PREPARING FOR THE FUTURE

A compelling account on how the SmartFix 4.0 team has been working through this lockdown to analyze data collected to come up with a robust Lockdown Recovery Plan.

As the pandemic of Covid-19 continues to impact our daily lives, we must continue to hope for a brighter future. To achieve that, we must utilize the present to prepare for it. The manufacturing industry, in particular, has had no choice but to close down factory floors for the safety of the employees. But soon there will be a day when the doors open again and they have to face the challenge of catching up and bringing things back to normal. Fortunately, Industry 4.0 has enabled companies to get a head start on this journey to normalcy. The (Forms & Gears/ASM) SmartFix 4.0 team has been working through this lockdown to analyze data collected to come up with a Lockdown Recovery Plan. Through the sensors on SmartFix 4.0, they are now able to determine the daily number of components manufactured by combining the clamp and unclamp data from pressure sensors along with operation data from vibration sensors. The benefit of this exercise is that it has allowed ASM to calculate the total machine time as well as the total idle time.

Source: RV Forms & Gears Pvt Ltd

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Case in point

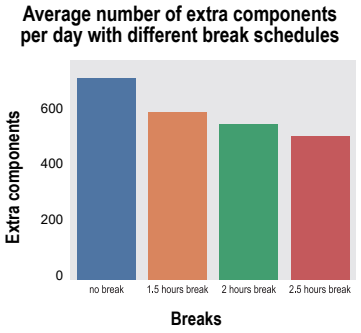
In a particular case of one customer, it was observed that there was more idle time than machine time on a daily basis. Hence, the first analysis done was to see how many additional components could be manufactured if the idle time was utilized.

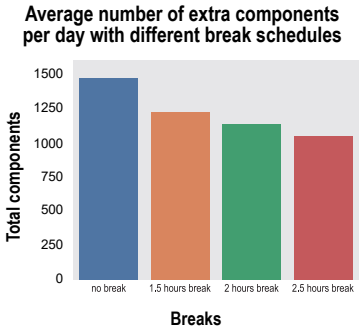
Now, it is not realistic to replace every minute of idle time with machine time so various models were generated to show how many additional components could be manufactured based on different idle times.

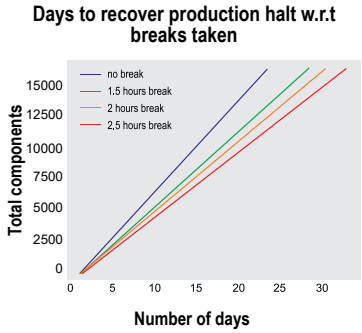
The next layer of analysis was to see total amount of idle time per shift. Data patterns show that there was a gradual increase in idle time per shift as the day went by. This granular layer of analysis can help a customer take measures to utilize specific shifts over the others and be more predictive.

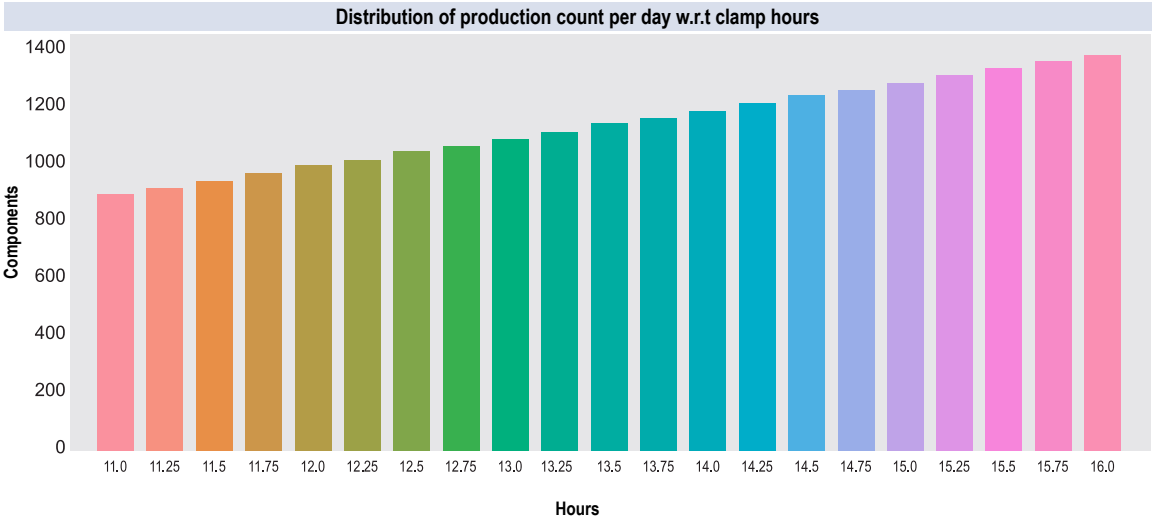
The implementation of SmartFix 4.0 for this customer had three vibration sensors, one pressure sensor and one proximity sensor. The proximity sensor, as the name suggests, logs the presence of the component on the fixture. The pressure sensor collects pressure applied during the clamping and de-clamping of the component. The vibration sensors (we use three to capture data across every axis) are used to record the vibration values caused by the impact of the tool on the component. When these values breach a certain threshold, we can detect issues with the component being manufactured as well as detect tool wear.

