

Value Stream Mapping and other methods within Lean Production

The term “lean” comes from using less of everything compared to mass production.

This means using less human effort in the factory with less manufacturing space, less investments in tools, less engineering hours to develop a new product in shorter time, keeping less inventory, fewer defects in production, and production of a greater and ever growing variety of products.

Tools and methods in Lean, examples

1. Mapping of the process
 - Waste
 - Value stream mapping, VSM
 - SIPOC
2. 5S
3. SMED
4. Poka Yoke
5. 5 Why's
6. Andon
7. Kanban

◆ **7 (+1) types of waste**

W1 - Overproduction;

W2 - Inventory;

W3 - Waiting;

W4 - Transportation;

W5 - Motion;

W6 - Process (useless steps in a process);

W7 – Defects

+1 Not using the full resource of each person / Not meeting external customer expectations

◆ Value-stream mapping

Value stream mapping is a paper and pencil tool that helps you to see and understand the flow of material and information as a product or service makes its way through the value stream.

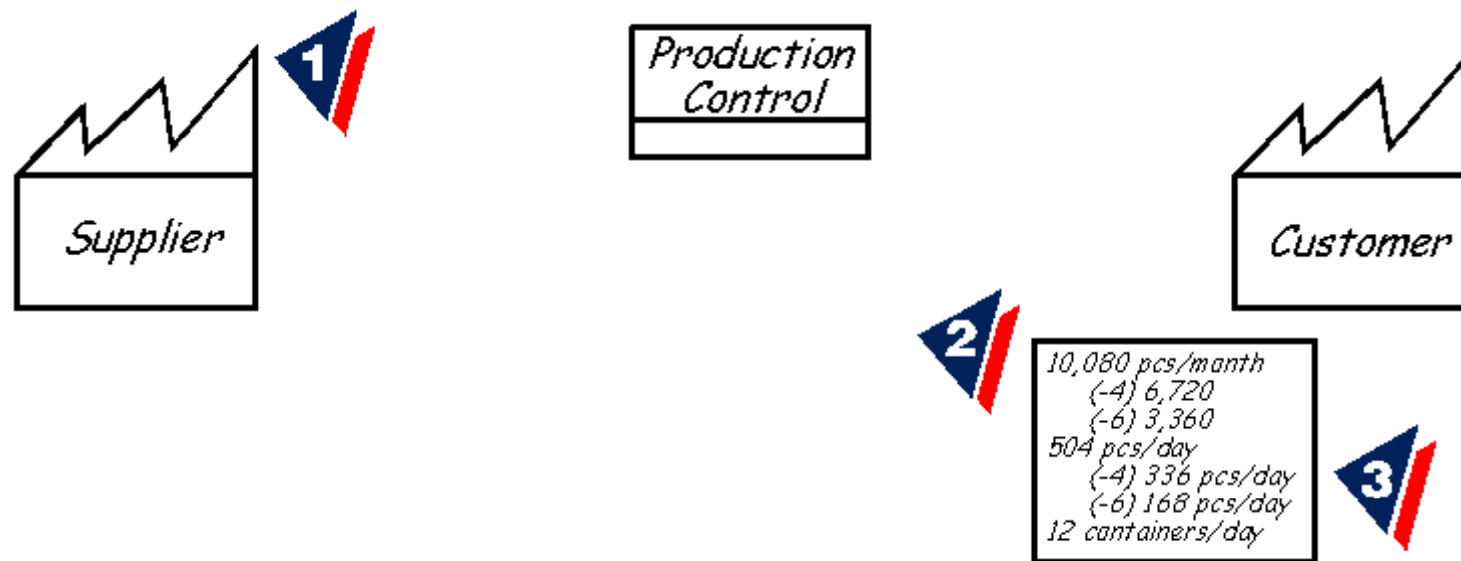
◆ Value-stream mapping

1. Identify product to analyze
2. Put together a team to perform the analysis
3. Go to the workshop and study
4. Overall process map of material flow when walking by. Start at the customer
5. Collect data
6. Identify information flow
7. Enter times and analyze
8. Draw future process

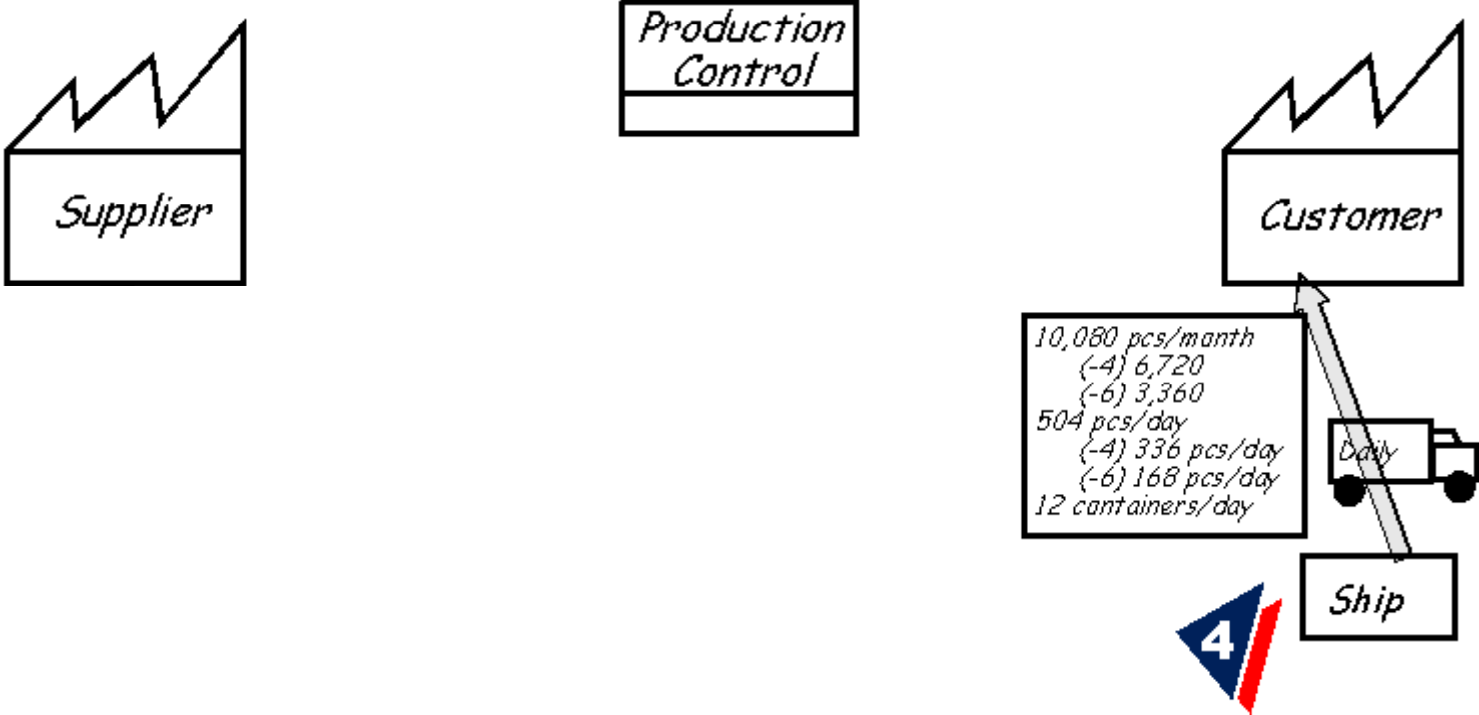
1. Draw customer, supplier and production control icons



