FOURTH INTERNATIONAL CONFERENCE ON LEAN SIX SIGMA

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CONTEXT: This project is developed in a Peruvian manufacture company of electrodes for welding. Currently, there are four packaging lines with 100% utilization on pick seasonal demands. There is a gap of 22.6% in the productivity with respect to the ideal value.

SCOPE: In the packaging line n°1 focus on 3/4 types of electrode diameters. It represents 80% of total production.

OBJECTIVE: Identify improvements to reduce the gap in the productivity to 14% (i.e. from 9 to 10 bags/min).

IMPACT: This improvement would give to the company an estimate of $0.25M per year.

Figure 1. Current Process Capability

Figure 2. Current Value Stream Mapping

From the VSM it was determined that the productivity of the process is given by packaging operation, 9 bags/min

Figure 3. Failure Modes Effects Analysis

74% of the failure modes exceed the accepted level of risk (100). The process is unstable.

Figure 4. Cause and effect diagram

The variability of the bag weight affects productivity. $R^2 = 89\%$

Figure 5. ANOVA test for repetitions

The type of material affects productivity. $R^2 = 0\%$

Figure 6. ANOVA test for materials

Figure 7. Bifurcation System

Cpk: -0.25 Process not centered

Cp: 1.06 Process capable

It was achieved to reduce the gap to 14% and obtain a productivity of 10 bags/min

Figure 8. Improved Process Capacity

Figure 9. Improved Value Stream Mapping

Figure 10. Improved Process Control Graph

4 IMPROVE

POKA

POKA

YOKE

CONTROL

The control chart allows to monitor the external causes of variation and statistical statistics.

1 DEFINE

2 MEASURE

3 ANALIZE

4 IMPROVE

BOTTLE NECK

Process Failure Mode Potential/ failure Effect SMV Potential/ Cause OCC Detection Method DRT YMS

Figure 11. Process Failure Effects Table

Figure 12. Process Failure Effects Analysis

- electrode weight

- counter machine

= bags

Figure 13. Process Failure Effects Analysis

$\bar{x}$