Scrap Reduction in the Mass Media Femoral Finishing Process using LSS 'DMAIC' Methods

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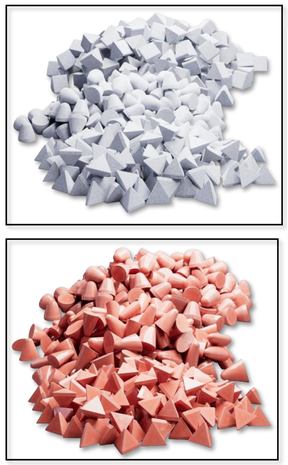
Aim of the Project

The Aim of the project is to use the DMAIC method to identify and resolve scrap causes in the Drag Finishing process at Croom Medical

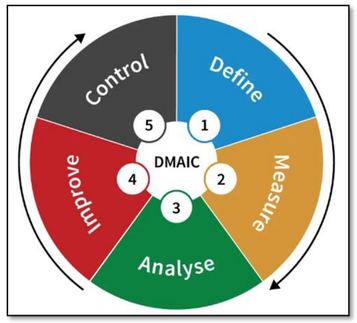
Background

Drag Finishing is a type of mass media finishing. Components are attached to a spindle that rotates and "Drags" the part through a bowl of media. The media particles makes thousands of tiny scratches on the surface of the component. If the media is coarse, it will give the component a rougher surface finish, smoother media will give a smoother finish. It is a similar process to grinding operations.

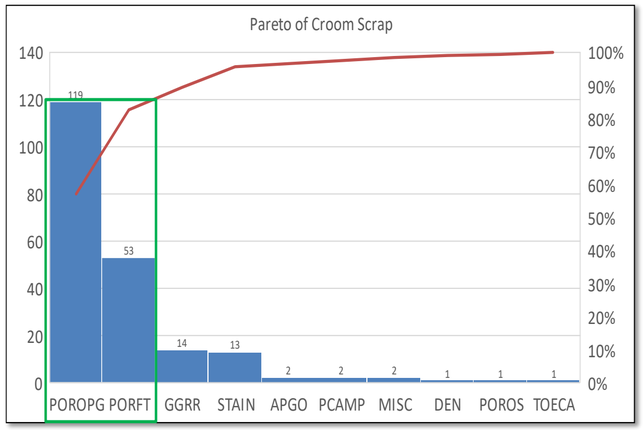


DMAIC is a Lean Six Sigma Tool that is used to solve problem, particularly in Continuous Improvement projects. It is an acronym for Define, Measure, Analyse, Improve, Control. The Define step is used to detail the problem that is to be addressed. The Measure step is to record the way the process is currently performing. The Analyse step takes all the measured data and analyses it to discover the Root Causes of the process problem/s. The Improve step builds on the discoveries from the Analyse step. The root causes of the problems are to be addressed in order to improve the process. The Control step is used to verify the effect of the Improve step. The same metrics decided upon in the Measure step are looked at to see if the improvements have been successful.

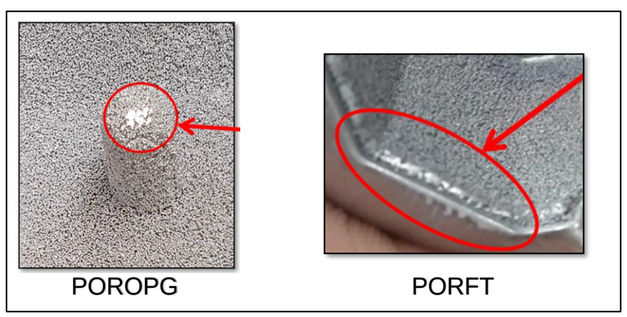
Methodology



The Scrap quantity for a 30-working day period of high-volume production was analyzed. It was found that the Scrap Codes for POROPG and PORFT accounted for 90% of all scrap produced. This was discovered using Pareto Analysis.

