Irox- Helix Process Optimization

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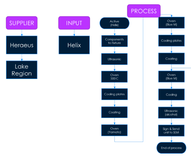
PROBLEM STATEMENT

Through the VOC and a conversation with the sponsor we identified a major concern in capacity, efficiency and continuous improvement in the IROX laboratory. So, we will be focused on analyzing the reason for these causes.

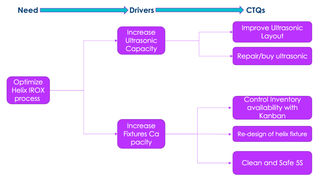
VOC

SIPOC



PROJECT CHARTER

CTQ



M

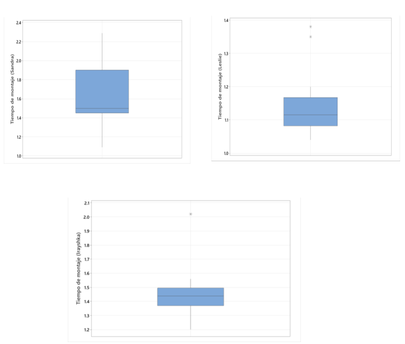
DESCRIPTIVE STATISTICS

Statistics

Variable	N	N*	Mean	StDev	CoefVar	Minimum	Median	Maximum	Range
Tiempo de montaje (Sandra)	12	0	1.6033	0.3374	21.04	1.0900	1.5000	2.2900	1.2000
Tiempo de montaje (Leslie)	20	0	1.1375	0.0898	7.89	1.0400	1.1150	1.3800	0.3400
Tiempo de montaje (Irayshka)	29	0	1.4472	0.1366	9.44	1.2000	1.4400	2.0200	0.8200

In the following writing we will be analyzing the results obtained in the measurement of the assembly process of "fixtures" for the 3 techniques that carry out this process (PB3, PB2 and PB1). Descriptive statistics is very useful for summarizing numerical data with a variety of statistics. Among them we can analyze the mean, standard deviation, coefficient of variation, median and range. Initially we have the average assembly time in the "fixtures" of the IROX laboratory, which indicates that the center of the data distribution for PB1 is 1.60 minutes, PB3 1.1375 minutes and PB2 with 1.4472 minutes. Here we begin to see that the fastest in average time carrying out the assembly process is PB2 and PB1 the least fast. In this case PB1 had a number of measurements taken "N" that PB3 and PB2 this influences the average time. With the standard deviation we can identify the variation of the data with respect to the mean, in this case the variation for PB1 with respect to the mean is 0.3373, PB2 0.1366 and PB3 0.0898, with the least variation of the 3.

BOX PLOT



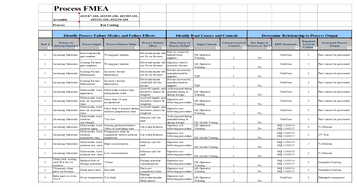
ULTRASONIC CAPABILITY

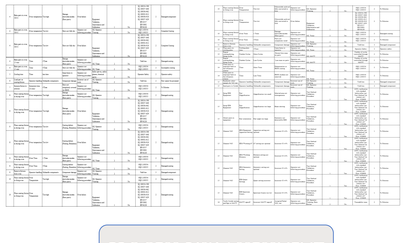
Size of the beaker (mL)	Qty of fixtures in beaker	Qty of beakers in ultrasonic	Qty of helix in each ultrasonic	Qty of ultrasonics	Total of helix production	Lot
150	1	12	432	6	2,592	2
400	3	5	540	6	3,240	2.5
600	4	4	576	6	3,456	2.6

Currently, in the ultrasonic station, baths are carried out in water or alcohol. Operators have several options to place the "fixtures", where the helix components are mounted, inside the "beakers" or glass beakers to later place them inside the ultrasonic ones. If you use the 150 mL glass beaker, only one "fixture" fits, inside each ultrasonic you can place 12 glass beakers, for a quantity of 432 helixes per ultrasonic, having six ultrasonics in total, the grand total of helix will be of 2,592, which are two lots of the component. If you use the 400 mL glass beaker, three "fixtures" fit, inside each ultrasonic you can place 5 glass beakers, for a quantity of 540 helixes per ultrasonic, having six ultrasonics in total, the grand total of helixes will be 3,240, which is 2.5 lots of the component. Finally, if you use the 600 mL glass beaker, four "fixtures" fit, inside each ultrasonic you can place 4 glass beakers, for a quantity of 576 helixes per ultrasonic, having six ultrasonics in total, the grand total of helixes will be 3,240, which is 2.6 lots of the component.

