



**An Introduction to Lean Manufacturing
for Alberta Food Processors**

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Alberta Agriculture and Rural Development

Welcome to *The Lean Journey* - The Workbook

Alberta Agriculture and Rural Development has developed an electronic resource available online or on CD, *The Lean Journey*, to help you, the food processor, improve quality, eliminate waste, reduce lead time and reduce total cost in your food processing operation. Food safety results can also happen when lean practices are implemented.

This Workbook has been developed to accompany *The Lean Journey*. There are 10 learning modules in the online resource. Each module focuses on a different aspect of a continuous improvement program, based on lean manufacturing principles and tools. Within each module, you will find:

- Introduction
- Overview
- Learning of concepts
- Hands-on activities
- Application to your own plant

Learning Modules in the Online Resource

- Introduction to Lean
- 5S
- Seven Wastes
- 5 Why's
- Spaghetti Diagrams
- Standard Operating Procedures
- Visual Management
- Food Safety and Lean
- Key Performance Indicators
- Value Stream Mapping

By the end of this journey, you will have a good understanding of what lean is, how it works, where it works, when you can start, and why it can work for you now and into the future.

To find the free resource *The Lean Journey*, go to:

www.agriculture.alberta.ca/leanjourney

But first ...

Turn the page for a taste of what you will find in the online resource.



Introduction to Lean

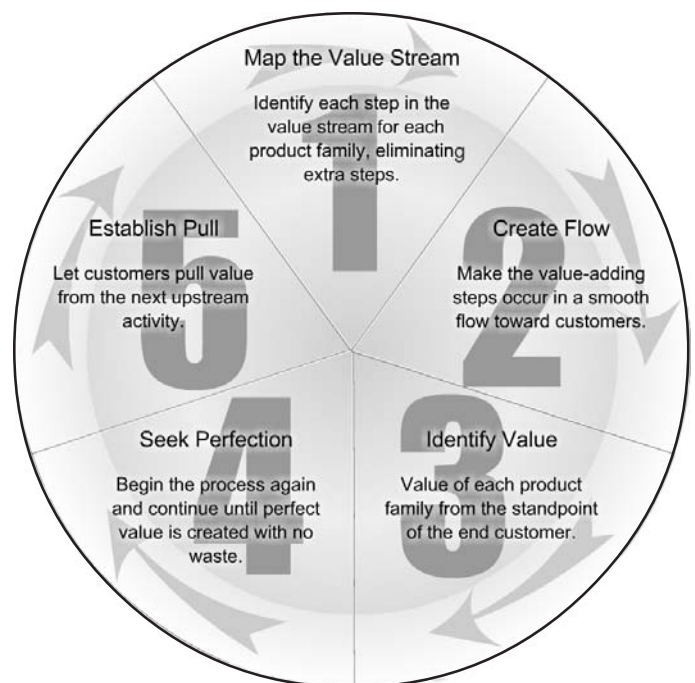
There are five guiding principles to keep in mind when considering lean. By applying lean principles to your food processing operation, you can achieve your productivity improvement goals.

1. Recognize or **identify value as your customer sees it**. In other words, what is your customer willing to pay for? For example, if your customer sees no value to delivering his sauce in small containers, then bulk delivery is where the value is for him.
2. Develop an efficient flow of product or service through your entire value stream, not just at certain points, and **map out that value stream**. So, once the process has started, any time waiting for the next step is wasted and should be eliminated.
3. Respond more quickly to your customer needs by **creating flow**. When the end product flows, more is accomplished with less effort and less time.
4. **Create ‘pull’** and develop the ability to respond to that pull. This means producing what is needed when it is needed, and in the exact quantity needed.
5. Live in a constant state of improvement – **always look for perfection**. That is why lean is often called a “continuous improvement” program.

The 5 Lean Principles



These 5 steps are not in the correct order.
Put them in the correct order by renumbering.





5S + 1

Sort, Set in Order,
Shine, Standardize,
Sustain + Food Safety

5S is a visual tool to help you organize your workplace.

In simple terms, here is how it works.

