## IME 408 Industrial Robotics -- Edwards

#### Test II

## September 10, 2020

Answer the Following Questions to the Best of Your Ability – GOOD LUCK!!

#### <u>SAFI</u>

ET	Y FIRST AGAIN!!!!
1)	If there were an incident in the Robotics Lab which required Emergency attention, what telephone number should you call if you were to use your cell phone?
	810-762-9501
	b) Why THIS number??
	It is campus safety, they know where the lab is rather than 911, where they would likely hesitate to know where the lab is at.
- \	
2)	If you need to go into a robotic work cell, Turning the Teach Pendant "On" and taking it into a robotic work cell is a layer of safety.
	True False

Why??

The teaching pendant overrides any programs loaded onto the robot and only moves via the teaching pendant

3) What are Denavit-Hartenberg (D-H) Parameters??			
The par	ameters for a particular convention for locating a robot in space.		
4) A 25%	Improvement in Cycle Time yields what Level of Improvement in JPH?		
B) C) D)	The Same 25% Between 20% and 25% Between 25% and 30%  33% All The Above		
IN LAB;			
5) <i>In Lab,</i>	There is an E-stop on the Teach Pendant and the Control Panel.		
	True False		
6) On the	teach pendent, what button clears a fault?		
B) C) D)	Clear Reset Shift +J1 All The Above		
7) On the	teach pendent, what button do we hold while pressing a +J2 to move the robot?		
A)	Clear		
_	Reset		
-	Shift +J1		
•	None of the Above		

8) What is the difference between accurate and $\mid$	precise??	
Accuracy: close to the intended point		
Precision: repetition about the same spot		
b) Which are robots noted for?		
Precision		
9) Which robotic system would be more flexible	and cost effective?	
	Prismatic	Articulating
<ul> <li>10) If you have a large working environment and crankshafts to move from a forging press across a Robotic System might you wish to use?  Gantry cranes allow for large arms to traverse large 3-dimensional movements, so it can reach down, move it to the machining area.</li> <li>11) Ideally, a Body Shop wants to operate in</li></ul>	an aisle to a machini ge areas. They allow for pull the piece up as neede	ng operation; which

12) If the Body Shop were asked to move production from 60 to 120 Jobs per Hours, What would be the necessary improvement (%) in the Cycle Time in order to achieve this goal.

In order to double the productivity, we must cut the cycle time in half, therefore we must see a 50% improvement in cycle time.

# Honolulu Assembly - TCF Layout

	Station 1	Station 2	Station 3	Station 4	Station 5	Station 6	Station 7	
From Paint	45 sec./ hr.	5 sec./ hr.	12 sec./ hr.	2 sec./ hr.	2 sec./ hr.	2 sec./ hr.	4 sec./ hr.	
<b>—</b>			Triı	m 1 - 67 JPH				
	Station 14 7 sec./ hr.	Station 13 13 sec./ hr.	Station 12 150 sec./ hr.	Station 11 5 sec./ hr.	Station 10 20 sec./ hr.	Station 9 5 sec./ hr.	Station 8 160 sec./ hr.	Buffer 5 Max
	/ Sec./ III.	15 Sec./ III.		m 2 - 67 JPH	20 sec./ iii.	3 sec./ iii.	100 sec./ iii.	
Buffer	Station 15	Station 16	Station 17	Station 18	Station 19	Station 20	Station 21	. 1
30 Max	40 sec./ hr.	30 sec./ hr.	23 sec./ hr.	22 sec./ hr.	15 sec./ hr.	10 sec./ hr.	40 sec./ hr.	
			Chas	sis 1 - 65 JPF	I			
	Station 28	Station 27	Station 26	Station 25	Station 24	Station 23	Station 22	Buffer
	115 sec./ hr.	112 sec./ hr.	115 sec./ hr.	115 sec./ hr.	110 sec./ hr.	115 sec./ hr.	110 sec./ hr.	5 Max
	Chassis 2 - 65 JPH							
Buffer 30 Max	Station 29	Station 30	Station 31	Station 32	Station 33	Station 34	Station 35	
30 Max	0 sec./ hr.	0 sec./ hr.	10 sec./ hr.	160 sec./ hr.	2 sec./ hr.	5 sec./ hr.	3 sec./ hr.	
7			Fin	al 1 - 63 JPH				
	Station 42	Station 41	Station 40	Station 39	Station 38	Station 37	Station 36	Buffer 5 Max
To Shipping	3 sec./ hr.	4 sec./ hr.	155 sec./ hr.	4 sec./ hr.	6 sec./ hr.	5 sec./ hr.	3 sec./ hr.	
4			Fin	al 2 - 63 JPH				

#### FOR THE FOLLOWING QUESTIONS - PLEASE REFER TO THE HOLOLULU PROJECT ABOVE!!!

13) If we automate Trim 1 and improve the SAJPH output by 20%, what percent improvement would we expect to see at the Paypoint?

Trim 1: ((59.85 - 65.55) / 65.55) \* 100 = 8.7

Even though trim 1 sees an 8.7% improvement, we do not see any of it since it is not the bottleneck.

14) If we automate Chassis 2 and improve the SAJPH output by 20%, what percent		
improvement would we expect to see at the Paypoint?		
Chassis 2: (59.85 * (final 1/2) - 50.7(50.7)) / 50.7 = 18% improvement		
15) Where would be the new Bottleneck? Where would it not be??		
The new bottleneck becomes final 1 and final 2 after Chassis 2 surpasses 59.85 SAJPH.		
16) Why would we not see the "Full Benefit" of this potential improvement in Chassis 2?		
Once Chassis 2 passes another area in its SAJPH, the other area would need to improve as well to keep up with the better version of Chassis 2.		
17) What would be new SAJPH of Chassis 2??		

### Extra Credit

I) In the Book	"Th	e Goal"				
i, iii eile book,	) In the Book, "The Goal"					
	Who was Alex Rogo's Mentor?					
		Jonah.				
II) What are Isaac Asimov's 3 Laws of Robotics?						
	1)	A robot may not injure a human being or, through inaction, allow a human being to come to harm				
	2)	A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.				
	3)	A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.				