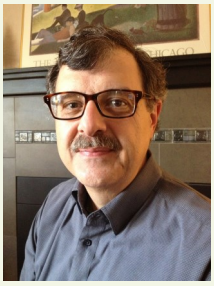
Sustainable Productivity Solutions
Processes + People DRIVE Performance

SUSTAINABLE PRODUCTIVITY NEWS

"for improving operating margin with Continuous Process Improvement tools"

Volume 8 Issue 2 Q2 2017

Optimizing Food Chain Efficiency



As demand for produce grows, so do the conflicting demands for land, people, and other resources that farmers need. Continuing into the future, farmers will have to produce more with less resources. Automation will provide some relief in this challenge. In addition, farmers will need to find new ways to optimize their efficiency, to truly meet this challenge. This is where my mind was in March, 2012.

Before I get into what I am trying to do with SPS, let me share with you a little of my history. My love of studying and improving processes started when I was 10 years old, and I got the opportunity to tour one of the casting plants my dad managed. Learning about the sand casting process was pretty cool; this was 1968, nowadays I don't believe OSHA would approve of a 10-year old on the manufacturing floor. This love of process thinking resulted in an Industrial Engineering (IE) degree from Purdue University.

I graduated from Purdue with an interest in Computer Integrated Manufacturing. With this interest, the first half of my career focused on using simulation modeling & analysis to design better processes and facilities. The second half of my career focused on a productivity arena that is complimentary to simulation: Lean Thinking and building Continuous Process Improvement culture. All teach to look beyond the surface for solutions that sustain.

In March, 2012, I was ready to start a productivity improvement engineering firm, but I wasn't sure where the best challenges existed. Thanks to my wife Gail and her suggestion to go on a greenhouse tour, my interest in growing plants was re-energized. Before getting my IE degree, I got a degree in Forestry which had sparked my interest in and learning of Silviculture.

Sustainable Productivity Solutions' (SPS) focus from day one has been on optimizing the efficiency of growers and shippers in the Western United States. In the last 5 years, we have added value to many farmers in California and Arizona. And we have barely scratched the surface of the good that we want to do.

SPS focus going forward is now more laser focused on **Optimizing Food Chain Efficiency**. For us, it starts with seed companies & greenhouses, and continues with growers, processors, shippers, secondary processors, retailers, and supply chain managers. SPS' contribution to feeding the world will be to optimize the processes that produce, process, ship, and deliver our food.

In the rest of this newsletter we will share our thoughts on software-based productivity tools that are most applicable for growers and for shippers (pages 2 and 3), and provide information on how you can learn to Unlock Operational Efficiency (page 4).

Khaled Mabrouk

In This Issue

Software-based Productivity Tools (1 of 2)

On page 2 and 3, we will share with you, based on our learning of farming operations, two software-based productivity tools that we believe best apply for growers (page 2) and processors/shippers (page 3).

Since we are looking at software-based productivity tools, we will focus on operations research tools such as simulation and optimization tools.

Optimize Production Plan (for growers)

As each calendar year comes to an end for many farmers, it becomes time to plan for next year. Many questions to answer include how many acres do we plan to plant, which products will we plant when and where, how we will meet the demand of our customers in a timely manner, etc.

Excel spreadsheets are the most popular mechanism for generating production plans to answer these questions.

Process Laborious & Limiting

Multiple spreadsheets are prepared; each with a different production plan. These spreadsheets are compared and adjusted until we can create a final plan that we are comfortable with. And as the growing season progresses, we adjust our production plan to reflect the impact of weather, insects, disease, labor availability, changes in customer demand, etc.

This process for generating a production plan is labor intensive and, due to its rigor, limits the number of options we consider for our production plan.

An excellent software-based productivity tool to assist in this area is Linear Programming (LP). LP is an operations research method used to achieve the optimal outcome (such as maximum profit or lowest cost) in a mathematical model whose requirements are represented by linear relationships.

LP Objective Function & Constraints

To develop a linear program (LP) for a ranch, we need to define both an Objective Function(s), and a set of constraints. Then we run the LP to compute the optimal production plan.

When using LPs to generate a production plan, the objective function would be set to optimize the production schedule; where the LP is tasked with identifying which field & block is planted when and with what specific product.

This LP's constraints would include: what our limitations are on how much we can plant in a week (based on our available resources), how much demand for each product we need to deliver during each week in the harvesting season, crop rotation strategy, production capability of various fields given soil and weather conditions, etc.

Optimize, Expand Your Options

The specific values for the LP objective function and constraints will vary for each grower/ranch. Also, the specific constraints will vary whether you are an organic or a conventional farmer. And once you program the constraints & objective function, you will be able to run the LP program to generate optimal production schedules for the year.

