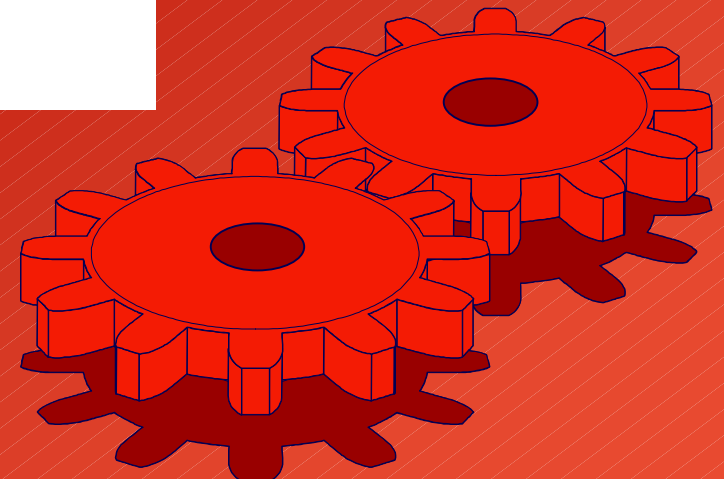


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Lean Manufacturing for Direct Application

A very simple way to improve our operations based on the logic concepts of the Toyota Production System

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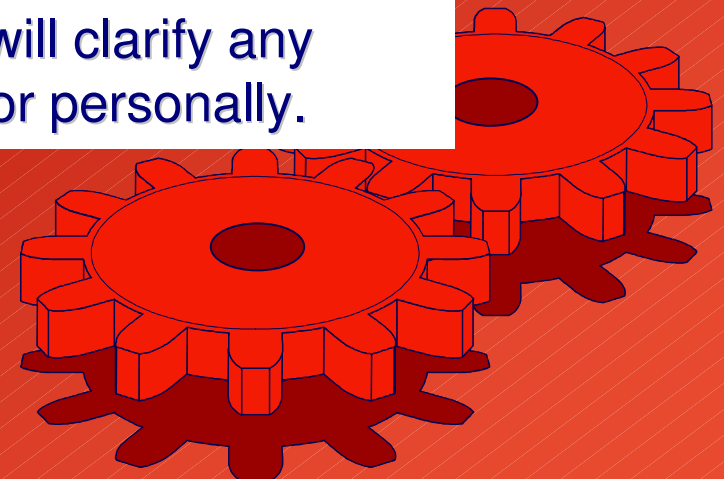


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Lean Manufacturing for Direct Application

This presentation lasts approximately 20 minutes. We recommend that you have paper & pencil handy to take notes of the subjects that you may find of interest, so you can discuss them further with some other members of your organization. We will clarify any doubts directly, through email, telephone or personally.

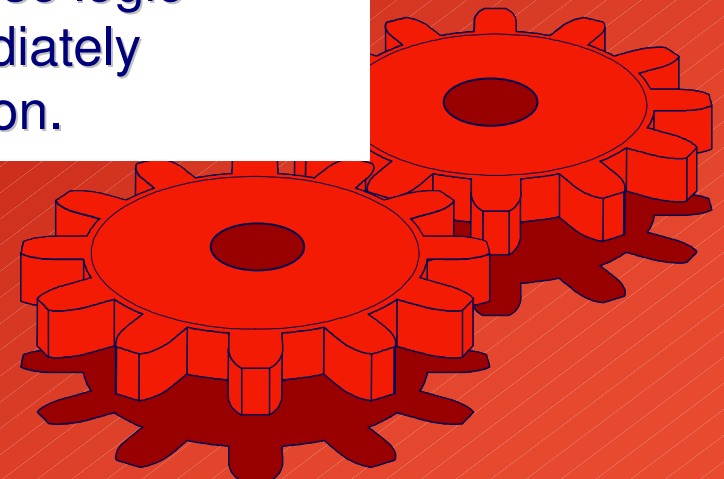
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What can you expect?