RECOVERY ANALYSIS (DAY WISE)









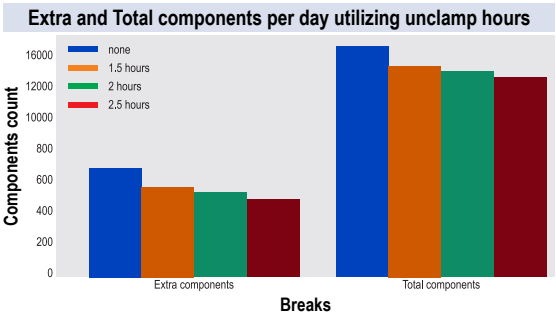


Fig 1 Dispute distribution of number of extra and total components produced during unclamped hours given 4 break plans

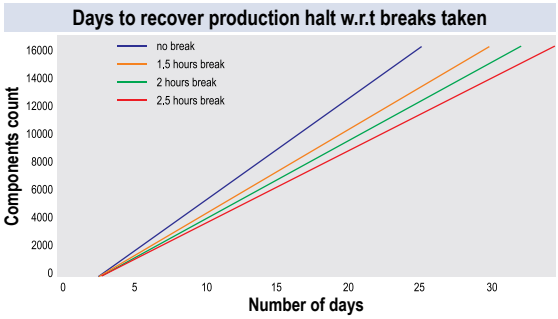


Fig 2 The projected number of days to recover 21 days production halt with different break plans

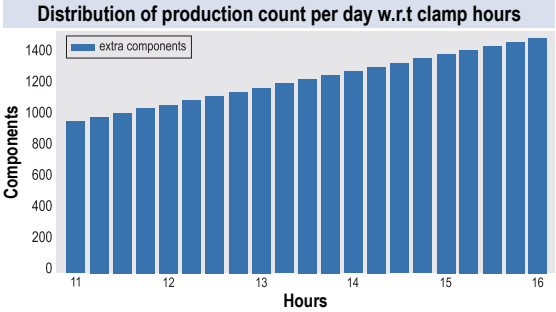
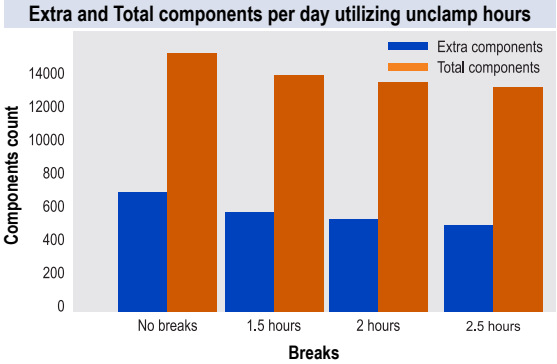


