ISSN: 0976-3376

Available Online at http://www.journalajst.com

ASIAN JOURNAL OF SCIENCE AND TECHNOLOGY

Asian Journal of Science and Technology
Vol. 08, Issue, 06, pp.4922-4924, June, 2017

RESEARCH ARTICLE

TO CALCULATE THE DIS-ASSEMBLY RATE BY USING THE PRODUCTION RATE PHILOSOPHY OF ADAMAGED CARS/ AUTO VEHICLE WHOSE DUMPED IN THE WAREHOUSES (A WASTE MANAGEMENT PHILOSOPHY)

***Mohammad TariqueJamali**

Lecturer in industrial Engineering, Department of Industrial Engineering

ARTICLE INFO

Article History:
Received 27th March, 2017
Received in revised form
01st April, 2017
Accepted 19th May, 2017
Published online 30th June, 2017

Key words:
Disassemble production rate,
Disassemble lead time,
Setup time, Operation time,
Non-operation time.

ABSTRACT

In this study we develop the dis-assembly production rate formula on the basis of production line analysis and calculate the disassembly production rate as well as disassembly lead time. This formula and calculation is useful for designing the new disassembly production line of a damaged car/ auto vehicles. And these random data is also useful for setting the robotic arm to operate the disassembly the damaged car / auto vehicle and also develop the software for microprocessor in disassembly production line to clean the warehouses(open space) where the damaged car/ auto vehicle are stored without usage.

INTRODUCTION

Today the word is facing the damaged car / auto vehicle. That's be stored in open space give the environment pollution and occupied the space. Therefore we dis assemble it and recycle it through an assembly line / production line. Therefore dis - assembly Production linedesigner required to design a disassembly production line robotic arms who automatically disassemble the damaged cars/ auto vehicle. Here we formulate and analyze the disassemble production rate. We design a disassembly production line which are helpful for the designer to make the software for microprocessor of robotic arm which perfectly (automatically) remove the damaged car/ auto vehicle component and put in a separate storage where manufacturer examine which parts/component is recycle or reuse. Here we develop a formula to calculate the disassemble production rate and disassemble lead time using the production rate philosophy. Theory- Here in a dis -assemble production line we take the batch size of 100 damaged cars / auto vehicle to dis -assemble it. For calculating the dis-assemble rate we developed a simple formula. The strategy as fallows Here we know that t there are five major component and other are assumed to be subcomponents of a damaged cars / auto vehicle to dis- assembled them by a robotic arm [1].

****Corresponding author: Mohammad TariqueJamali***
Lecturer in industrial Engineering, Department of Industrial Engineering

These are shown below in a tabular form to calculate the set up time in hours (h) and operation time in (h). we use the abbreviation for set up time for dis-assemble part is $STD_{ij}$and for operation time disassemble part is OTD $_{ij}$ where i for main components for damaged car/auto vehicle and j for sub component of that main component.

The tables are given below

For first main component D1 means disassembly of car wheels which have suppose two sub component like D11-Disassemble tire, D12-Disassemble rim from damaged car / auto vehicle

Table 1. Disassembly of car wheels (D1)

Disassemble component	Set up time (h)	Operation time (h)
Disassemble tire D11	STD11 = 1	OTD11 = 0.5
Disassemble rim D12	STD12 = 1	OTD12 = 0.3
TotalΣD_{ij} = 2	ΣSTD_{ij} =2	ΣSTD_{ij} =0.8

$T1_{SU} = \Sigma STD_{ij}/ \Sigma D_{ij}$ = 1 hours
$T1_{AV} = \Sigma STD_{ij}/\Sigma D_{ij}$ = 0.8/ 2= 0.4 hours

Where $T1_{SU}$ = average set up time for disassemble component 1

$T1_{AV}$ =average operation time for disassemble component 1
Similarly for second main component disassemble the car body D2 which have sub component like

D21- disassemble the car wind screen, doors, D22-disassemble the car roofs

Table 2. Disassemble the car body (D2)

Disassemble component	Set up time (h)	Operation time (h)
D21	STD21 = 2	OTD21 = 0.6
D22	STD22 = 1	OTD22 = 0.4
TotalΣD_{ij} =2	ΣSTD_{ij} = 3	Σ OTD $_{ij}$ = 1.0