Lean Manufacturing for Direct Application

You will discover and identify through this presentation a good number of opportunities that *already exist in your plant*, to apply these logic and simple practices and start immediately to benefit from their implementation.



What is Lean Manufacturing?

- ▶ The purpose of this presentation is to show you the characteristics of these practices that contributed to the “Japanese Miracle”
- ▶ Lean Manufacturing was born and raised in Japan. It is based on U.S. statistician William Edwards Deming’s principles and it was originally named the “Toyota Production System”
 - ▶ The American Auto-Industry had to adopt this system in order to survive and remain competitive, therefore the need to switch the name to “*Lean Manufacturing*”
 - ▶ Today, 100% of these plants operate under some form of this system. It is the only smart alternative to remain in the market



Why Should We Adopt It?

- ▶ Manufacturing experts consider that in the years to come it will not be possible to subsist for any company that does not implement these disciplines in their operations
- ▶ The Global Economy has caused a stronger competition in all kinds of businesses
- ▶ Manufacturing industries face continuous reduction in profit margins in order to keep a share of the market
- ▶ Each little savings will contribute to improve the economy of the enterprise and its community
- ▶ This is the time to perform the best use of each and every one of the resources available
- ▶ The Human Resource is perhaps the most critical of all...

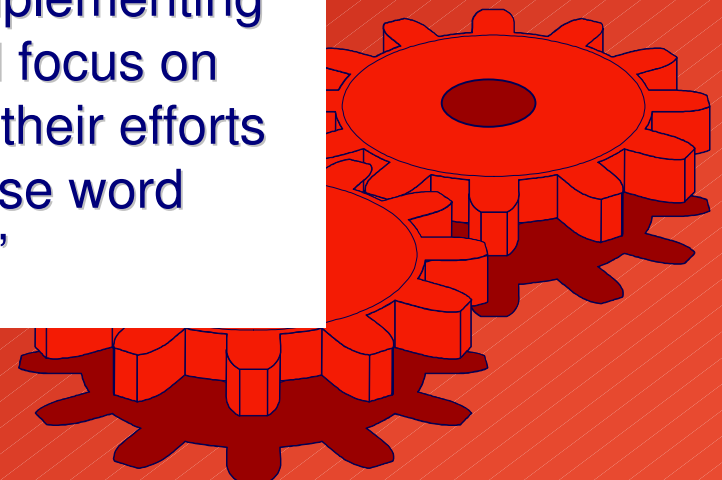
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Which practices are these?

- ▶ TPM, Total Productive Maintenance
- ▶ The 5S philosophy, to improve cleanliness, organization and utilization of the work areas. This improves the use of time as well.
- ▶ JIT Just in Time and the “Pull” System
- ▶ SMED (Single Minute Exchange of Dies)
- ▶ Zero Quality Control - Quality at the source - No inspection
- ▶ Production in Work Cells - One piece Flow - Cross Training
- ▶ Additionally and complementarily Kanban & Poke Yoke are important elements... we will define them...

In all these practices, Kaizen is an excellent implementing procedure. Small teams are put together and focus on understanding a particular goal. Then they put their efforts in play to accomplish it. Kaizen is a Japanese word meaning “Continuous Improvement”



How can we get to know them?

- ▶ This presentation allows for us to share the general characteristics of these Lean Manufacturing practices and their particular applications. This way we can define if they are a response to some of your needs.
- ▶ We will overview each of them and will be able to decide if one or the other is suitable for your operation.
- ▶ In some cases the application can be appropriate just in a small part of your plant, but it will for sure be very cost effective.
- ▶ The training modules, either in electronic form (like this presentation) or through our on site hands-on coaching directly in your plant, cover thoroughly and in detail the implementation process. We provide a continued online or telephone support for one full year at no extra cost.

