Establishing Standardized Work at Mexican Original

Adam Hope, Sarah Kiner, Liz Luzcando, & Arturo Nuñez Uribe

University of Arkansas Department of Industrial Engineering

Introduction

This project was the result of a partnership between Tyson and the Department of Industrial Engineering at the University of Arkansas. With a team of four students, this project detailed an assignment to Tyson's Mexican Original (TMO) plant in Fayetteville, Arkansas where the team was to support the facility's ongoing operations. As one of TMO's biggest customers, Taco Bell recently selected the Fayetteville plant to produce 100% of the volume for their new Quesalupa product. By applying our interdisciplinary academic education to this real-world problem, our team of industrial engineering students was able to model the optimal tortilla size of 7.125 ± 0.125 inches that would minimize scrap from 32% to 15%. The team also simultaneously developed standardized work instructions that reduced the risk of injury, while increasing efficiency by minimizing scrap to 2%. Substantial financial savings of about $1.4 million was the result of this project, as well as a positive ongoing relationship between the University of Arkansas and Tyson Inc.

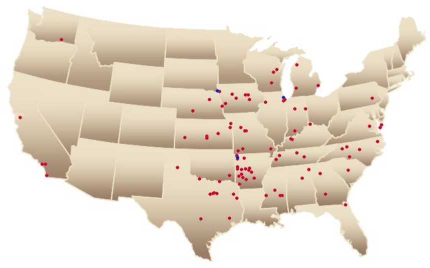

Figure 1 – Our project findings can be shared across the 90 Tyson plants in the U.S.

Figure 2 – The system boundary was defined as the flour production lines.

Problem Statement

The objectives of this project were given as a two-fold problem statement:

1. Ensure Tyson's Mexican Original (TMO) could produce the capacity required to meet the demand for Taco Bell's new Quesalupa product
2. Develop standard operating procedures (SOP) as field implementation manuals that would reduce the risk of injury, while increasing efficiency by minimizing waste

Methods

In order to determine the optimal tortilla size, the following methods were conducted:

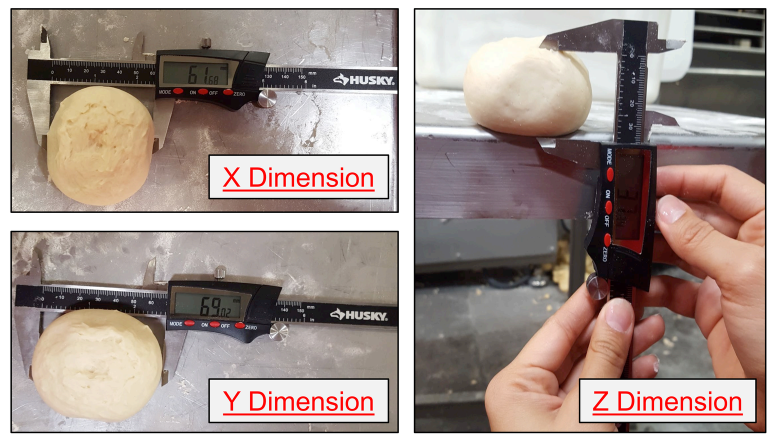

Figure 3 – The 30 sample population of dough balls were measured in three dimensions using a caliper as shown.

- Use a 30 sample population of dough balls and tortillas to determine rheological properties
- Geometrically dimension and weigh the 30 sample populations, using the direction of travel as a reference
- Conduct average dough ball diameter statistics for each weight of the dough ball
- Apply regression analysis to build an extrapolation table

Methods (cont.)

Standard Operating procedures were developed by the following methods:

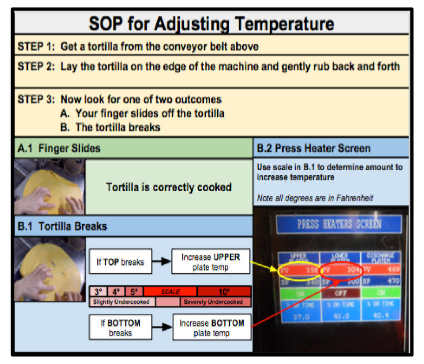

Figure 4 – Our team found visual SOP's to be more effective for start-up operations than heavily worded SOP's

- Quantification of current line performance, including scrap %
- Transposing operator's start-up procedures into a graphical process flow
- Determine critical steps and develop visual standardization
- Calculate reduction in waste using new SOP