$T2_{SU} = \Sigma STD_{ij} / \Sigma D_{ij} = 3/2 = 1.5$ hours
$T2_{AV} = \Sigma STD_{ij} / \Sigma D_{ij} = 1/ 2 = 0.5$ hours

Where $T2_{SU}$ = average set up time for disassemble component 2

$T2_{AV}$ =average operation time for disassemble component 2
Similarly for third main component disassemble the chassis D3 which have sub component like

D31- disassemble the rare axle, D32- disassemble the live axle, D33- disassemble the shock absorber, D34- disassemble the muffler, D35- disassemble the Fuel tank

Table 3. Disassemble the chassis (D3)

Disassemble component	Set up time (h)	Operation time (h)
D31	STD31 = 1	OTD31 = 0.5
D32	STD32 = 1	OTD32 = 0.5
D33	STD33 =0.5	OTD33 = 0.2
D34	STD34 = 0.5	OTD34 = 0.1
D35	STD35 =1	OTD35 = 0.2
TotalΣD_{ij}	ΣSTD_{ij} = 4	Σ OTD $_{ij}$ = 1.5

$T3_{SU} = \Sigma STD_{ij} / \Sigma D_{ij} = 4/5 = 0.8$ hours
$T3_{AV} = \Sigma STD_{ij} / \Sigma D_{ij} = 1.5 /5 = 0.3$ hours

Where $T3_{SU}$ = average set up time for disassemble component 3

$T3_{AV}$ =average operation time for disassemble component 3
Similarly for four main component disassemble the car Engine D4 which have sub component like D41- disassemble the Engine Fan, D42- disassemble the piston,D43- disassemble the transmission assembly, D44- disassemble the Battery, D45- disassemble the Fuel injector, D46 -disassemble the radiator

Table 4. Disassemble the car Engine (D4)

Disassemble component	Set up time (h)	Operation time (h)
D41	STD41 = 1	OTD41 = 0.3
D42	STD42 = 0.5	OTD42 = 0.2
D43	STD43 = 1	OTD43 = 0.3
D44	STD44 = 0.5	OTD44 = 0.2
D45	STD45 = 0.5	OTD45 =0.2
D46	STD46 = 0.5	OTD 46 =0.2
TotalΣD_{ij}	ΣSTD_{ij}	Σ OTD $_{ij}$ = 1.4

$T4_{SU} = \Sigma STD_{ij} / \Sigma D_{ij} = 4/ 6 = 0.67$ hours
$T4_{AV} = \Sigma STD_{ij} / \Sigma D_{ij} = 0.23$ hours

Where $T4_{SU}$ = average set up time for disassemble component 4

$T4_{AV}$ =average operation time for disassemble component 4
Similarly for four main component disassemble the car Accessories D5 which have sub component likeD51- disassemble the steering assembly,D52-disassemble the brakes, D53-disassemble the pressure gauge,D54-disassemble the clutches,D55-disassemble the spark plug,D56 for disassemble alternator.

Table 5. Disassemble the car Accessories (D5)

Disassemble component	Set up time (h)	Operation time (h)
D51	STD51 = 1	OTD41 = 0.3
D52	STD52 = 2	OTD42 = 0.4
D53	STD53 = 1	OTD43 =0.2
D54	STD54 = 0.5	OTD44 = 0.1
D55	STD55 = 0.1	OTD45 =0.1
D56	STD56 =0.1	OTD 46 = 0.1
TotalΣD_{ij}	ΣSTD_{ij} = 4.7	Σ OTD $_{ij}$= 1.2

$T5_{SU} = \Sigma STD_{ij} / \Sigma D_{ij} = 4.7/6 = 0.78$ hours
$T5_{AV} = \Sigma STD_{ij} / \Sigma D_{ij} = 1.2 / 6 = 0.2$ hours

Where $T5_{SU}$ = average set up time for disassemble component 5

$T5_{AV}$ =average operation time for disassemble component 5
First we calculate the Dis- assembly average set up time that we know that

Table 6. Disassemble of the damaged car/ auto vehicle main component (D_i)

Disassemble component	Set up time (h)	Operation time (h)
D1	$T1_{SU}$= 1.0	$T1_{AV}$=0.4
D2	$T2_{SU}$ = 1.5	$T2_{AV}$ =0.5
D3	$T3_{SU}$ = 0.8	$T3_{AV}$ =0.3
D4	$T4_{SU}$ =0.67	$T4_{AV}$ =0.23
D5	$T5_{SU}$=0.78	$T5_{AV}$= 0.2
Total ΣD_i	ΣTi_{SU} =4.75	Σ Ti $_{AV}$ = 1.63