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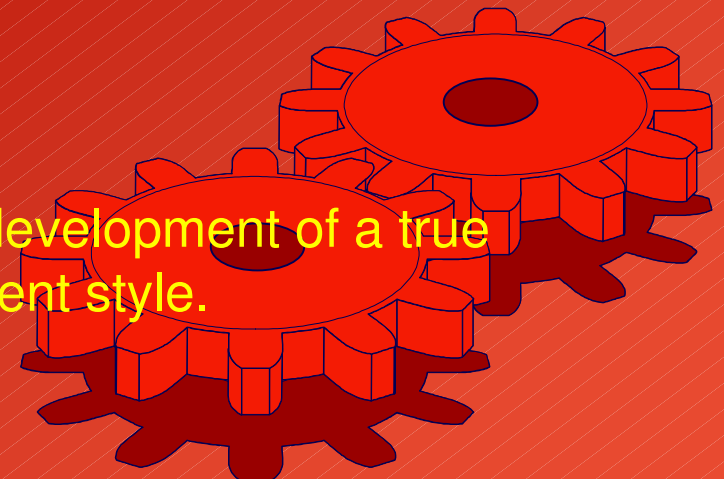
TPM Total Productive Maintenance

- ▶ TPM is without a doubt an excellent starting point in this series of positive changes. It conciliates two traditionally antagonistic areas of the productive environment.
- ▶ The maintenance tasks are developed through a cooperative activity with production operators. They receive a valuable training which builds more self confidence and empowers them to make decisions about their equipment. As a result, the equipment becomes more reliable and the Operation, and Life Cycle Costs are reduced. It is a Win-Win situation for the whole organization.
- ▶ The level of satisfaction and morale among the personnel raises and a feeling of “ownership” develops towards the equipment, the product and the company.



TPM Total Productive Maintenance (2)

- ▶ The elements of technical knowledge acquired by the operator represent a source of pride for him and also more job security.
- ▶ As a whole, the implementation has three objectives interesting to all of us: That is to make the operation...
 - ▶ easier
 - ▶ safer
 - ▶ more productive
- ▶ TPM has three main goals:
 - ▶ Zero Breakdowns
 - ▶ Zero Defects
 - ▶ Zero Accidents
- ▶ The key to these accomplishments is the development of a true new way of doing things. A new management style.



How to Achieve Implementation?

- ▶ All the changes required to adopt the new disciplines are possible through a gradual continual implementation.
- ▶ Whatever our plan or schedule, we have to start with ONE machine or Work Station.
 - ▶ We will select it with this criteria...
 - ▶ It must be an important operation within the process
 - ▶ It must be visible to everyone in the organization
 - ▶ We must know the actual conditions and performance before the implementation effort
- ▶ We must broadcast the support that TPM is getting from top management and create awareness that it is a permanent change in the process and the attitude.
- ▶ Show each one in the organization how they will benefit from TPM. This will help get their support.

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What Are The Benefits?

- ▶ 1.- To secure that the company will remain in the market, therefore the job source.
- ▶ 2.- A higher level of education and training makes everyone more valuable inside and outside of the working environment.
- ▶ 3.- Lean Manufacturing is The Present and The Future of the World Class Industry
- ▶ 4.- Higher productivity always translates into benefits for all the organization and the community.

Each person will have to realize how this change will benefit them. It is not about convincing people.- One of the big errors we frequently incur in, is to ask people to work for *our objectives*, instead of letting them see how *their own needs and aspirations* can be satisfied and achieved through their participation. That is the motivation that each person can create on their own.



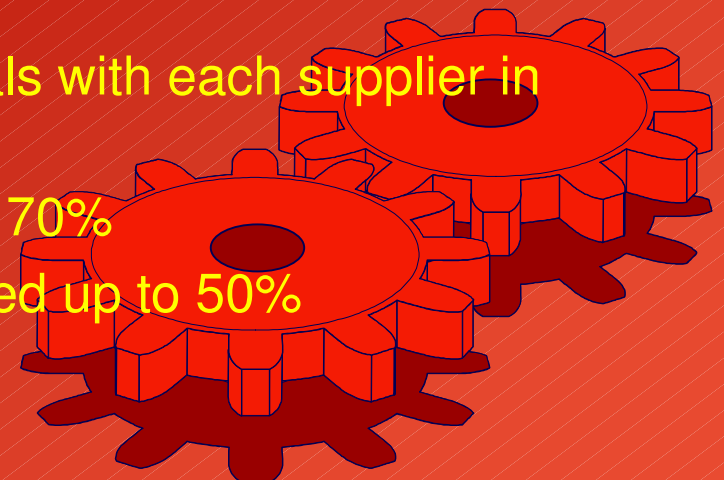
What are the 5S' s?