Results

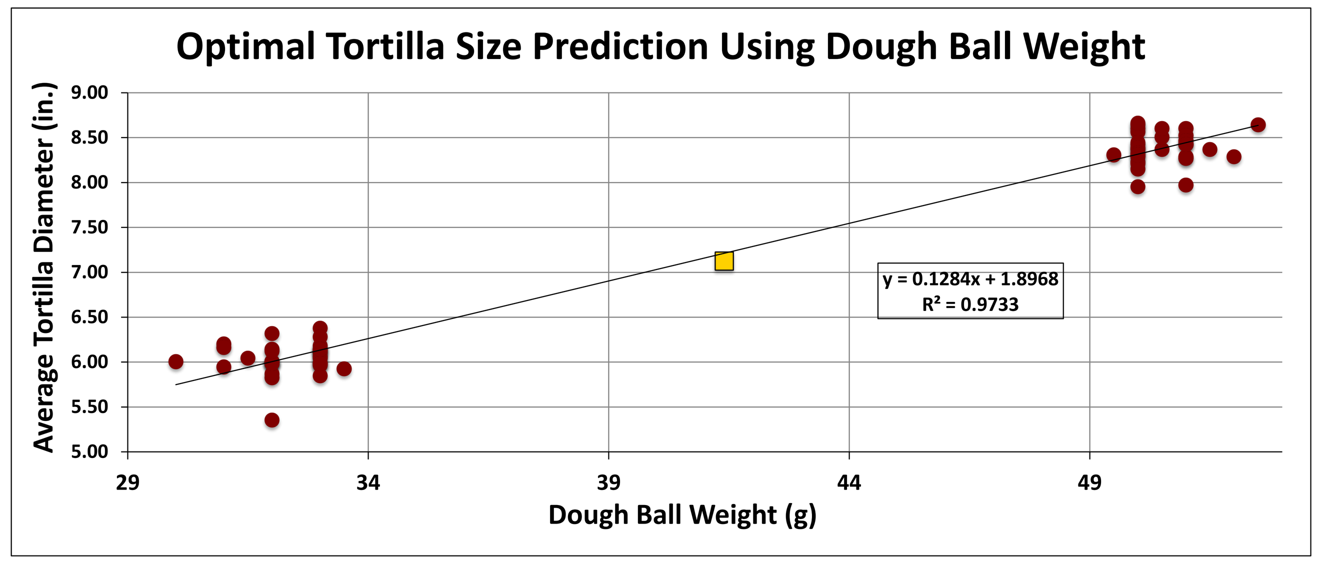

Figure 5A

Figure 5B

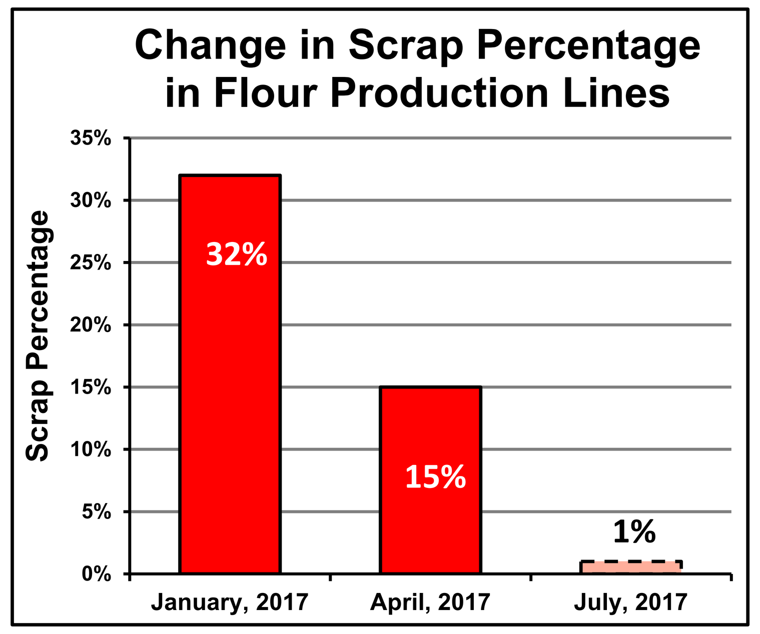

Figure 5C

The results of our prediction analysis showed the following:

- The optimal tortilla diameter was determined to be 7.125 ± 0.125 inches, as shown in Figure 5A, with a correlation of 97%.
- Dough balls between 41 and 42 grams would result in the optimal tortilla size, as shown in Figure 5B.
- The percentage of scrap on the flour production lines would be reduced to 15% by pressing the correct dough ball size and weight, as shown in Figure 5C.
- Using our methodology over multiple iterations, our group hypothesizes that the scrap percentage could be reduced to 1%.

Methods (cont.)