Sort: Decide what equipment, resources or tools are needed to get the work done. Get rid of anything that is not needed.

Set in Order: Arrange all the necessary equipment, resources and tools into an efficient work space. Each item needs a home so it is easy to find.

Shine: Clean your work space.

Standardize: Create procedures so that everyone can maintain the system. Empower staff to maintain rules and procedures.

Sustain: Make the procedures standard in your workplace and continuously improve it.

These are the 5S's that will help transition your operation into a lean operation. Practice the 5S tool and you will see your operation in a whole new way!



Change

By following the 5S's you can:

- Reduce set-up and cycle times
- Create more space to work in
- Lower accident/incident rates
- Decrease wasted labour
- Increase the reliability of your equipment
- Create a safer work environment.

One of the great benefits of following 5S is that it creates a much safer work environment. Often safety is referred to as the sixth S or 5S +1. In the industry, the sixth S can refer as much to food safety as it does to worker safety.

Some organizations experience decreased costs by making even the smallest changes.



Select an area of your operation where you might apply the 5S principle. Write down how you might make changes to this area.

Take pictures. Use the pictures to identify where you might **sort, set in order, shine, standardize, or sustain**. Don't forget to look for ways to improve both worker and food safety.

Now go online to get some hints on how to make changes and increase efficiency.

7 + 1 Wastes

In your pursuit of continuous improvement, knowing the Seven Wastes will be extremely beneficial. Waste reduction is a great way to increase your profitability. The key is finding out which steps in your process add value and which do not. And remember, anything that does not add value from the **customer's** perspective is considered a waste. The goal is to improve the steps that add value and eliminate or reduce those that do not. This section defines the Seven Wastes and lets you know what you can do to minimize or eliminate them altogether. Sometimes an eighth waste is also included.

Overproduction



Transportation:	This is characterized by excessive movement of goods or materials. Keep transportation to a minimum.
Inventory:	Overproduction must be handled, stored and transported—all this consumes resources that are not providing what the customer wants.
Motion:	Excess motion takes time and adds no value; it contributes to employee fatigue and errors or defects.
Waiting:	Any time there is waiting for material, parts, tools, information or people there is the waste of waiting.
Overproduction:	This is overproduction of what the customer needs or wants now and is the worst waste of all as it creates many of the other wastes.
Overprocessing:	This may result from processes done on oversized equipment or additional processing steps that are unnecessary.
Defects:	The cost of a dissatisfied customer is high. Defects can occur in all areas of the operation.
Skills:	This is the under utilization of employee skills and creativity.



Check off some areas where you think you may have waste and describe that waste. (TIM WOODS is an acronym to help you focus on eliminating waste.)

- Transportation _____
- Inventory _____
- Motion _____
- Waiting _____
- Overproduction _____
- Over Processing _____
- Defects _____
- Skills _____

Now go online to get hints on what you can do to minimize or eliminate waste.

5 Why's



The 5 Why's is a simple but very effective tool that helps find the primary cause of errors, defects or other wastes in food processing operations.

How will you fix a problem if you don't know where it began?

To get to the bottom of a problem, you have to learn why it happened. That's typical.

In lean, it's not just a case of asking why once – it's a progression of questions – an approach that digs deeper to find the root cause for a particular problem. It's called root cause analysis or the 5 Why's...and it works!



We are having trouble meeting our daily packaging requirements for our smaller sized packages.

1. Why are you having trouble meeting demand?

Our packaging equipment capacity must be too small for demand so we have to run those lines overtime.

2. Why do you run those lines overtime?

To provide enough operating time to meet demand

By observation, the lines are down...therefore

3. Why are the lines stopped?

For staff breaks

4. Why does all your packaging staff have to take their breaks at the same time?

Because that is break time

5. Why do breaks have to occur at the same time for everyone?

I guess they don't; we have just always done it that way.

Once you have defined the root cause, you can look at solutions to the problem.