- ▶ It is a set of 5 Japanese words
 - ▶ Seiri - Sort
 - ▶ Seiton - Set in place
 - ▶ Seiso - Shine
 - ▶ Seiketso - Standardize
 - ▶ Sitsuke - Sustain
- ▶ In essence it is about...
 - ▶ Eliminate from the work area anything that doesn't belong in it
 - ▶ Assign one logic place for each tool or material that belongs in the area and have it always in its place
 - ▶ Clean the area as never before
 - ▶ Establish new conditions as the standard
 - ▶ Sustain the effort so you do not lose what you have achieved



Just in Time...?

- ▶ Indeed, we used to think that in order to assure production, we were supposed to have large volumes of raw materials. That concept did have several disadvantages though...
 - ▶ Too much investment in inventories
 - ▶ Risk of damaging materials
 - ▶ Possible changes in design would have to wait
 - ▶ Large spaces dedicated to storage
 - ▶ Longer distances to do anything in the plant
- ▶ What did Toyota do?
 - ▶ They established punctual delivery deals with each supplier in exchange for continual loyalty
 - ▶ They reduced inventories in more than 70%
 - ▶ The areas and distances were shortened up to 50%



Just in Time...?(2)

- ▶ Today each supplier knows exactly how many parts he has to deliver in which spot of the plant and at what time, (in some cases more than one delivery per day and even one each hour). Storage and receiving areas have been minimized.
- ▶ As well as the amount of materials in stock, the areas were also substantially reduced, and so were the distances that each operation requires for the operator to cover. Material handling was minimized.
- ▶ We will talk ahead about Kanban, a simplified system to ease operations related to production control, supplies, work in process and material handling in general.
- ▶ Along with JIT, we will analyze the “pull” systems. This is about the volume and speed being controlled basically by the following step in the process. The final production line is regulated by the final consumer.



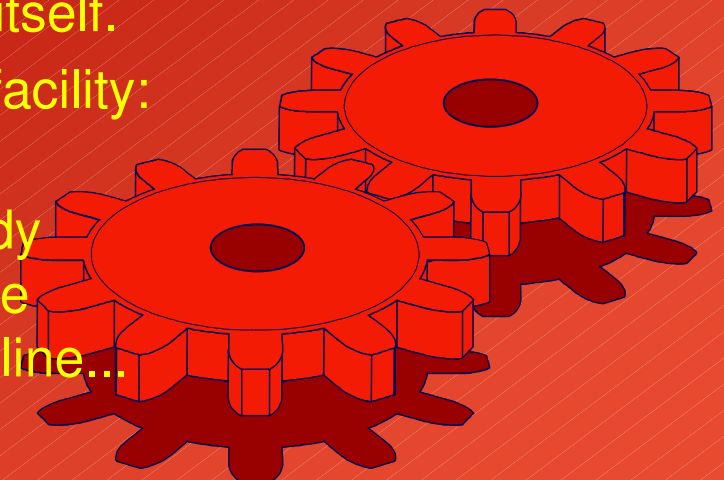
“Pull” system...

- ▶ The simplest way to illustrate and understand this system is to think of the modern supermarket. In this kind of business, the “storage” areas have practically vanished...
 - ▶ We can see a good number of people who “do not work there”, replenishing the shelves with their products. They are the suppliers of products and work for manufacturers or distributors of those products. They are performing a Just In Time delivery, but the volume of products that they deliver is not read from a purchasing order of the supermarket. They can only deliver the amount of product that final consumers “pulled” from the shelves. Therefore the name of the system.
 - ▶ The same process takes place in many factories where some suppliers through an agreement keep a pre-defined stock of: Screws, nuts, bolts, hoses, cables so that the consumers (in this case operators or maintenance technicians), “pull” from those strategically located supply centers. This simplifies operations.