EVENTS CALENDAR

Testicle Festival, Santa Cruz County Farm Bureau (SCCFB),
August 26, 2017
Watsonville, CA

Santa Cruz County AgTech Meetup - Harvesting
August 30, 2017
Watsonville, CA

IISE Engineering & Lean Six Sigma
September 25-27, 2017
Orlando, FL

Santa Cruz County AgTech Meetup - Processing & Shipping,
October 25, 2017
Watsonville, CA

Agri-Culture's Annual Progressive Dinner, SCCFB.
October 28, 2017
Watsonville, CA

EVENTS CALENDAR

Western Growers Association Annual Conference
October 29 - November 1, 2017
Las Vegas, NV

California Farm Bureau 99th Annual Meeting
December 3-6, 2017
Orange County, CA

Santa Cruz County AgTech Meetup - Planning,
December 13, 2017
Watsonville, CA

Santa Cruz County AgTech Meetup - Land Prep,
February 28, 2018
Watsonville, CA

Santa Cruz County AgTech Meetup - Planting,
April 25, 2018
Watsonville, CA

Software-based Productivity Tools (2 of 2)

Optimize Processing/Shipping Facility (for shippers)

Every year, shippers design and build numerous new processing lines and coolers. Each new design reflects what has been learned from existing processing lines and coolers.

Testing Ideas Disruptive to Operations

The improvements tend to arrive in a step-wise manner, because testing out ideas on the production floor can be very disruptive. As a result, very few ideas get tried out.

In addition, as we design new facilities, we tend to over-estimate how much of each type of equipment we require; resulting in an unnecessary increase in project budget.

Process Logic + Data >>> Simulation

To develop a simulation model of a processing line or DC, we need to first understand the flow of all products through our facility. In addition, we need to gather data to reflect processing times, changeover times, downtimes, production run size & mix, etc.

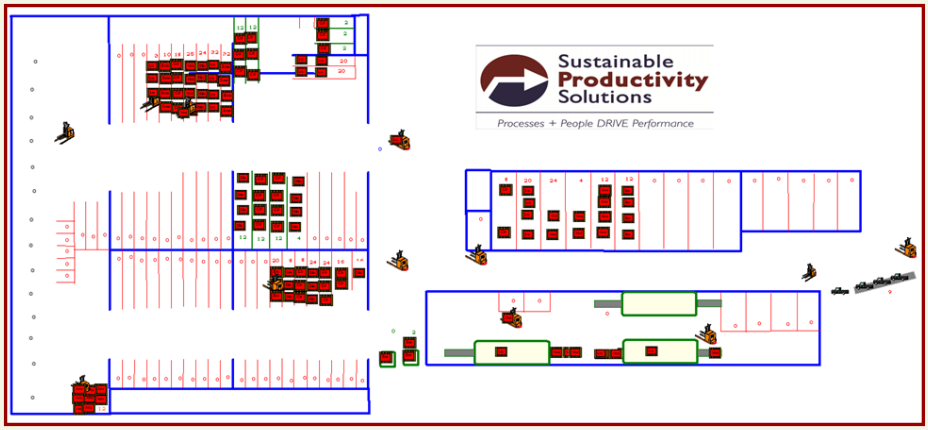
Once all this information is put into the simulation model, we test the model and compare its results to the real operation. Then we adjust the model until we are comfortable that the model accurately reflects the operations.

Vet Ideas + Optimize Operations

Once we have validated our model, we can start experimenting with it. The initial set of experiments tend to reflect the initial ideas we had for improving the operations. And the model will quantify for us how beneficial or not these ideas are.

Next thanks to the insight gained from the initial experimentation with the model, we generate additional experiments to help us optimize our design for our processing lines or facility.

Once the processing line or facility that we modeled is built, we can validate the model again, and make some adjustments to it. From



Simulation Model of Produce Cooler

Learn to Unlock Operational Efficiency

In 2025, the world's population is expected to reach 8 billion people. How can our agriculture systems and ag-related industries scale up to satisfy demand at that level?

By **increasing operational efficiency** and doing more with less resources; and by getting to the root cause when solving problems.

By **reducing waste** (not only food waste) but waste in our processes (wasted time, wasted money, wasted input materials, wasted motion, wasted transportation).

By **embracing technology** such as automation, sensors, big data, simulation, and optimization.

By **engaging employees** because you'll need them to work smarter and harder alongside the technology that will inevitably be introduced. Plus, there is no downside to being a great leader.

The field of Operational Engineering (a.k.a. Industrial Engineering) has been around since the early 1900s and has evolved throughout the last hundred years. Today, our core competencies mirror the four components listed above: increase operational efficiency, reduce waste, embrace technology, and engage employees.

This training program teaches you to use the modern techniques of Operational Engineering, known as LEAN and Continuous Process Improvement (CPI), to unlock operational efficiency within your organization. Our goal is to provide you with hands-on learning so that you are confident using LEAN and CPI principles in your work and are excited to implement and share these concepts with others.

The Unlocking Operational Efficiency (UOE) Level I Modules are offered this September both in Scotts Valley (Tuesday 5th, 12th, 19th, & 26th), and in Arroyo Grande (Wednesday 6th, 13th, 20th, & 27th).

For more information, please email us at UOE@ReduceOR.com

Module 1: Get to Root Cause

Module 2: Organize Your Storage Areas

Module 3: See the Process

Module 4: Eliminate Waste

"highly recommend the seminars to anyone who understands there is always room for improvement." - Jordan Marcellus, Greenheart Farms

"an excellent trainer and very knowledgeable! It's a must to attend seminars." - Julio Lopez, Costa Farms

"rather than spoon-feeding the information, [trainer] explains the concepts, and then motivates you to apply the concepts on a real problem." - Milind Makwana, PayPal

"enjoyed the course and brought more of my Team Members the second time around." - Bart Walker, Pacific AG Rentals

Contact Us

Contact us when you need to generate sustainable productivity solutions for challenging operational issues

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