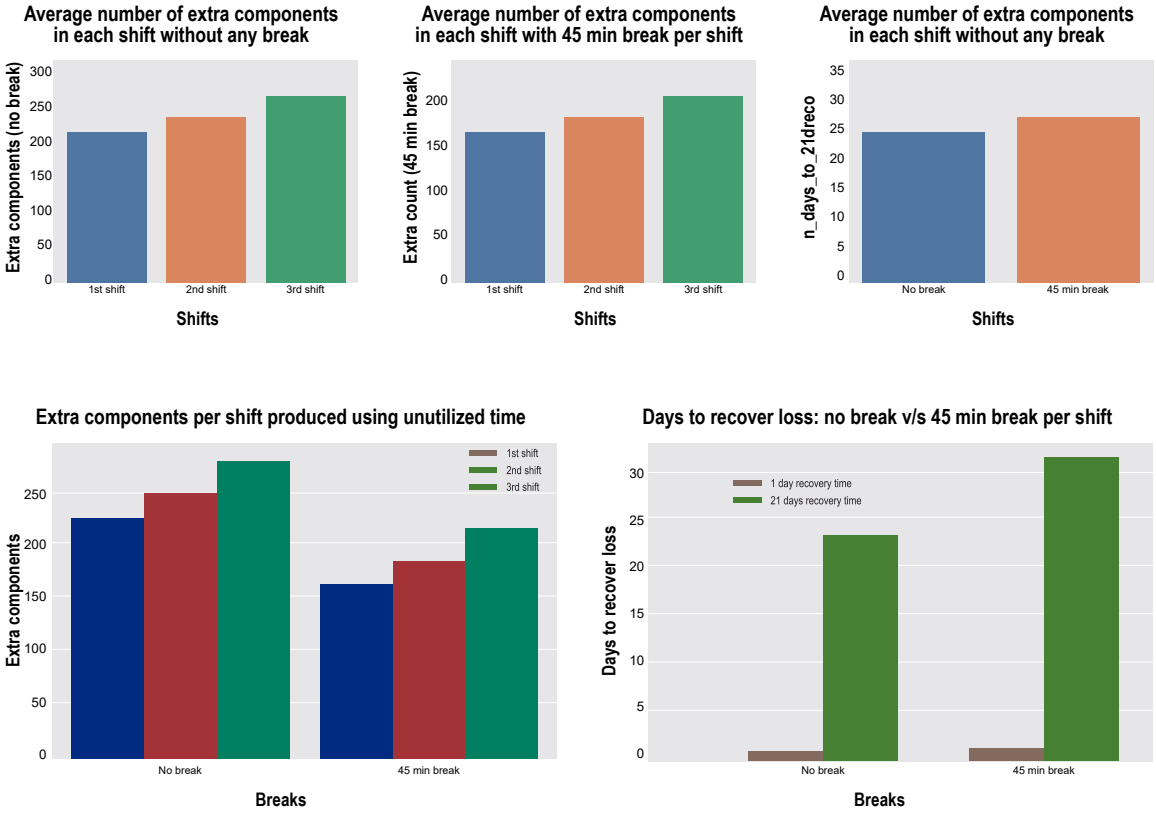
Fig 3 The trend of number of components with respect to total clamp hours throughout the day



Source: RV Forms & Gears Pvt Ltd

One might wonder with shorter shifts being planned by government and industrial bodies, will it be possible to recover the shortage of shifts with the utilization of idle time. The short answer is 'Yes'.

RECOVERY ANALYSIS (SHIFT WISE)



Source: RV Forms & Gears Pvt Ltd

The data captured by SmartFix 4.0 allows the customer to not only see how much idle time exists, but also pin point the exact moment when the idle time began to increase.

Being as efficient as possible

In order to achieve the highest efficiency during this lockdown recovery process, we have utilized machine learning techniques to give us different work models. The work models primarily are divided on the basis of two factors: one 24-hour day analysis and three 8-hour shifts analysis.

24-hour analysis: This analysis is based on data compilation of continuous 24 hours including breaks. Within these 24 hours, we have clamped and unclamped hours. The unclamped hours include both planned and unplanned breaks. Efficiency of the production plan, upon segregating the unplanned, breaks into 4 types: no break, 1.5-hour break, 2-hour break and 2.5-hour break.

8-hour shifts analysis: Three 8-hour shifts comprise a working day on the shop floor. This analysis gives different efficiency enhancing models. Based on break distribution within each shift, the efficiency curves differ. Projection on the number of components produced is done utilizing the present unclamped hours. Shift wise efficiency models are divided as two types: No break in any shift and 45 minutes break per shift.

One might wonder with shorter shifts being planned by government and industrial bodies, will it be possible to recover the shortage of shifts with the utilization of idle time. The short answer is 'Yes'. The data captured by SmartFix 4.0 allows the customer to not only see how much idle time exists, but also pin point the exact moment when the idle time begins to increase. It is for each company to find ways to utilize as much of this idle time as possible and varied resources available will determine their ability. The situation the world is facing has forced us to innovate in order to stay relevant as well as the lack of data on this granular level. We are only scraping the surface with whatever insights and outcomes can be accomplished with the power of data that will usher the fourth revolution to the industry.

The impact of Covid-19 has tossed up a bunch of changes. The demand for different commodities has changed and, hence, each industry will have to plan accordingly. With the use of real-time data captured by SmartFix 4.0, management teams can employ a robust and dynamic approach that will help them take action to tackle all the unknown challenges that are yet to come. The timeframes will vary based on the demand dictated by the industry.