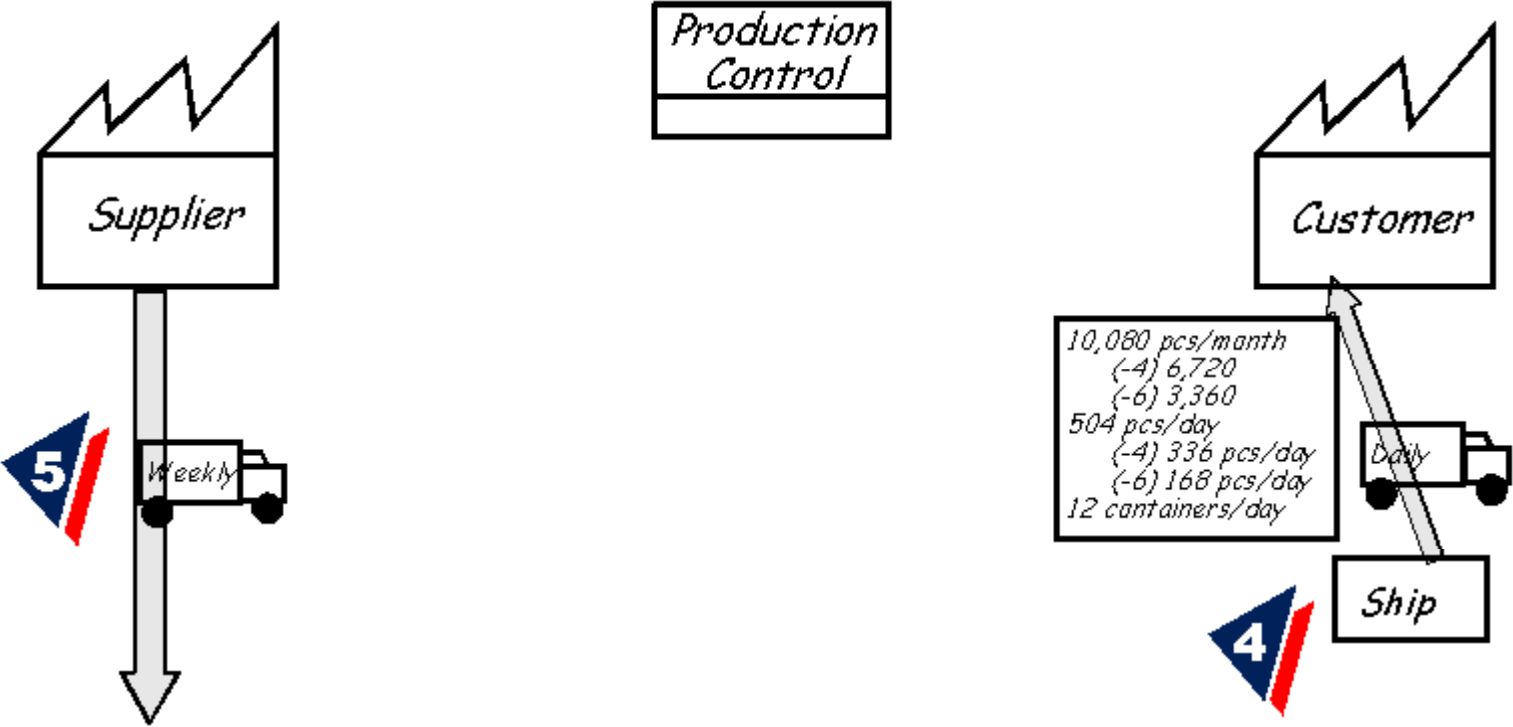
2. Enter customer requirements per month and per day
3. Calculate daily production and container requirements