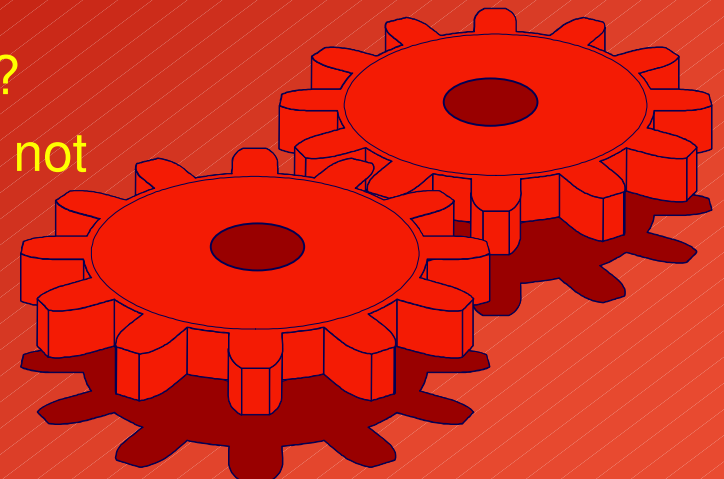
Kanban, a Tool for Simplification

- ▶ Closely associated with JIT and the Pull System efficiency, Kanban is a concept based on visual items like tags, cards, banners, boxes, trays, etc.
 - ▶ This is about creativity. We can use cards or tagged or color coded boxes, trays, etc. to identify one product or material being handled in the system. Those cards or tags, boxes, bins, trays, etc. will be used in a way that we will determine conventionally.
 - ▶ Without a complex computerized system, these elements will be generating visual, clear information that we will be able to use in the control of materials or the process itself.
- ▶ Example at an automobile manufacturing facility:
 - ▶ A simple color coded card with a few signs, letters or numbers tells everybody what accessories or features have to be installed on a vehicle on the assembly line...



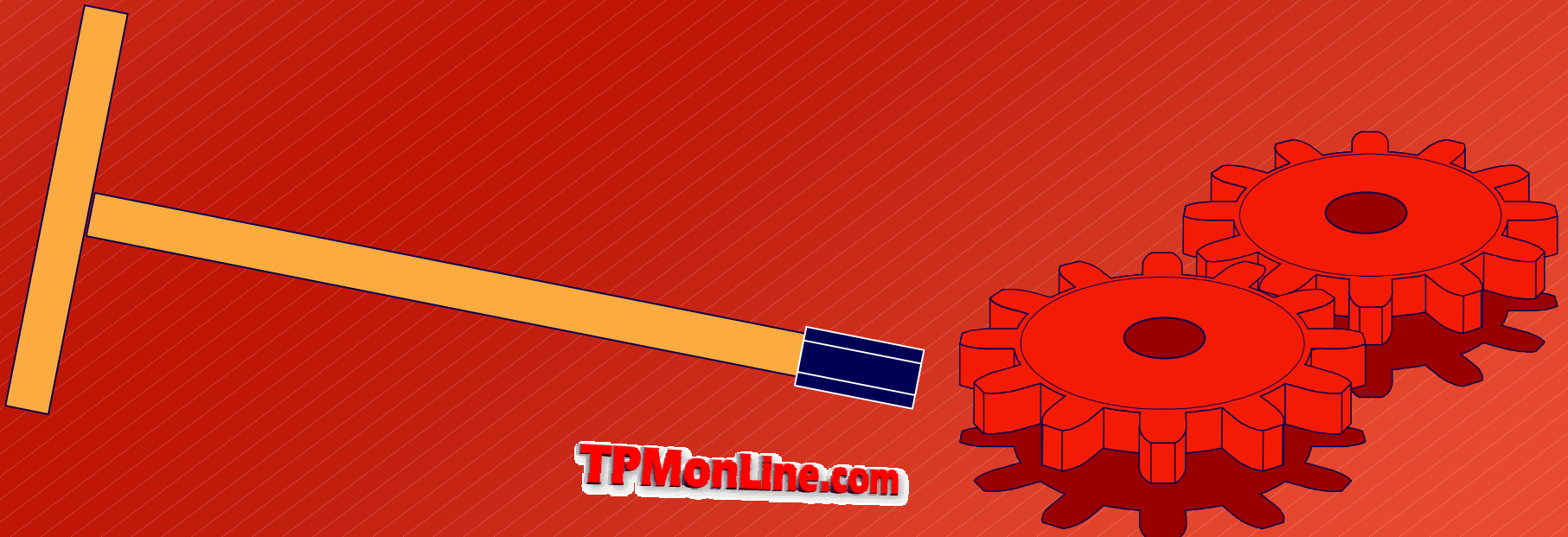
¿SMED?