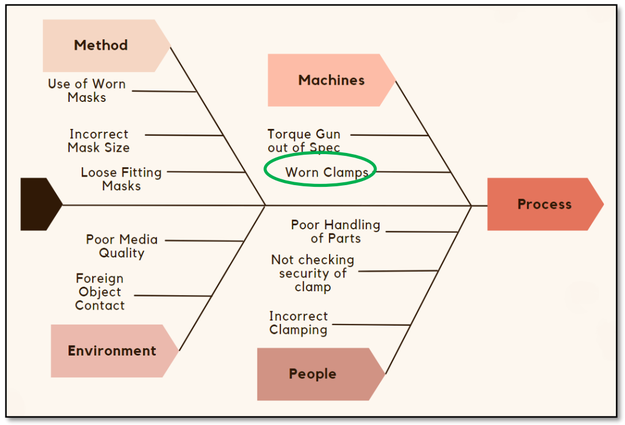


These scrap codes relate to each of the defect shown below.

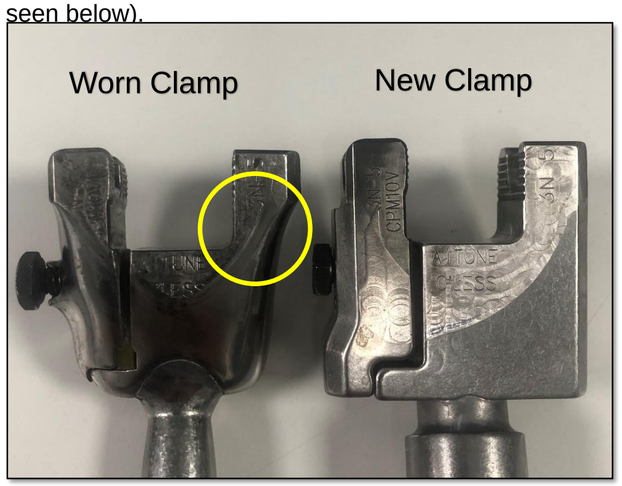


A Cause-and-Effect diagram was constructed to Root-Cause the POROPG issue. This contained all the potential causes of scrap. An investigation was then carried out to determine the validity of each of the possible causes. It was determined that Worn Clamps was the root cause of the POROPG Scrap.

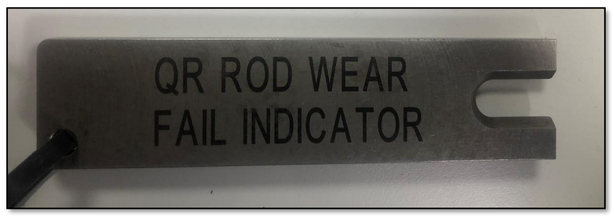
Methodology



The difference between a worn clamp and a new clamp was quite apparent once compared side by side (as seen below).



This excessive wear allowed for media to ingress and damage the Critical-to-Quality surface on the internal face of the component. A wear gauge was created to determine which clamps were acceptable to production. This gauge checks the dimension of the area highlighted in yellow above. All worn clamps were removed from the production floor. This gauge check was then added to the daily ECC's.

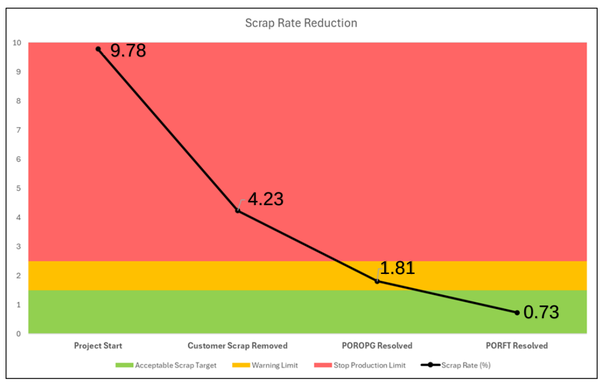


Methodology

A 5 Why's Analysis was carried out in order to Root Cause the PORFT scrap code. The result of this was "No check for media quality present in SOP's or ECC's". The related SOP for media sieving was updated to reference the media quality as the indicator to sieve the bowl. This quality check was also captured in the Equipment Condition Checks that the operators perform daily. A visual aid was created to better defined acceptable and unacceptable media quality.

Results

When customer scrap was removed from the total scrap count, the scrap rate was reduced to 4.23%. This reflected the scrap for the Croom Value Stream. When the POROPG scrap was root-caused and addressed, the scrap rate reduced to 1.81%. When the PORFT scrap was addressed, the scrap percentage of the process was said to be 0.73%.



Conclusion

The use of the DMAIC methodology in this project has allowed for the efficient solving of scrap causes. While the root causes cannot be definitively proven until a production run is in progress, a comparative product with similar features was ran with a scrap rate of 0.44%