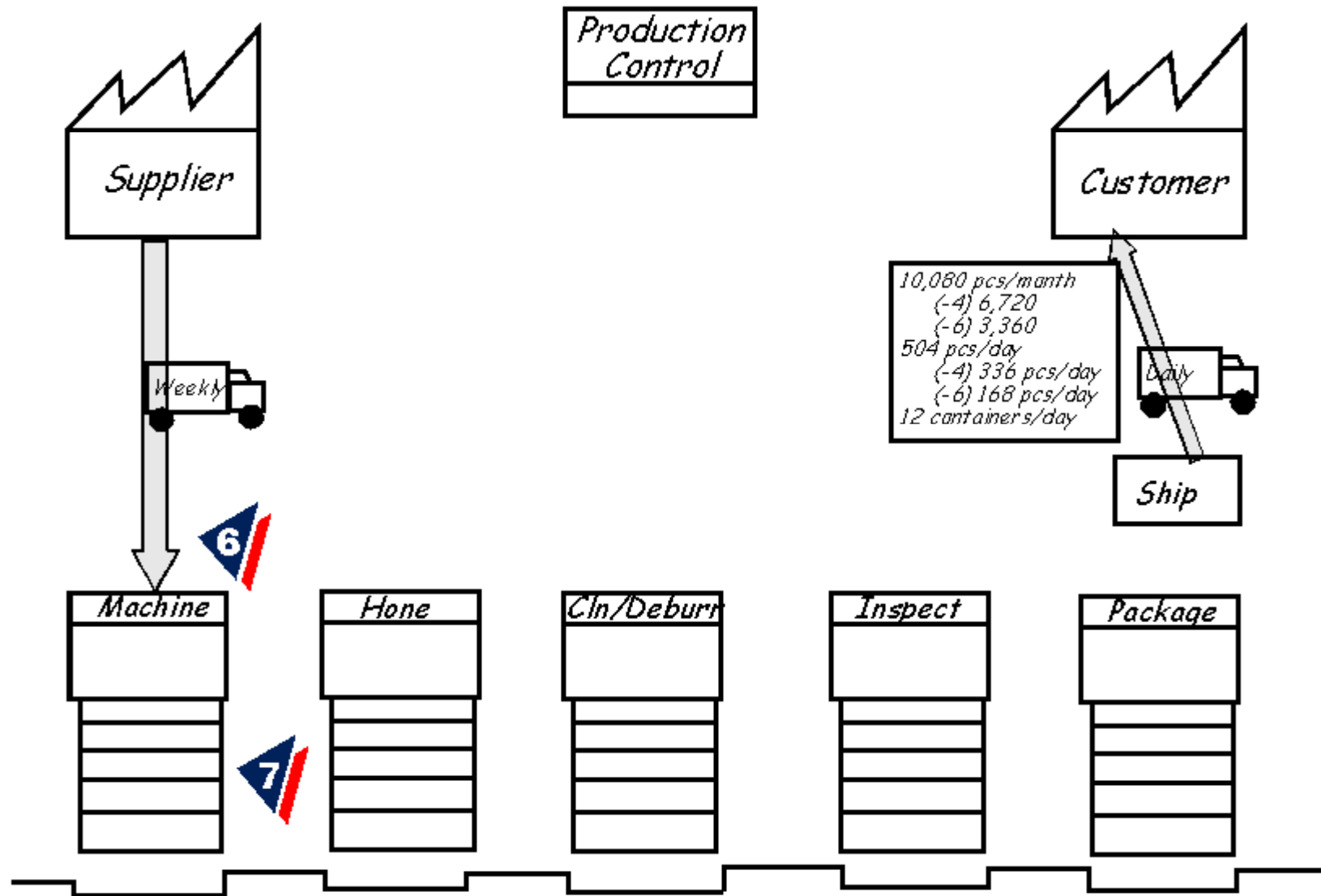
4. Draw outbound shipping icon and truck with delivery frequency



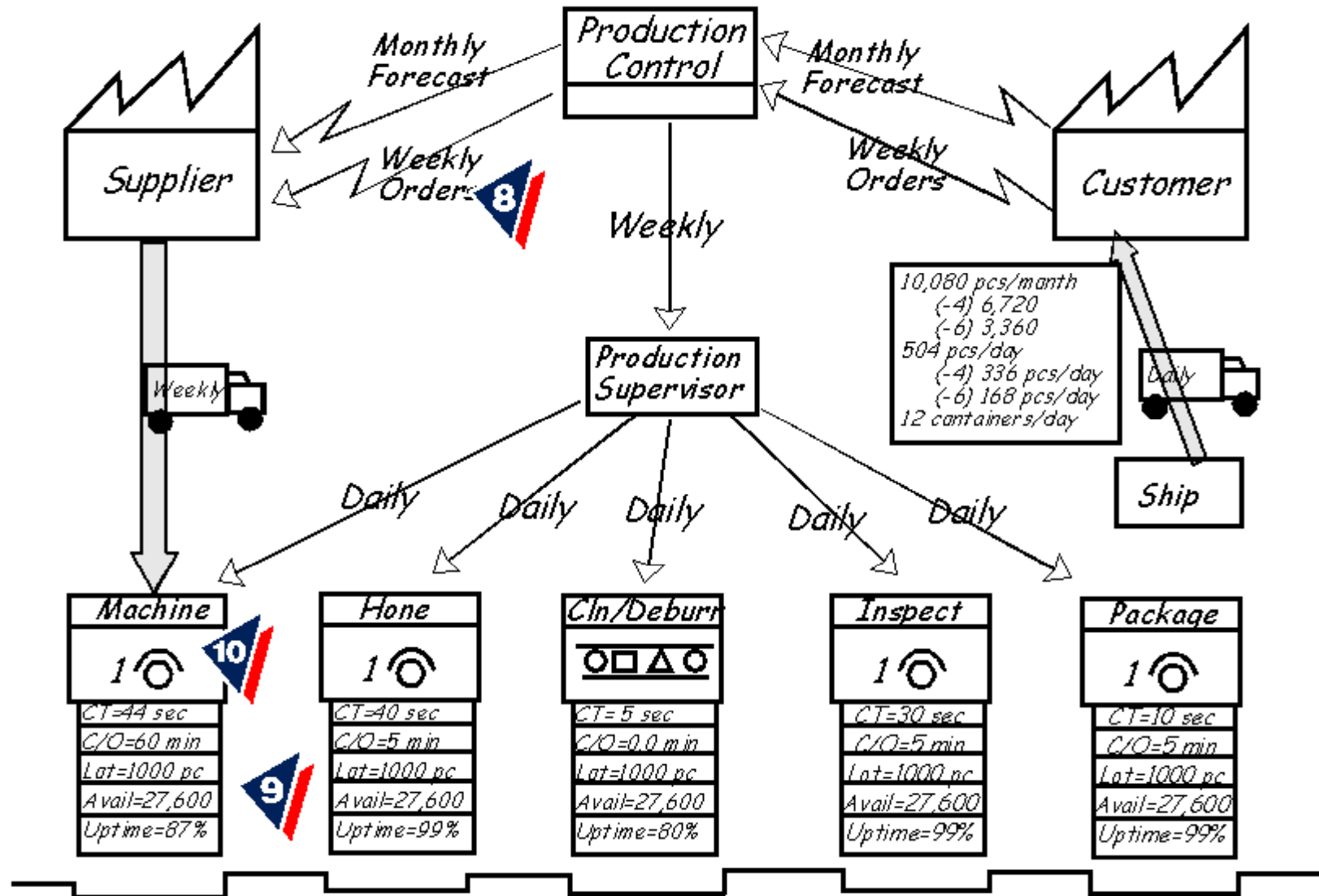
5. Draw inbound shipping icon, truck and delivery frequency