- ▶ “Single Minute Exchange of Dies” is the name given to a discipline focused on simplifying machine setups. This allowed for stamping machines to go from 4 or more hours to few minutes in their set up or die exchange processes.
- ▶ Using locating or self centering pins instead of bolts, fast setting clamps, sliding rails, wheel mounted parts, special cranes, divided covers, etc. set-up times are cut to just a few minutes.
- ▶ These techniques are comparable to the process of removing and replacing a set of tires in a racing car with just one bolt each and in just 5 or 6 seconds.
Right! We are in a competition, remember?
- ▶ We must be very careful though, so we do not compromise safety or security of the operation in search for speed.



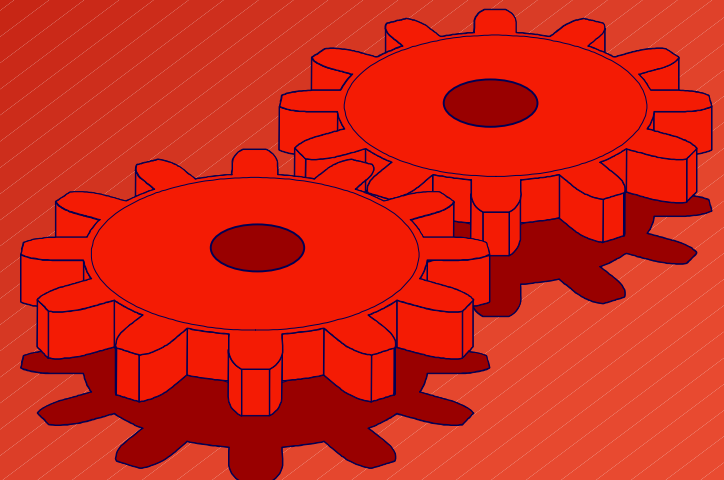
Example?

- ▶ In many cases, we can produce a special tool with minimal cost and excellent results.
- ▶ A special tool can be, for example, a simple “T” handle made of steel tube with an hex or allen point or a socket wrench attached. This will ease some difficult to reach spots in a machine or will eliminate the need for other tools to be brought each time to the operation. It will also make it safer.



