6512 Rutherford Road
Plano, TX 75203
(512) 693-8280
contact@simcon-solutions.com
www.simcon-solutions.com

SUPPLEMENTARY DOCUMENT

Title:	**SIMCON Simulation Case Study for Omaha Steaks Order Fulfillment Facility**		
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To:	Prospective and Existing Clients	**Date:**	04/30/2020
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Description:	This document provides a case study for a SIMCON simulation project to inform the design of two distribution centers for Omaha Steaks.		

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1. Purpose

This document describes a case study of a SIMCON simulation project for an Omaha Steaks order fulfillment facility undertaken between June 2019 and October 2019. This case study was prepared by SIMCON in conjunction with our client and outlines the client challenges, the SIMCON solution approach, and the key takeaways from the project. It both reflects our experience working on the project and our client's perspective of working with SIMCON on this particular simulation project.

2. Client Challenges

Omaha Steaks International, Inc. (Omaha Steaks) is a food retailer that ships the large majority of its products directly to consumers in insulated coolers chilled with ice. The demand for their products is extremely seasonal, where the vast majority of orders are purchased as gifts for the holidays. Omaha Steaks owns and operates two distribution centers to fulfill these orders, and needed to determine a cost-effective way to improve the ability of these facilities to meet peak demand.

Omaha Steaks contracted Tompkins International (Tompkins), a supply chain consulting and implementation firm, to evaluate and improve the current facility designs implemented in the two Omaha distribution centers. Tompkins in turn contracted SIMCON to simulate the major production and material handling operations within the Omaha Steaks DCs in support of the systems analysis initiative. The facility simulation model was designed to address the following challenges:

- Evaluate the effectiveness of the current equipment configuration
- Determine cost-effective changes to the equipment configuration that could improve capacity
- Identify system bottlenecks and determine how best to resolve them
- Quantify the impact of stretch wrapper downtimes (e.g., roll changeovers)
- Evaluate conveyor congestion at the sorter merge point and upstream of the stretch wrappers

3. SIMCON Solution Strategy

After working with Tompkins and Omaha Steaks to define the project challenges and desired outcomes, the SIMCON engineering team went to work collecting the prerequisite data and developed a to-scale model of the Omaha Steaks distribution centers. We designed the model to be driven by a production schedule, where the baseline system configurations were those currently implemented in the Omaha Steaks distribution centers and the baseline production schedule was the actual schedule Omaha Steaks attempted to meet peak demand with for the previous year. The facility simulation model was developed to evaluate and improve the ability of the DCs to meet peak demand by allowing Omaha Steaks and Tompkins to:

- Experiment with alternative cooler packing station configurations
- Determine if and how many additional packing stations were needed to meet peak demand
- Experiment with conveyor merge logic to alleviate congestion at the merge point
- Quantify the impact of stretch wrapper changeovers on upstream and conveyor congestion

SIMCON developed the model to be entirely data-driven. This modeling approach allowed the engineers at Omaha Steaks and Tompkins to easily define and evaluate alternative production schedules, equipment configurations, and operating policies by editing an external spreadsheet, which is automatically imported before each run. We employ this approach for almost all of our simulation projects.

Additionally, the simulation model automatically exports all pertinent output logs and statistics to a macro-enabled Excel file at the end of each simulation run to streamline the review and analysis of results. Some of the pertinent system performance metrics generated by this model included:

- Pertinent event times and performance metrics for each cooler and batch produced
- Event logs with information about the timing of each pertinent event for each order (e.g., released to line, picking complete, packing complete, moved to conveyor, stretch wrap start and end, merge clearance, trailer loading)
- Changeover logs for all packing stations and stretch wrappers
- Blockage time statistics for all packing stations
- Conveyor congestion statistics

Once development was complete, we validated the model by comparing these model results for the baseline facility configuration to those actually observed for the peak production day of the previous year. We then experimented with alternative system configurations and operating policies to improve the ability of the system to meet peak demand conditions. These experiments included:

- Reallocating high-demand orders to packing lines with greater buffers before stretch wrapping
- Redistributing packing lines to different conveyors (and stretch wrappers)

4. Results and Key Takeaways

By simulating the baseline configuration, we were able to reproduce actual facility behavior and performance for the peak demand observed during the previous year. The ultimate takeaway from these simulation analyses was that the current configuration of the Omaha Steaks distribution centers was not sufficient to meet the peak demand for the previous year. Additional takeaways from this facility simulation project included:

- Most packing stations were able to meet peak daily demand, but some were late by several hours
- Reallocating high-demand orders to packing lines with longer buffers:
  - Increased the total blockage time observed across all of the packing lines
  - Reduced system performance (several more hours were required to meet peak demand)
- Reallocating the most constrained packing line to a different conveyor
  - Increased the total blockage time observed across all of the packing lines
  - Improved system performance (system met peak daily demand in just over 24 hours)
- Conveyor merge logic was not a bottleneck on system throughput
  - Actual conveyor merge logic was not available for this simulation project
  - SIMCON developed custom merge logic to approximate the performance of this system

Most importantly, the simulation model provided Omaha Steaks and Tompkins with a tool for evaluating alternative demand profiles, system configurations, and operating policies for both distribution centers in order to quantify their impact on system performance and throughput capacity. The data-driven modeling approach also enabled our client to continue conducting simulation analyses and determine how alternative system configurations will perform under different operating conditions and demand profiles.

5. Simulation Model Video

A video overview of the Omaha Steaks facility simulation model is provided in Video 1 below. In the event that the video provided below will not play, try downloading and installing the Adobe Flash Player plugin here. Once installed, right-click the video below and select 'Enable Content.' Alternatively, the video can be downloaded directly by clicking here.

Video 1. Simulation Model Video – Omaha Steaks