6. Add process boxes in sequence, left to right



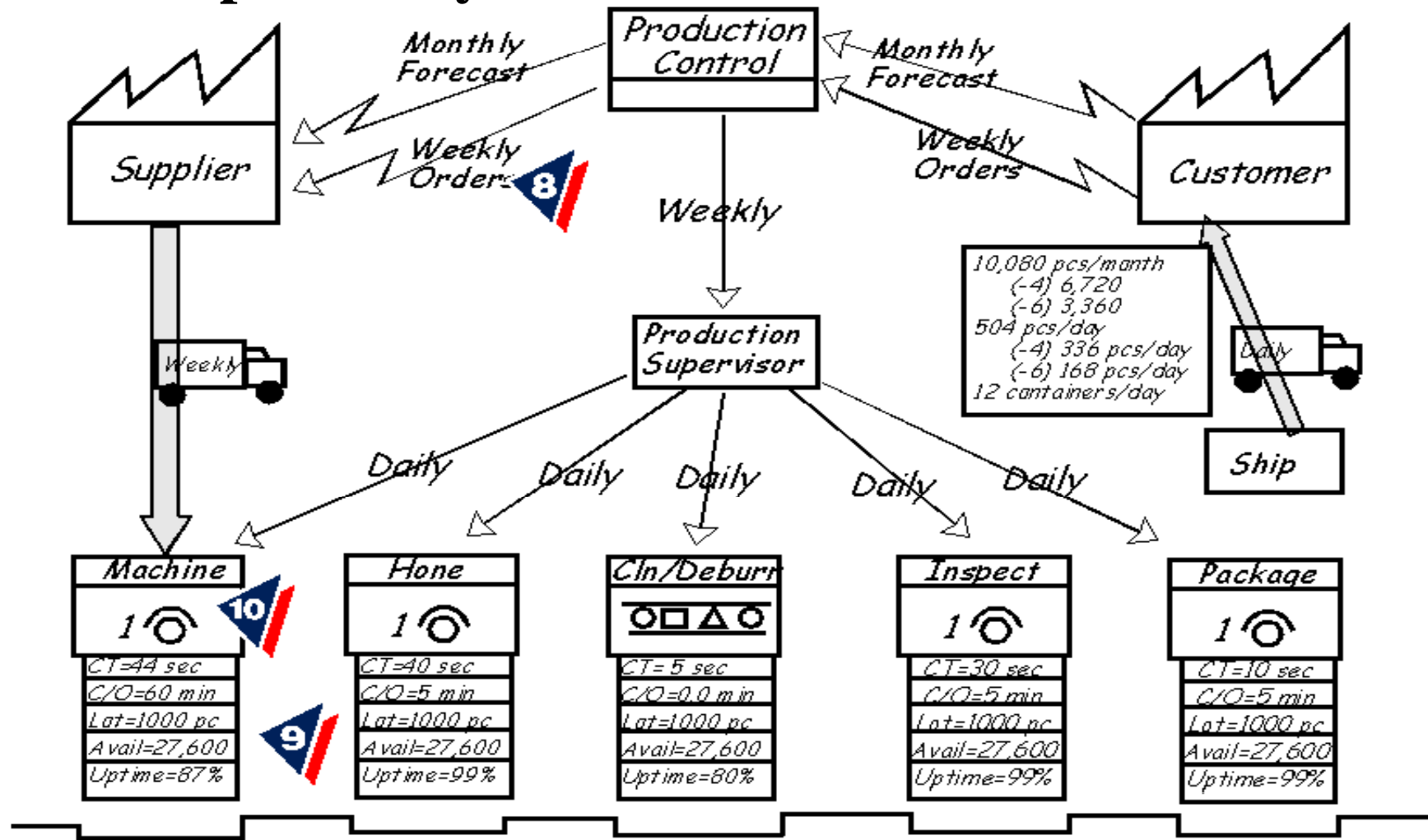
8. Add communication arrows and note methods and frequencies