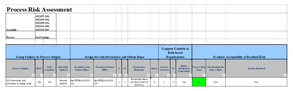
A

FMEA

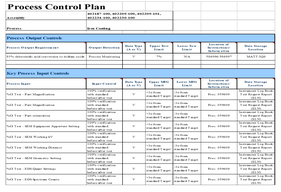




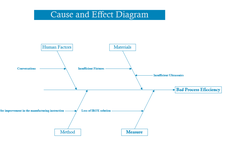
PROCESS RISK ASSESSMENT



Process Control Plan



CAUSE AND EFFECT DIAGRAM



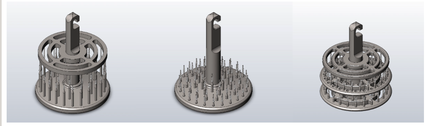
In the diagram we break down the most important causes that we were observing and determine the root cause of the project as important factors. Among them we have the following: in the first place we have human factors, specifically with the conversations between the same technicians who are in the laboratory, they affect since this time could be used to carry out multiple tasks, we are not saying that they do not comply with the tasks or production, but they could maximize the time even more to be more efficient and productive. In 2nd place we have the lack of material such as fixtures and ultrasonic capacity, since this amount is in short supply, it limits the number of batches that can come out per turn depending on the component that is running. In 3rd place we have the method since we identified some steps in the instruction that can be eliminated since it does not impact the quality of the component, we do not know why this step continued to be carried out without being necessary. Finally, in 4th place, we have the measure of the IROX solution since we receive information that sometimes the order is given to prepare this solution because apparently the components will arrive the next day but if they do not arrive that day or the next, the solution is lost since it must be used before the end of 48 hrs.

I

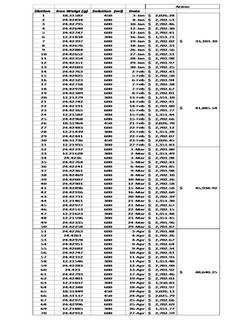
RE-DESIGN

No.	Type	Order	Description	Qty	Unit	Price	Amount
1		7000332425	Irox Fixture 2nd Option: 7000278264-ICFT20-WM	1	each	$2,475.00 USD	$2,475.00 USD
2		7000332425	Irox Fixture 2nd Option: 7000278264-ICFT36-WM	1	each	$4,350.00 USD	$4,350.00 USD

Both recommended fixtures were sent to be manufacture and a production order was created. The fixture option #1 with more than 20 pins has a cost of $ 2,475.00 and the recommended fixture # 2 of two floors has a cost of $ 4,350.00. Both fixtures were sent to do and then carry out the tests to validate the selected fixture.



SAVINGS



EXPENSES AND RETURN OF INVESTMENTS

	Fixture #1	Fixture #2
Cost	$2,475	$4,350
Qty	36 = $89,100	36 = $156,600
	27 = $66,825	18 = $78,300
Testing	$60,000	
Subs	$20,000	
Savings	$400,000	
Total	36 = $169,100	36 = $236,600
	27 = $146,825	18 = $158,300
ROI	36 = 137%	36 = 69%
	27 = 172%	18 = 153%

Passive Process

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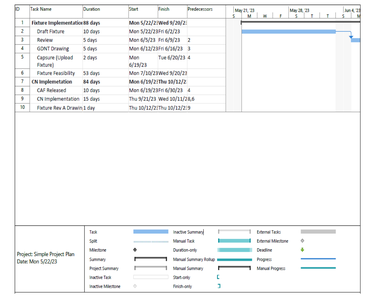
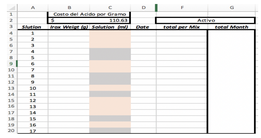
IMPLEMENTATION PLAN



ID	Task Name	Duration	Start	Finish	Predecessors
1	**Fixture Implementation**	**88 days**	**Mon 5/22/23**	**Wed 9/20/23**	
2	Draft Fixture	10 days	Mon 5/22/23	Fri 6/2/23	
3	Review	5 days	Mon 6/5/23	Fri 6/9/23	2
4	GDNT Drawing	5 days	Mon 6/12/23	Fri 6/16/23	3
5	Capture (Upload Fixture)	2 days	Mon 6/19/23	Tue 6/20/23	4
6	Fixture Feasibility	53 days	Mon 7/10/23	Wed 9/20/23	
7	**CN Implementation**	**84 days**	**Mon 6/19/23**	**Thu 10/12/23**	
8	CAF Released	10 days	Mon 6/19/23	Fri 6/30/23	4
9	CN Implementation	15 days	Thu 9/21/23	Wed 10/11/23	6
10	Fixture Rev A Drawin	1 day	Thu 10/12/23	Thu 10/12/23	9

MONITORING TABLE



Solution	Irox Weight (g)	Solution (ml)	Date	Total per Mix	Total Month
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

CONCLUSION

For this part of the project, after developing the cause-and-effect diagram, we can have a better visualization of what can help to optimize the HELIX process in irox, we opted for the idea of redesigning the fixture, which is the most important factor to reduce expenses in The IROX solution, additionally, we analyzed what would be the ideal amount of ultrasonics that should be used in this process to reduce alcohol baths and beaker inventory in the same way. Also, we analyzed the human factors, the measurements and the standard method that was used to carry out this operation. We carry out an economic analysis where you can see a large amount of money in savings with our recommendation, we present tests, and we will be waiting for this new fixture to be manufactured to be tested by the machines of the manufacturing line.

GRATITUDE

We want to thank the Boston Scientific company for helping us and allowing us to carry out our project. We thank our sponsor for receiving us and entrusting us with his staff. In the same way, we want to thank our professor Carlos González for providing us with the necessary tools and knowledge to carry out an excellent job. This project has been vital in leading us towards our future as industrial engineers.