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NAVIGATING ROBOT DOWNTIME

Our Line is Down...

Our line is down. The four most disruptive words a manufacturing manager will hear in their facility. The chaos of diagnosing the problem, constructing a solution, and implementing the solution can instill a significant amount of unwanted stress. This is why most manufacturing organizations have detailed plans to handle down line situations.

So this begs the questions, should 6-axis robots have similar contingency plans. The answer depends on a couple of factors such as robot utilization and manufacturing demand for your robot. If both those numbers are high, then a detailed rigorous recovery plan needs to be a part of your manufacturing process.

Even the highest performance robots will have downtime issues at some point in their deployment life cycle. Robot downtime can be caused my a multitude of factors including:

- Joint replacement
- Mechanical drift
- Accidental setup displacement
- Misaligned parts
- Robot fault

Most of these problems are a natural part of automation. While preventative measures can help stave off these problems longer, at some point the manufacturing/ automation team will come across them.

Robot Downtime Cost

So how impactful is the financial impact of an unplanned downtime scenario? Lost production and direct labor costs sum up the bulk of tangible downtime costs. Let's take the example of one robot on one manufacturing line.

- 1 Part Per Minute
- Part Revenue = $500
- Part Profit = $50

The robot on this line produces 1 part per minute that is worth $500 in revenue and $50 dollars in profit. The robot generates $30,000 in revenue and $3,000 in profit per hour.

PPM (PARTS PER MIN)	PART REVENUE	PART PROFIT	LOST REVENUE (PER HOUR)	LOST PROFIT (PER HOUR)
1	500	50	30,000	3,000

The average downtime session is 4 hours based on the Vanson Bourne Research Study. We assume solving the problem required two manufacturing engineers at $50/h or $400 total. We can also deduce that the production losses in revenue and profit in this scenario are $120,000 and $12,000 respectively. **In total, the unplanned downtime wiped away $12,400 from the bottom line.**

AVERAGE DOWNTIME (HOURS)	AVERAGE DOWNTIME LOST REVENUE	AVERAGE DOWNTIME LOST PROFIT	MANUFACTURING ENGINEER COST
4	102,000	12,000	400

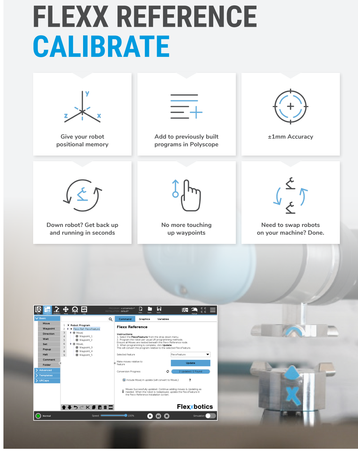
Multiply this by the number of robots you have in your facility and you can see the holistic impact of how robot downtime can affect your business.

Devising a Plan

We concluded speed and efficiency are the most crucial aspects of a successful line down preventative plan based on the financial implications above. If a facility has multiple robots, having a spare robot is a good preventive measure. A spare robot alone is not enough to complete your preventative measure. Replacing a downed robot with another robot during say a joint replacement is based on the manufacturing concept of exchangeability. The ability to replace one robot with another requires a process that ensures both robots have similar accuracy and repeatability. The joint replacement itself requires a meticulous process that can change waypoint positions.

You can accomplish calibration by sending your robot to a Universal Robot servicing facility, where they perform a combined kinematic calibration of both robots. The process can take a few days to complete and when every minute counts it can delay your recovery plan. Furthermore even if the robot is calibrated, you most likely will need to touch up waypoints for higher precision applications.

Alternatively, hardware/software solutions like the Flexx Reference from Flexxbotics can provide quick and easy relative offsets for your robot. Imagine the Flexx Reference tool as providing real world positional memory for your robot. Use the Flexx Lockout to set your feature offset and click update in Polyscope with the URCap plugin to update your program relative to the offset. Whether the robot is calibrated or uncalibrated the Flexx Reference can update all of your waypoints within ±1mm of your originally programmed way points.



With solutions like the Flexx Reference robot downtime should never be longer than a few minutes. Once a joint or robot has been replaced, the Flexx Reference will ensure your program's repeatability is achieved in under 5 minutes. Your downtime is significantly reduced, your engineers can remain on their current projects and your bottom line is preserved. Avoid the stress of a robot downtime and devise a plan today.

For more info on the Flexx Reference feel free to reach out to either sales@flexxbotics.com or visit www.flexxbotics.com