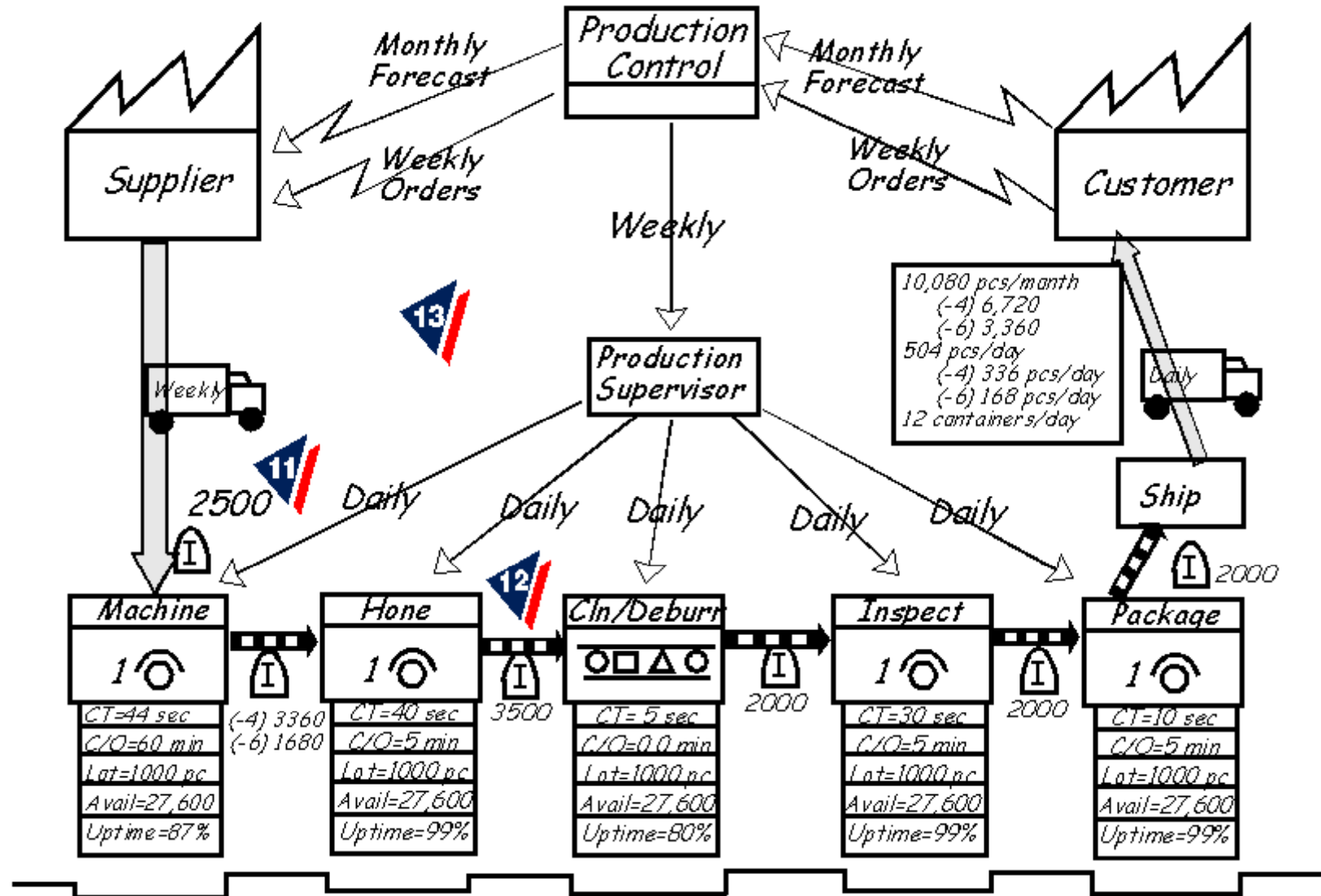
9. Obtain process attributes and add to data boxes

Observe all times directly!