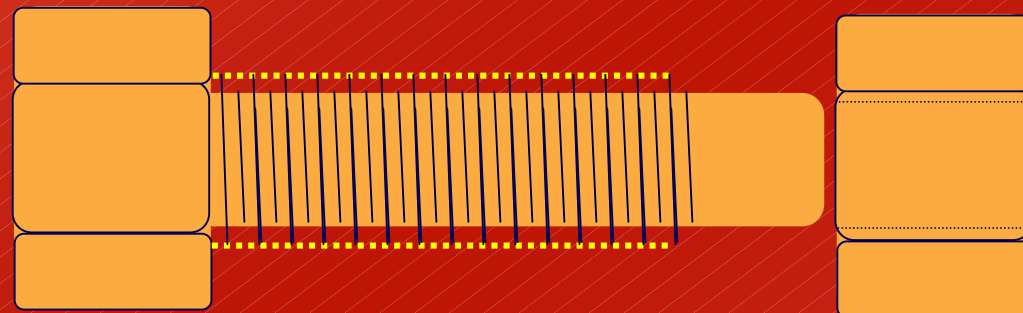
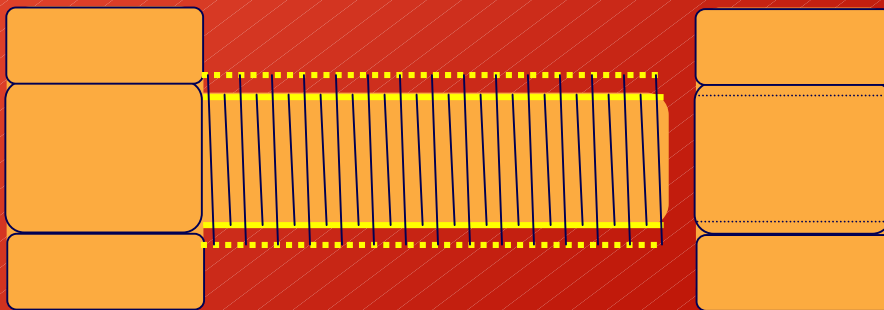
Clamps for Quick Release

- ▶ There are a number of clamps and other hardware that will help accomplish the projects to simplify your operations.
- ▶ Some of them may be manually operated while others may be pneumatic or even hydraulic.
- ▶ These clamps are just an example of the many resources that we can use to make our setups easier, safer and faster.

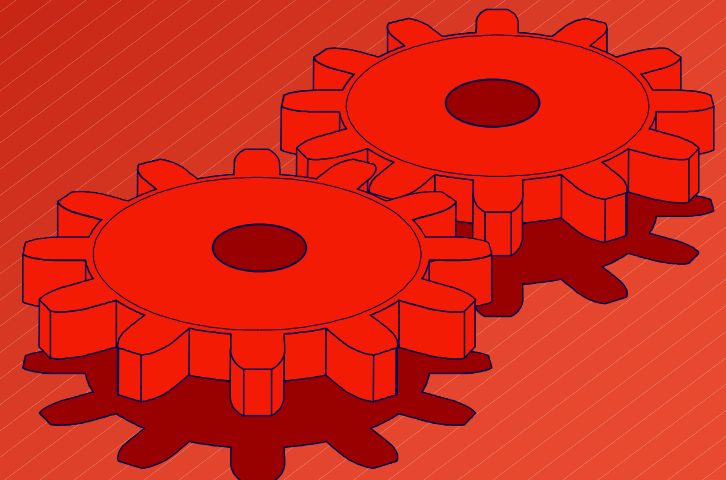


Guided Bolts?

- ▶ Just one more idea...



In the case of a bolt that has to be used over and over again to affix a tool, an extended shaft guide will help to get it done easier and faster, since it will not allow for the thread to be misaligned.