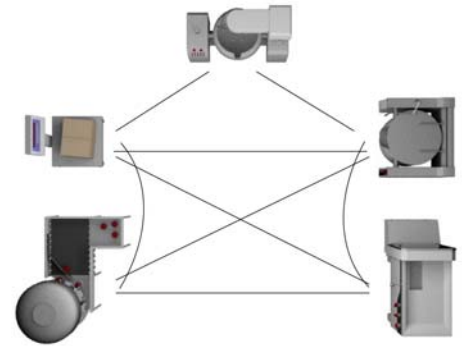


Write down a problem you have in your processing plant. Use the 5 Why's to see if you can get to the root cause of the problem.

Now go online to see how the 5 Why's can help you get to the root of the problem.

Spaghetti Diagrams

The spaghetti diagram is a visual way of depicting the movement of product, people or information in a work environment. Spaghetti diagrams can help you identify the wastes of transportation and motion by clearly depicting them in a diagram.



Think about the last time you misplaced something. Car keys are a good example. By simply retracing your steps, you locate your lost keys. If you were to draw those traced steps on a piece of paper, you would have created a spaghetti diagram. The same principle is applied in the processing industry. Track the movements of people, parts, ingredients, and even entire teams to see who is tripping over whom.

Making a spaghetti diagram is not difficult. On a map of the designated work area, simply draw the continuous movement of the target person(s) or product(s) as they move through the work area. You will be surprised at how much motion you find and the distances that people and products travel. This waste can then be addressed by streamlining the flow of products and information to minimize wasted movement and handling.



Draw a map of a work area in your processing plant. Now draw the continuous movement of the target person(s) or product(s) as they move through the work area.

Now go online to see how you can minimize the travel time.



SOPs

Standard Operating Procedures

In a lean workplace, everything is compared to a standard, and then worked to improve it. Improvements don't just happen... information and visual tools help identify areas requiring improvements. Standards set the benchmark for future improvements and bring consistency when training staff in work processes.



Steps to Standardize

- Step 1: Establish some procedures and processes.
- Step 2: Document the procedures.
- Step 3: Create visual work instructions.
- Step 4: Train staff.
- Step 5: Use the standard as a benchmark for the next continuous improvement.



Write down 5 or 6 steps to create a standard operating procedure that you would use to keep the area you identified in 5S clean and tidy. Think about a visual that would reinforce the procedures.



Now go online to further develop an SOP for an area of your processing plant.



Visual Management

Seeing is believing... The old saying “a picture is worth a thousand words” rings true in lean workplaces. Visual aids, drawings, cues and signals are all forms of visual management that enhance communication by taking the guessing game out of the equation. When provided a picture of how to build a hamburger, and the images show that the patty goes on the bottom, followed by a slice of tomato and then a pickle... then the picture conveys exactly what is expected. Simple. Effective.



Visual management has several aspects to it. It includes making operational processes and procedures visible to all staff, improving efficiencies through visual communication, and it's about making performance targets and results immediately available to all so that continuous process management takes place by all members of the production team. It can also support your 5S program by designating and visually identifying a place for everything and ensuring that everything is kept in its place. This includes mobile and handling equipment such as forklifts, pallet jacks, carts and bins as well as locations for all types of inventory.



Draw your own visual to outline a task or process in your processing operation.

Now go online for more examples of visual management and ideas on how you can create your own visual cues.