10. Add operator symbols and numbers

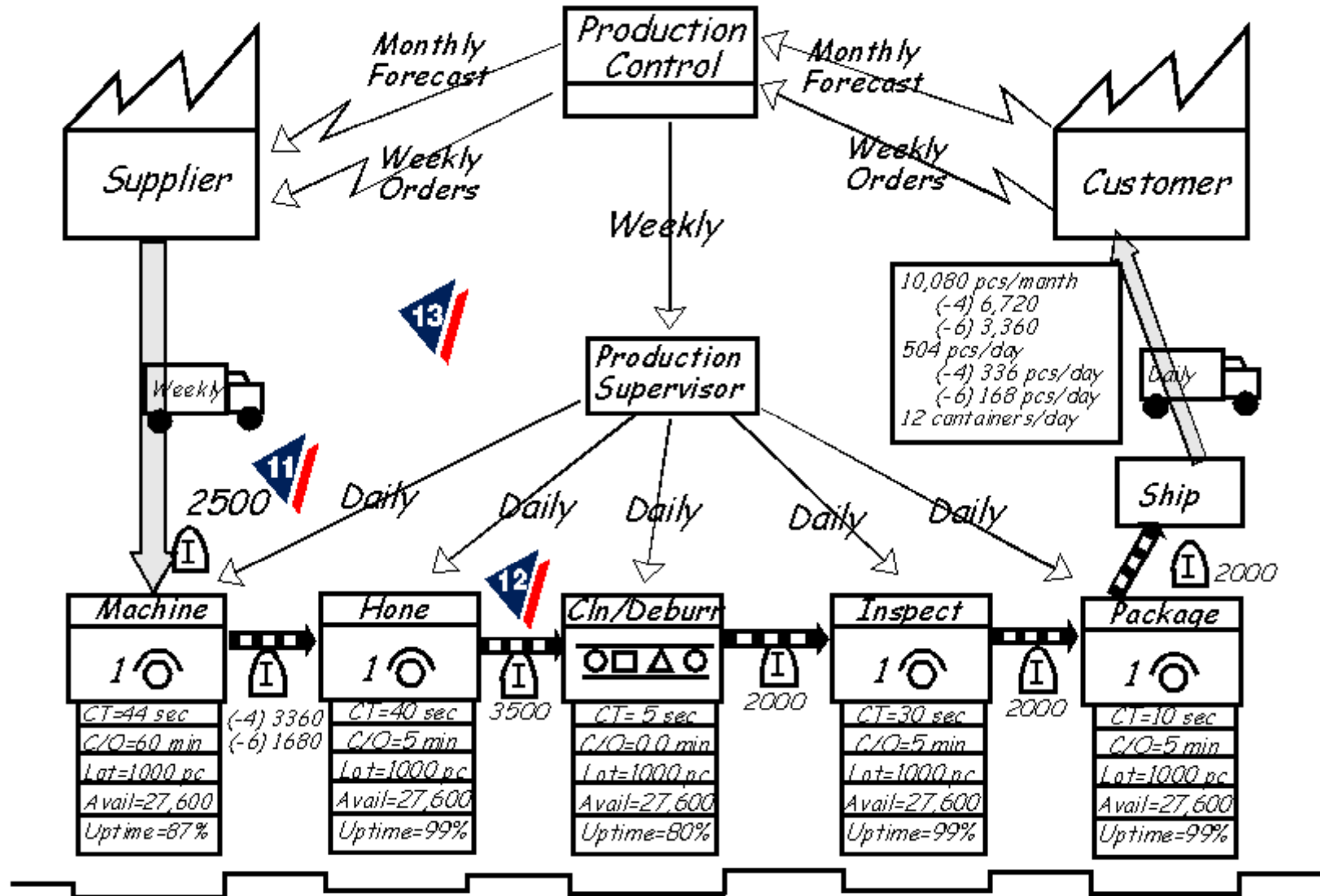


11. Add inventory locations and levels in days of demand and graph at bottom



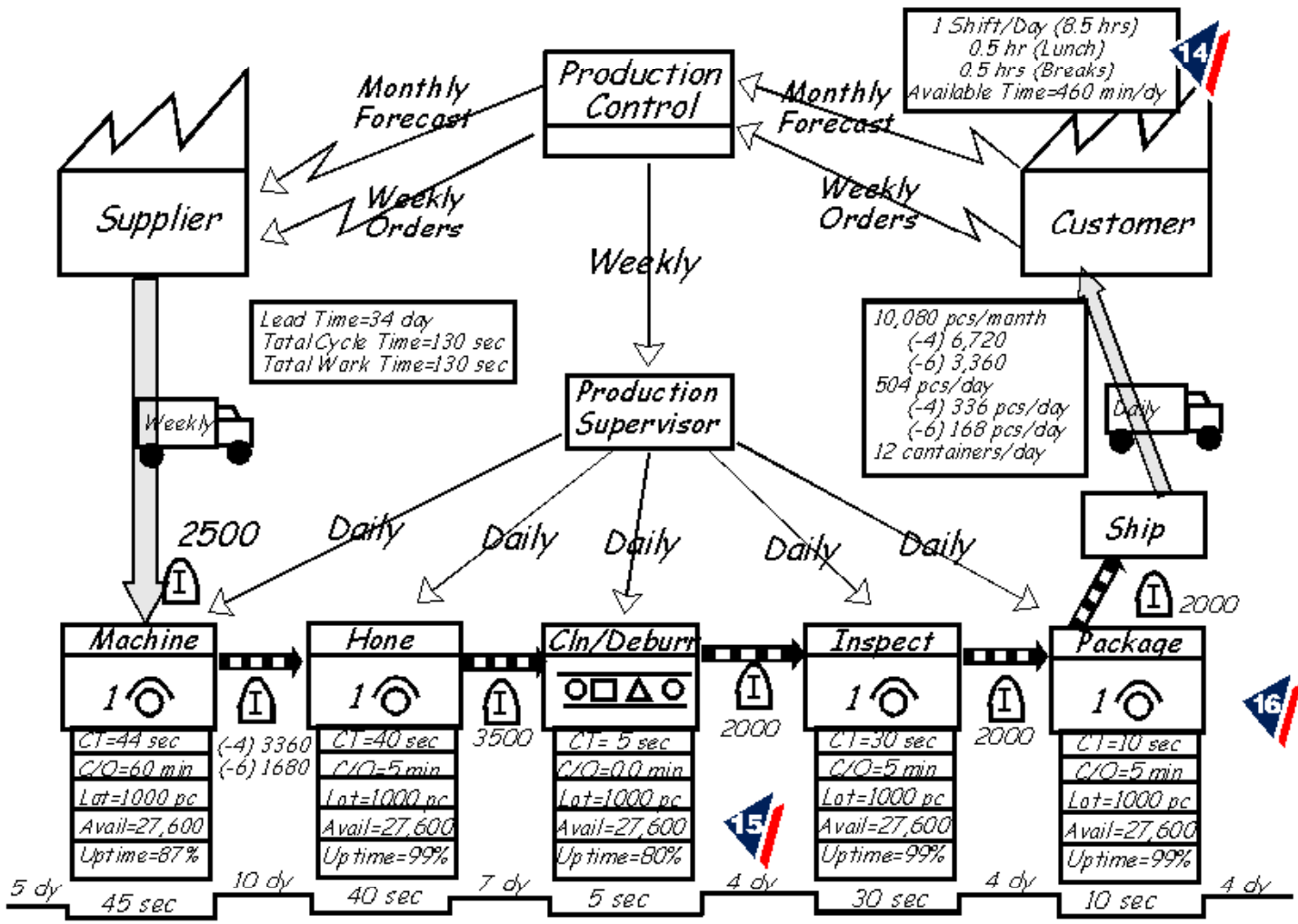
12. Add push, pull and FIFO icons

13. Add other information that may prove useful

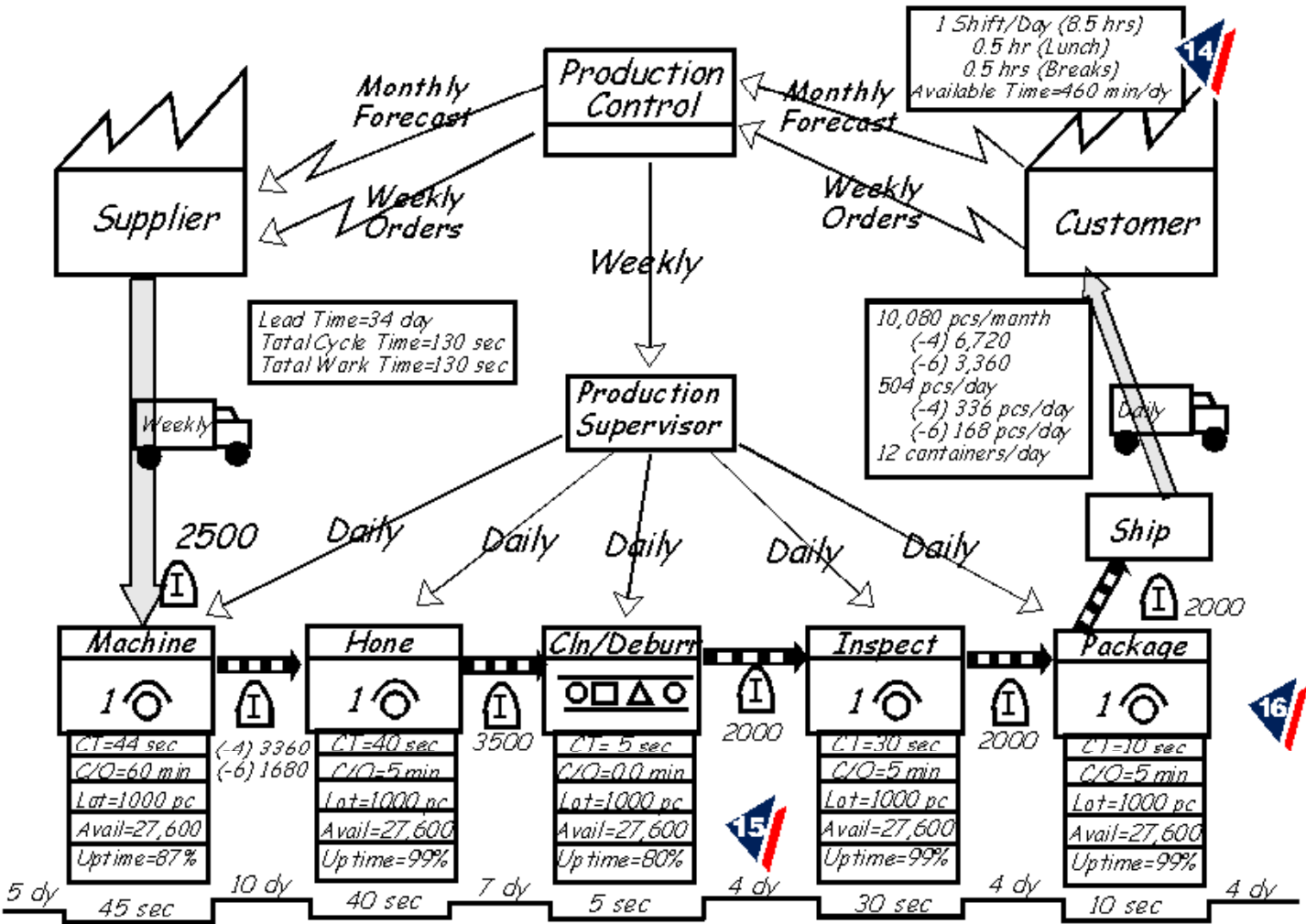


14. Add working hours.

15. Cycle and Lead Times

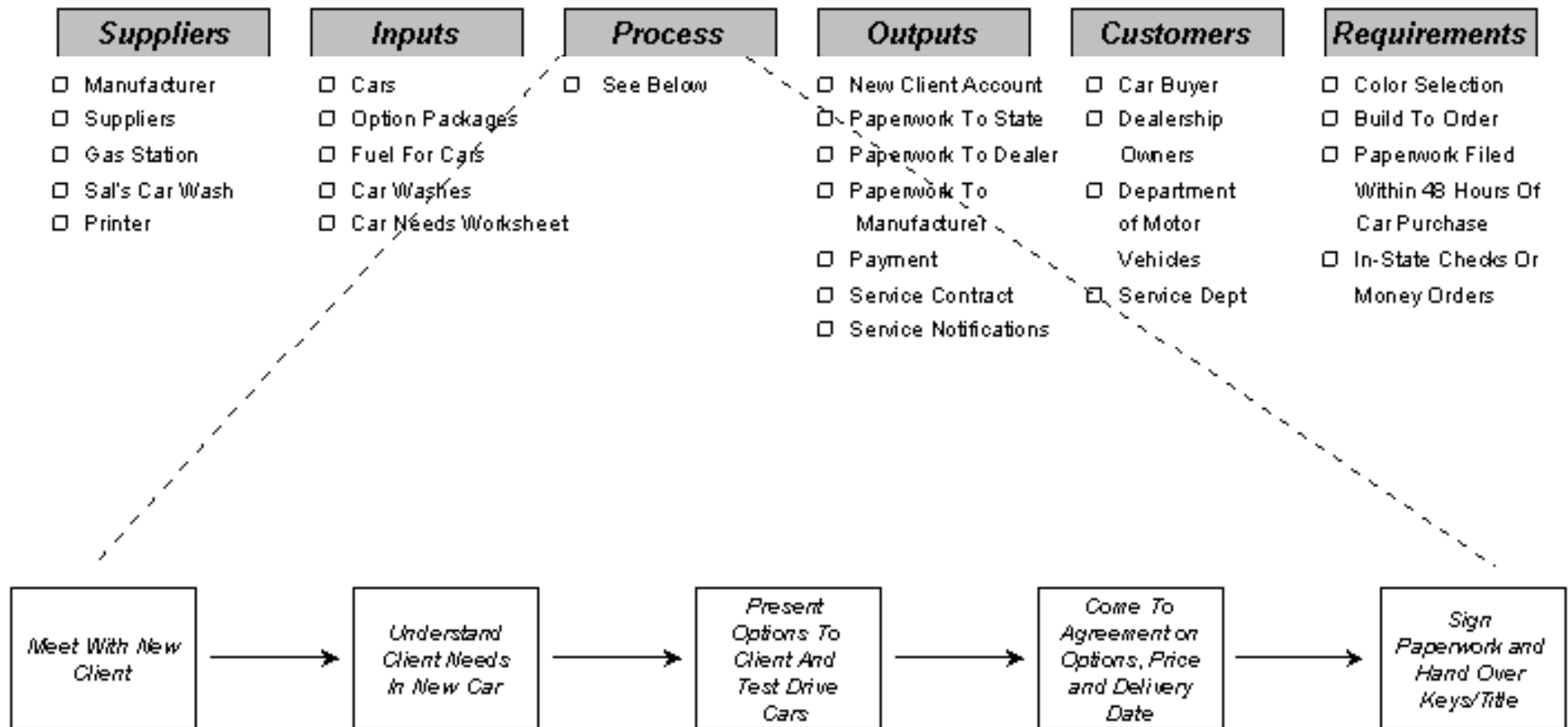


16. Calculate Total Cycle Time and Lead Time



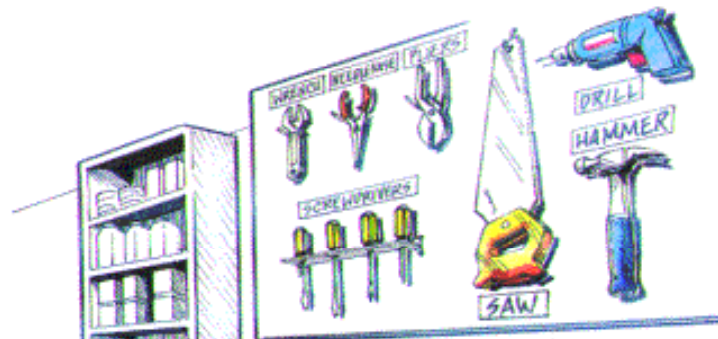
SIPOC Diagram

Fictitious Car Dealer Example



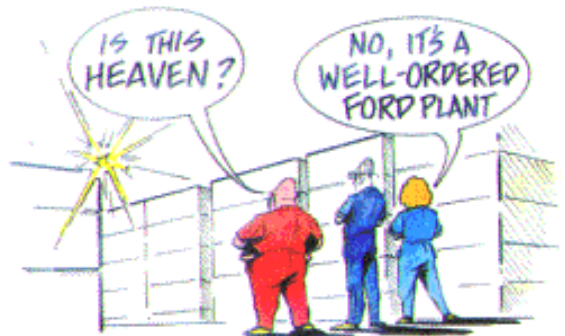


1. Sort



2. Stabilize

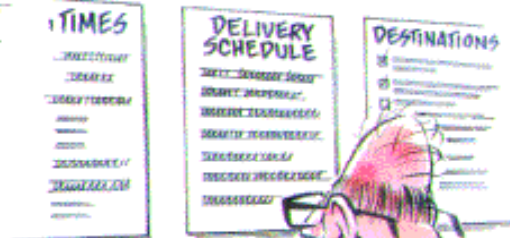
5 S's



5. Sustain



3. Shine



4. Standardize

5S

The 5S system is based on the English translations of five Japanese words.

They are:

- Seiri - Sort (Sortera, arrangera) through and sort out: Clean out the work area, keeping what is necessary in the work area, relocating or discarding what is not.
- Selton - Set in order and set limits (Strukturera, ordna): Arrange needed items so they are easy to find, use and return, to streamline production and eliminate time searching for them.
- Seiso - Shine and inspect through cleaning (Städa, renlighet): Clean and care for equipment and areas, and inspect while doing so.
- Seiketsu – Standardize (Standardisera, prydighet): Make all work areas similar so procedures are obvious and instinctual, and defects stand out.