We know that average set up time and average operation time given below

$T_{STDU} = \Sigma Ti_{SU} / \Sigma D_i = 4.75/5 = 0.95$
$T_{OTDU} = \Sigma Ti_{AV} / \Sigma D_i = 1.63/5 = 0.326$

Then we know that

The Disassemble Lead Time = DLT
Total Number of Dis assembled component = $\Sigma Di + \Sigma D_{ij}$
Damaged Car / auto vehicle Batch size = DB
Non- operation time of robotic Arm of disassemble the component are = T_{nop}

Therefore we formulate the disassemble lead time as on the basis of production rate formula by an assembly line/ production line

$DLT = ((\Sigma Di + \Sigma D_{ij}) (T_{STDU} + DB \times T_{OTDU} + T_{nop}))$

Disassemble production rate (R_{Pd}) when emphasis given to the component D3

First we calculate operation time rate 3 say T_{pd}

$T_{pd} = (T3_{SU} + DB \times T3_{AV} + T_{nop}) / DB$

We Know that

$R_{pd} = 1/ T_{pd}$

Result - we assume the timing as given in the above table we found the following results

$DLT = ((\Sigma Di + \Sigma D_{ij}) (T_{STDU} + DB \times T_{OTDU} + T_{nop}))$

$(\Sigma Di + \Sigma D_{ij}) = (5+(2+ 2+ 5+ 6+6)) = 26$

$T_{STDU} = 0.95$, $T_{OTDU} = 0.326$

BD = 100, T_{nop} = 12 hours (assume the robotic arms are working in 12 hours)

Then DLT = (26 (0.95 +100 X 0.326 + 12)) 1.184.3 hours

$T_{pd} = (T3_{SU} + DB \times T3_{AV} + T_{nop}) / DB$

= (0.8 + 100X 0.3 + !2)/ 100 = 0.428 hours / piece

$R_{pd} = 1/ T_{pd} = 1/ 0.428 = 2.33644$ piece / hours

R_{pd} = 2.34 pieces / hours

From here we found the Disassemble production rate of the damaged car is 2.34 pieces per hours when we give the emphasis of the main component of chassis D3. This is good for dis assemble the car/ auto vehicle. Conclusion – from the result we give some conclusion which are favorable to the dis-assembly production line designers. These are

- Choose the random time for first calculated by manual robotics arm to disassembled the damaged car components and set these values in a microprocessor (software). Then the assembly line process automatically by robotic arm.
- Production line designer also designed the optimal dis assemble rate to give the priority accordance to the design of dis-assemble time / production time[2] in a particular satiation
- Production line designer also calculate the Efficiency and effective ness[3] of the disassemble production line through un-paced production line philosophy.
- We develop the fully automatic disassemble production line with optimal production rate to achieve through bowl phenomenon[4]in un-paced production line.
- Future scope- we also calculate the high disassembly production rate when we give the more variance in the line and also reduce the setuptime to disassemble the component.

REFERENCES

Jamali, M.T., Mohd Ziaulhaq, Dr. A. Suhail, Mohammad Khalid, (Jan- Feb. 2015)," The Effect of Imbalance on the Performance of Un-paced Production Line – A Mathematical Modeling Approach", *IOSR Journal of Mechanical and Civil Engineering* (IOSR-JMCE), PP 14-19, Volume 12, Issue 1 Ver. I, www.iosrjournals.org

Jamali, M . T., Prof. ArifSuhail "The Effect Of Imbalance On the Performance Of Un- paced Production line when the optimal bowel known" academia.com"

Jamali, M. T., Prof Arifsuhail"THE EFFECT OF IMBALANCE ON THE PERFORMANCE OF UN-PACED PRODUCTION LINE WHEN THE OPTIMAL BOWL UNKNOWN" *International journal of core Engineering and management* (ISSN 2348-9510 , vol. 3, issue 8, Nov 2016) ,www.ijcem.in

Mohammad tarique jamali[1] "Waste management of damaged cars/ auto vehicle whose dumped in the warehouses (open Environment)." *International Journal of Current Research*" www.journalcra.com (accepted and published in April 2017 journal)

****