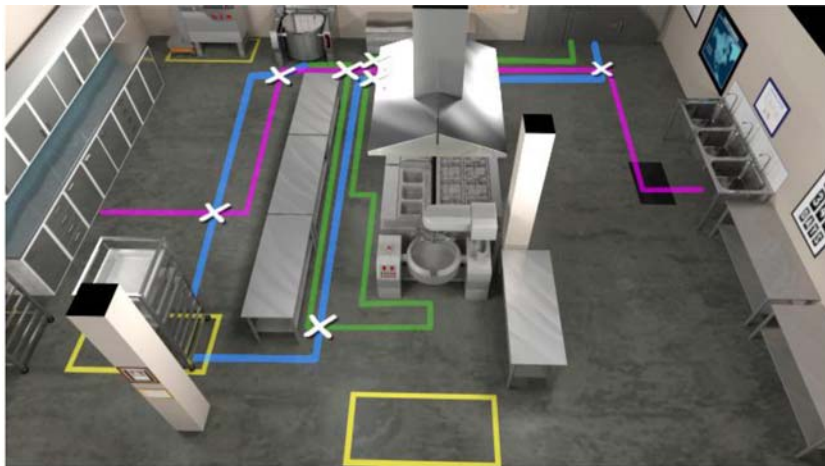
Food Safety and Lean

A food safety program helps you identify and control food hazards in a food processing environment. Lean manufacturing and food safety programs are complementary in many areas. Both programs help you remove waste, streamline operations and identify/prevent cross contamination points, and most importantly control food safety hazards. Food safety hazards can be allergenic, biological, chemical or physical hazards.

Many of the lean tools that help you identify or reduce waste can also be applied to help you identify or reduce food safety hazards.



The following spaghetti diagram illustrates potential cross-contamination points for biological or chemical hazards.



- Raw ingredient
- Finished product
- Chemical product

Current path with cross points

The "X's" in the current diagram show potential cross-contamination points for biological and/or chemical hazards.



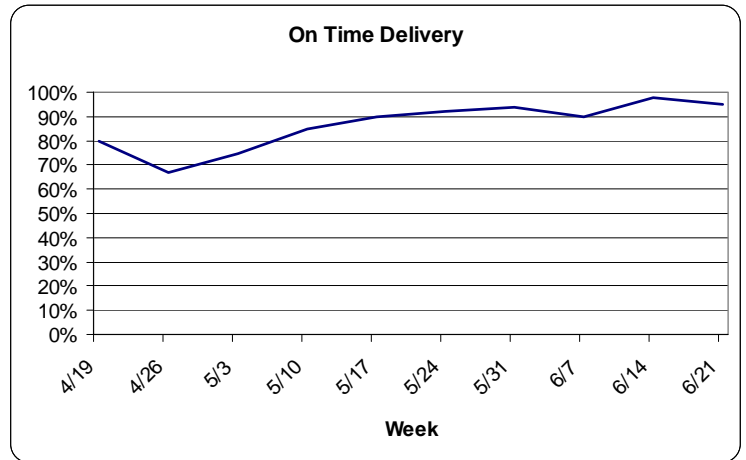
Use the drawing you made of a Spaghetti Diagram on page 11. Using a different coloured pen, add the path taken by a potential contaminant (e.g., a cleaning fluid or an allergen). Put an X where there might be potential cross-contamination points.



KPIs

Key Performance Indicators

Key performance indicators are used to help you manage your processes and highlight how you are performing. Select your indicators according to the kind of processes you are doing. For most operations this is a measure of how you are doing against a particular standard. In your lean operation, those performance standards are set by your customers.



Some examples of key performance indicators include the following:

- Day by the Hour Report: You would determine how much product your customers want on average per hour and measure your production against that target.
- On-Time Delivery: Another important measurement is **delivering product to your customer on time**. This is key for most customers. Late deliveries cause all kinds of problems. So you need to know how you are doing in your production throughput by measuring your on-time delivery.
- Quality Score: A third critical performance indicator is your **quality score**. Customers expect to receive the product they ordered, not only on time, but also with perfect quality. Therefore, you need to develop some kind of quality score in your operations. You want to know how you are doing quality-wise every hour of every day in what you are producing.



