIN QTY	TOTAL QTY FOR 2 BINS	RATE	WIP INVENTORY COST	1 BIN QTY (10KG/BIN)	TOTAL QTY (10KG/BIN) FOR 2 BINS	RATE	WIP INVENTOR Y COST
		ZND									
164	170019	KEY, SQUARE, 14X9X40 ROUND 5	32150	327	654	18.18	11,887.17	250	500	18.18	9,088.05
165	9837937	BOLT, M12X100FULL 8.8 ZND	32150	500	1000	12.80	12,798.03	110	220	12.80	2,815.57
166	14499601	WASHER, 13 X 20 X 2.5 MM CST ZND	32150	500	1000	1.06	1,056.60	300	600	1.06	633.96
167	918253	HOUSING, BEARING DKGRA	32150	30	60	220.21	13,212.60	12	24	220.21	5,285.04
168	333115	EYE BOLT	32150	500	1000	87.98	87,980.00	40	80	87.98	7,038.40



Calculation:

Total WIP inventory cost before implementation = INR15,57,008.704

Total WIP inventory cost after implementation = INR7,65,929.2554

Total savings in WIP inventory = 15,57,008.704 - 7,65,929.2554

= INR7,65,929.2554

% savings in WIP inventory = 7,65,929.2554 / 15,57,008.704

= 0.491923554 * 100

= 49.192 %

Conclusion & Suggestions

Conclusion:

Work in progress (WIP) is a form of inventory, usually unfinished goods which still require further work, processing, assembly and or inspection. Work in progress is considered a type of waste just like inventory as it ties up cash for a certain period of time which could be generating higher returns elsewhere in the organization. In a large manufacturing facility even small amounts of WIP can add up to a large sums of capital locked up in this type of inventory.

In Neosym ltd there are two main assembly lines and beside two main lines there are two sub-assembly lines i.e. one on left hand side and other is right hand side. Each line contains several workstations. At each workstation 2 bin system is followed. So there is large amount of inventory stored on the line itself

- No standard criteria are there for the parts in the bins.
- There are some parts in bins on the lines which are small but heavy in weight. When the quantity of 1st bins gets over then worker has to go to store for replenishment. At the time of replenishment he has to lift that bins which is heavy in weight. So it is ergonomically difficult for the worker.
- Some of the bins contained excess inventory.

- In the warehouse there are so many small parts which are kept in bigger bins (43150 type) unnecessarily instead of that, that parts can be stored in smaller bins easily(32150 type).So bigger bins unnecessarily blocking the space in the warehouse

Key Learnings & Contribution to the Host Organisation

Key Learnings

Kanban:

Kanban is often seen as a central element of “Lean” manufacturing and is probably the most widely used type “Pull” signalling system. Kanban stands for Kan-card, ban-signal and as you probably guessed, is of Japanese origin.

“Pull” production system controls the flow of work through a factory by only releasing materials into production as the customer demands them i.e. Only when they are needed.

“Push” system on other hand would release material into production as customer orders are processed and material becomes available, MRP(material requirement planning / Manufacturing Resource Planning) systems are typically “push” systems. What must be made clear at this point is that Kanban is not a scheduling system but rather a production control system.

FIFO

"FIFO" stands for the first-in, first-out, mean that the oldest inventory items are recorded as sold first but do not necessarily mean that the exact oldest physical object has been tracked and sold. In other words, the cost associated with the inventory that was purchased first is the cost expensed first and The FIFO method is an important for a company to value their ending inventory at the finish of an accounting period. This amount can help businesses determine their Cost of Goods Sold, an important number for budgets and evaluating profitability.

Inbound Logistics

Inbound Logistics the receiving and warehousing of raw materials, and their distribution to manufacturing as they are required. Operations: the processes of transforming inputs into finished products and services. inbound coming into a business. Outbound **logistics** refers to the same for goods going out of a business

JIT:

Just in time (JIT) is an inventory management method whereby materials, goods, and labor are scheduled to arrive or be replenished exactly when needed in the production process.

5S:

5S stands for the 5 steps of this methodology: Sort, Set in Order, Shine, Standardize, Sustain.

: Establishing a safe and sanitary work environment (Safety)

2 Bin system:

The two-bin system (sometimes called the min-max system) involves the use of two bins, either physically or on paper. The first bin is intended for supplying current demand and the second for satisfying demand during the replenishment period.

PFEP (Plan For Every Part)

PFEP (Plan For Every Part) defines and sustains information about each part of the process.

- Where its come from
- How it is delivered
- When it is delivered and how often
- How it should be stored and packaged
- What is the point of use
- When to replenish

A well designed and maintained PFEP system significantly reduces material shortage, inventories, supply chain complexities and costs

Learned how the ERP System 'Infor LN' works.

Suggetions:

- Organization should reduce the assembly line side inventory for the model area i.e. maintaining 10kg quantity of parts per bin.
- Organizations have to arrange the whole warehouse according to 10kg quantity of parts per bin.
- Company should have to prepare the kanban cards for the model area i.e. for model area.
- They have to Reduced the space in the warehouse by replacing 75 bigger bins (43150 type) into smaller bins (32150 type).By doing this more 38 smaller bins can be accommodated.

REFERENCES

- ‘Supply Chain Management’ by Sunil Chopra
- http://papers.ssrn.com/sol3/JELJOUR_Results.cfm?form_name=journalbrowse&journal_id=992388
- <https://www.logility.com/library/white-papers>
- <http://www.iimm.org/index.php/education-research/student-zone-iimm/mba-scm-previous-question-papers>