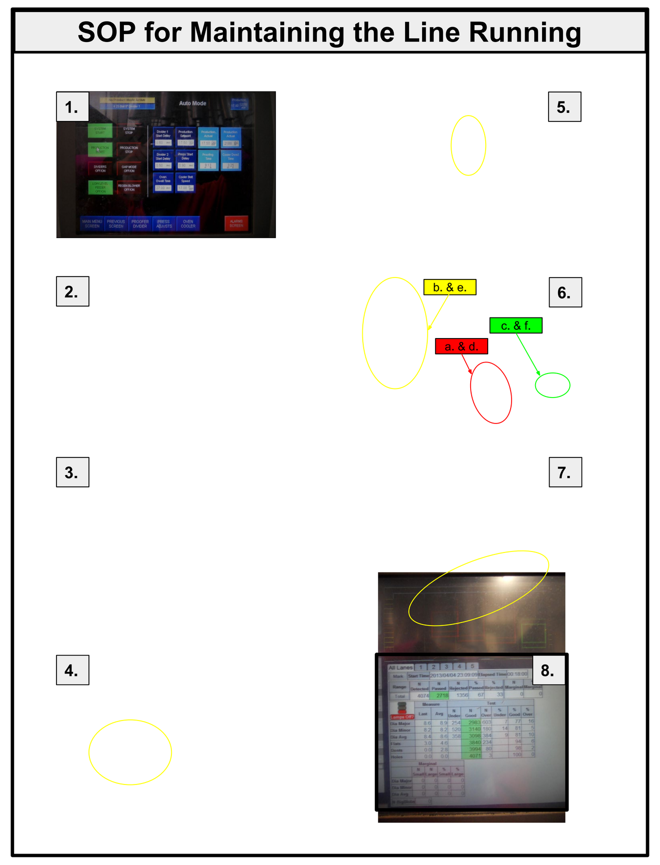

Figure 6A

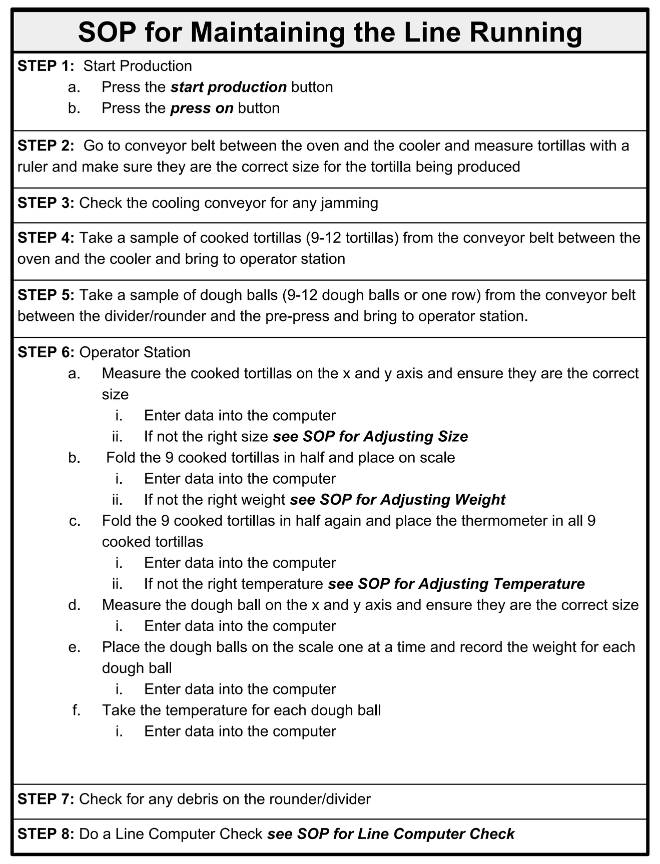

Figure 6B

The integration of our standard operating procedures resulted in the following:

- Visual SOP's, as shown in Figure 6A, are easy to read and can be understood regardless of language preference.
- Using images as guides, scrap percentage was reduced from 5% to 2% as reported by an expert press operator
- Our step-by-step instructions produced a logical sequence that was easy to follow.
- Multiple troubleshooting SOP's were developed in addition to the main, in the event that further instructions were needed.

Potential Savings

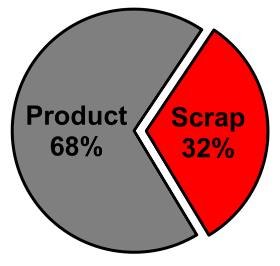

Figure 6A – Product and scrap percentages pre-optimization

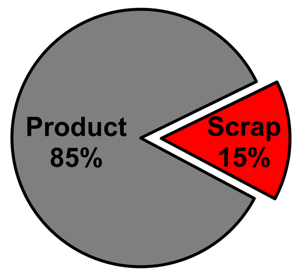

Figure 6B – Product and scrap percentages post-optimization

TMO currently produces near 1,000,000 tortillas per day. If we assume a fictional cost of $0.10 per tortilla, this results in a cost of $100,000 per day. At 32% scrap, this results in a daily cost of $32,000 in scrap alone. With the increase in volume and reduction in waste, the daily cost is reduced to only $15,000 per day. From Figures 6A and 6B, it is calculated that the current savings after optimization is $17,000 per day, which results in annual savings of **$4,250,000** assuming a minimum of 250 workdays per year.

It is important to note that these numbers were skewed in our quantification in order to ensure financial privacy of TMO. The potential annual savings, however, show how small changes in scrap percentages can result in substantial savings. Scrap avoidance also resulted in potential savings by implementing our standard operating procedures. Although the savings are indirect, it was found that an operator saves TMO twice of their wages.