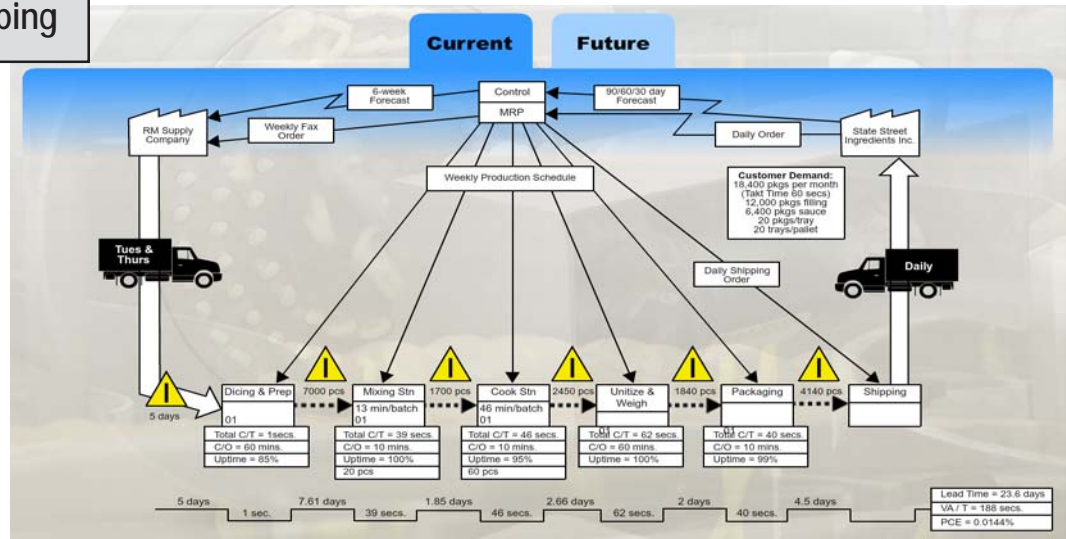
List some of the performance standards for your operation or standards that you think would help deliver on what your customer values.

Now go online to learn more about how you can use KPIs to assess your performance.



VSM

Value Stream Mapping



Value Stream Mapping (VSM) is a powerful yet simple visual tool for analyzing the current state performance of your operation and planning future state alternatives using lean tools and operational changes required to reach that future state.

Information on your value stream map includes:

- Information flow
- Material flow
- Inventory (work in process)
- Non-value adding activities
- Value adding processes
- Transportation flow

On the drawing above, information flows from right to left across the top portion of the map, and material/process flows across the bottom portion from left to right. Always begin with your current state map which answers the question “Where are you now?” From this you create your vision of the future in response to “Where do you want to be?” The map gives insight into the “How do you get there?” question.



Write down a place in your operation that might need improvement.

Now go online to learn more about how you would create a visual tool to analyze the current state of your operation and plan for the future state.



Resources

Productivity Improvement Website:

www.agriculture.alberta.ca/productivity

Alberta Agriculture and Rural Development's Productivity Improvement Initiative strives to assist producers and processors to remain competitive despite increased competition, rising prices and a shortage of qualified employees. Employing tools such as facility assessments, hands-on coaching and workshops, the Productivity Improvement Initiative works with companies who are in the business of growing and are looking to improve their current level of productivity, whether that be through increased automation or adopting lean practices.

The website is also intended as a learning resource, with relevant websites, articles, videos and training materials all being posted, as well as upcoming events. It includes:

- Lean Library – books and videos available for lending to agriculture and agri-processing companies. These resources aim to increase awareness of the benefits, best practices, management approaches and accounting strategies associated with the implementation of lean.
- Lean & Green – tools and resources for organizations that are looking to implement lean with sustainable practices that combine a respect for people, the environment and a commitment to the improvement of sustainable processes.

Alberta HACCP Advantage (AHA!) Program Website:

www.agriculture.alberta.ca/aha

Alberta HACCP Advantage is a voluntary program established by Alberta Agriculture and Rural Development, in cooperation with Agriculture and Agri-Food Canada. AHA! is a food safety program that has resources to assist processors in developing, improving and implementing a food safety system to meet the requirements of their current customers and help gain new customers. AHA! was developed to complement current food safety regulations and to facilitate consistent program development within the processing industry.

The goal of the Alberta HACCP Advantage program is to assist processors in implementing a complete and effective food safety program. An effective food safety program identifies hazards and measures to prevent, eliminate or reduce hazards during the processing and production of food. It is an outcome based approach which provides flexibility during implementation, regardless of the operation.

The Lean Journey—an online learning resource

www.agriculture.alberta.ca/leanjourney