- Shitsuke – Sustain (Skapa vana, disciplin): Make these “rules” natural and instinctual. Once they are habits, the total benefits of 5S will be reaped.

5S

1. Identify what is needed within the workplace
– red post-it's on everything unnecessary
2. Find place for everything that are left – check that it is used, find storage place, label storage place etc.
3. Clean and inspect as an every day routine
4. Repeat step 1-3

SMED

- **Single Minute Exchange of Die.**
One of Lean tools that reduces the changeover time. It has a set of procedures to be followed for a successful implementation.
- **Some Advantages:**
Setup reduction and fast, predictable setups enable Lean Manufacturing. Setup reduction reduces setup cost, allows small lot production, smoothes flow, and improves kanban

Poka Yoke

Assure that mistakes are not done

1. Switch – use form, dimensions or other physical criteria's
2. Constant amount – if deviation - warning
3. Sequence – perform operations in right sequence

5 Why's

- The 5 why's typically refers to the practice of asking, five times, why the failure has occurred in order to get to the root cause/causes of the problem. There can be more than one cause to a problem as well. In an organizational context, generally root cause analysis is carried out by a team of persons related to the problem. No special technique is required.

Andon

In 'ancient' Japan, Andon was a paper lantern (a handy vertically collapsible paper lampshade with an open top and a candle placed at the central section of the closed bottom). To the ancient Japanese, Andon functioned as a flashlight, a signaling device in distance, or even a commercial sign.

Nowadays, Andon at many manufacturing facilities is an electronic device: audio and/or color-coded visual display. For example, suppose an Andon unit has three color zones (red, green, and orange) and when the orange zone flashes with a distinctive sound, it calls for an attention of and is signaling operator to replenish certain material.

A tool of visual management, originating from the Japanese for "Lamp". Lights placed on machines or on production lines to indicate operation status. Commonly color-coded are:

- Green: normal operations
- Yellow: changeover or planned maintenance
- Red: abnormal, machine down

Often combined an audible signal such as music or an alarm.

Kanban

- Kanban: A Japanese term. The actual term means "signal". It is one of the primary tools of JIT system. It signals a cycle of replenishment for production and materials. It maintains an orderly and efficient flow of materials throughout the entire manufacturing process. It is usually a printed card that contains specific information such as part name, description, quantity, etc.

- Plan your own self study of the course book, **The Toyota Way!** Sit also together in study groups, it helps!

Start soon with a first overview read!