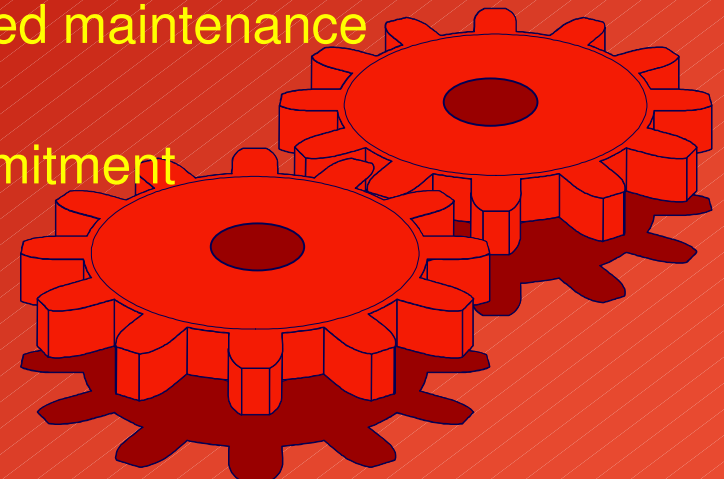
Zero Quality Control

- ▶ Quality is always a very complex concept and it applies not only to our final product, but to each condition, operation and action.
- ▶ Traditionally, inspection was the way to prevent a defective piece from leaving the plant.
- ▶ Today “*jidoka*” is the real concept of quality. Jidoka means “Autonomous Control” and that is what “Quality at the source” is about.
 - ▶ We achieve Jidoka when we create ideas that will help to stop the production when a tool or material is out of specs, when the pressure is not enough to stamp a part with total quality. I just remembered those old tubular knitting machines that would stop as soon as one of the treads was broken. Quality control applied *before* we have a bad product.
 - ▶ “*Poka Yoke*” is Japanese for *Mistake-Proofing*
 - ▶ Prevention stops losses before they occur.



Zero Quality Control (2)

- ▶ As in most of these disciplines, training will be the key. Operators and everyone in the organization must learn the signs of bad quality.
- ▶ Specifications have to be clear and well known by each person, *whatever the position*.
 - ▶ In many cases people who are in constant touch with the materials and sub assemblies *know* how to detect errors and defects and will be able to help create “*poka yoke*” (error-proof) measures.
 - ▶ Some operators will be trained to perform adjustments and minor repairs that in the past would’ve required maintenance technicians and caused down time.
 - ▶ This level of training will raise the commitment and ownership over the operation.



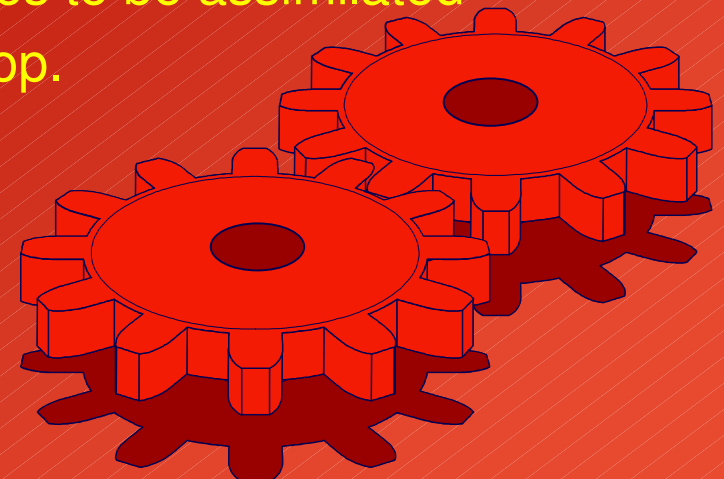
What is a Work Cell?

- ▶ One of the most important changes implemented by the Toyota Production System was the Work Cell concept.
- ▶ As in all these disciplines, the Work Cell's success comes from the combination and exchange of skills among a small group of people who form a *trustworthy and highly respected* Team...
 - ▶ They own the cell and make one product or sub-assembly at the time. This is the base for one piece flow
 - ▶ Autonomous quality, that is: their product does not have to be inspected, *they know* it is within specs
 - ▶ Multi-disciplinary. All the people can run all the tasks
 - ▶ They are friends among them and are always willing to help and support each other
 - ▶ They know their product, equipment, materials and tools



What is the Key Element?

- ▶ CHANGE is the Key Element in all these accomplishments...
 - ▶ Training becomes a part of the everyday routine
 - ▶ The old idea of a few knowledgeable people hoarding secrets is replaced by the will to learn and to share all that we know
 - ▶ The power is now based on the mutual respect and not in the hierarchical assignments
 - ▶ Leadership substitutes for authority and positions represent our levels of responsibility towards the people in all the other jobs
- ▶ No doubt, this is a series of cultural changes to be assimilated
 - ▶ This is the task that we can help develop.
 - ▶ Thank you for watching this presentation. We look forward to being of service to your firm.



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- ▶ Implementation through dynamic Kaizen workshops in your plant with guaranteed results.
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