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tutorials case studies

World-Class, Lean Performance Tutorials and Case Studies - Tutorial 06 THE CASE OF 200 L. DRUMS BECOME UNUSABLE

The case

A large Chemical Complex supplies various products (mostly fertilisers) in 200 l. steel drums which are regularly returned by Clients because of their considerable cost. The returned drums, after washing, are re-used - this, for several times. However sooner or later they become totally unusable: both due to corrosion (internal, caused by the product - and external, caused by exposure to all weather conditions), and to various damages (dents and scratches caused by handling and transport).

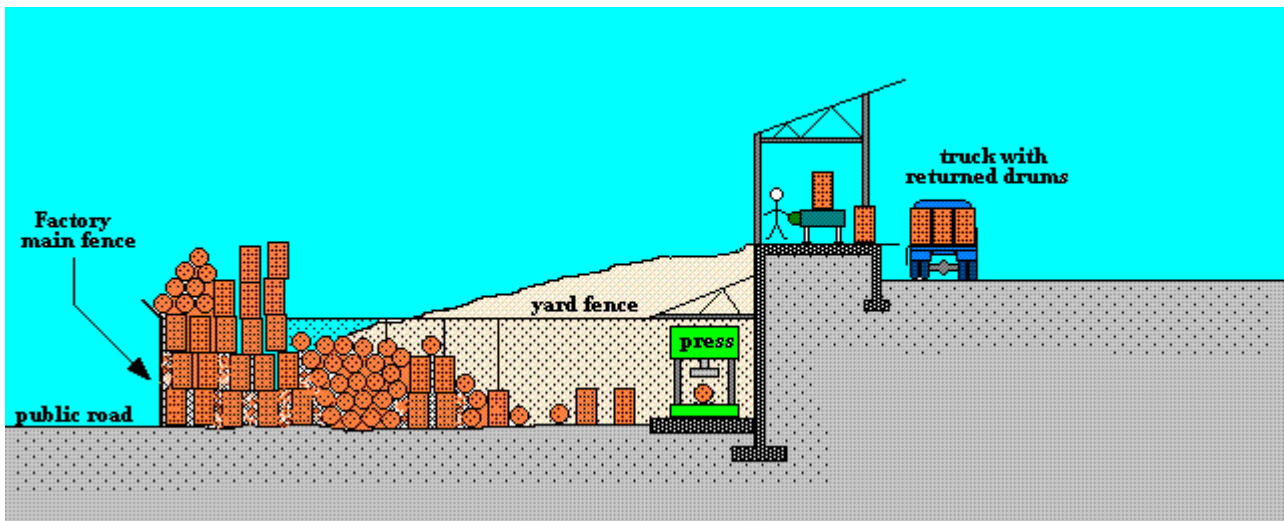
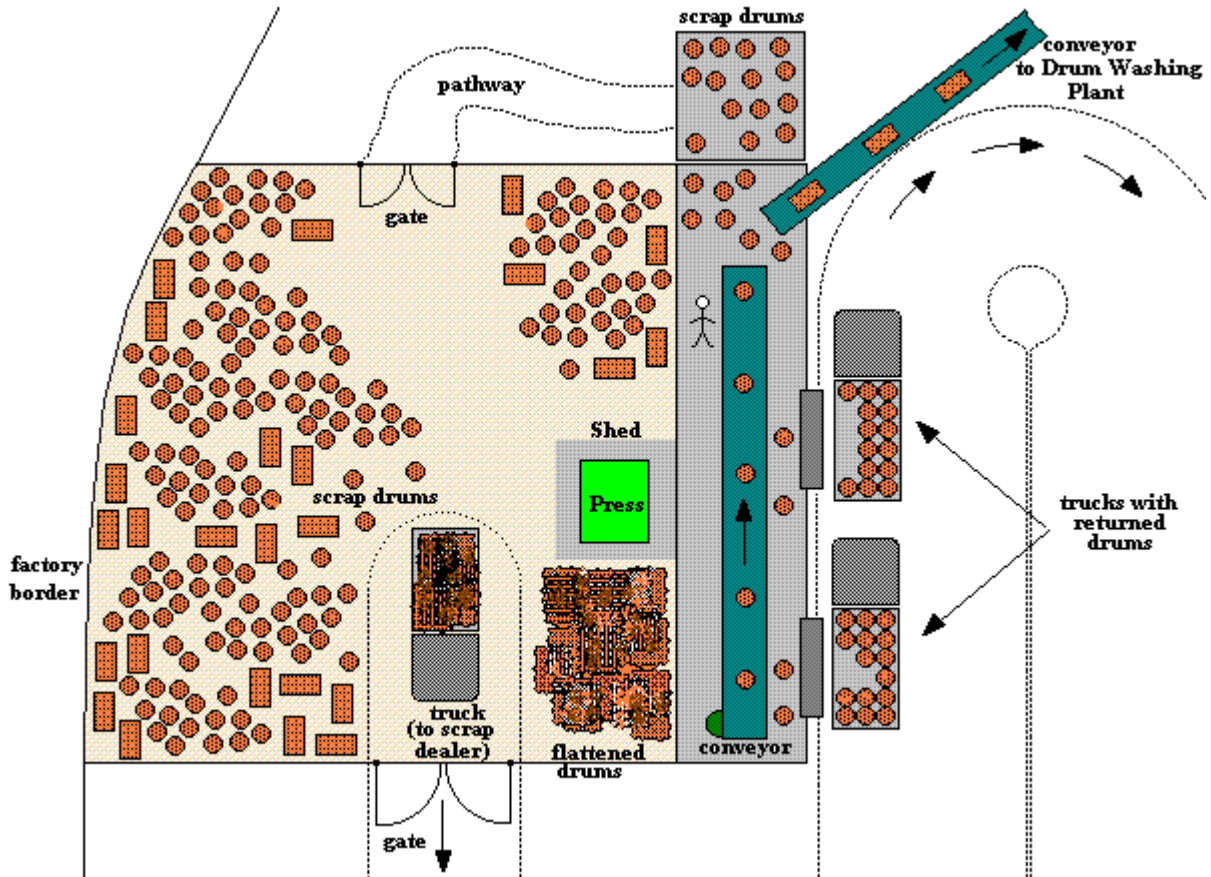
Already from long time many 200 l. drums had become damaged beyond possible re-use, so it was decided to scrap and sell them, after flattening, as scrap metal. Flattening had been considered because of the easier handling; of the much lower cost of transport to the scrap metal dealer; and also because of the higher price per kg. paid by the scrap metal dealer for flattened drums.

A small yard, next to the Fertiliser Plant, had therefore been arranged for the purpose. A workmen, from time to time, moved all scrap drums to the yard, until the yard was full - then he flattened them one by one with a 150 Ton hydraulic press placed under a shed - and then he loaded a truck with the flattened drums, for onward transport to the scrap dealer.

The present state

Things have changed. Production of fertilisers has increased more than 400% compared to three years ago. The majority of drums, besides, are getting old. The net result is that, presently, there are some 500 drums a week to be scrapped.

The scrapping operation is now organised as illustrated in the following sketches (plan and side views):



Drivers collect returned drums from clients and offload them onto a conveyor
 An inspector checks them for damages, one by one.
 He positions good, reusable drums onto another conveyor for transportation to the washing plant.
 Whereas he positions unusable drums on a concrete slab, for onward processing (flattening).

Two workmen are now assigned full-time to the flattening operation: they move manually (roll downhill) drums to the yard - flatten them with the press - and load the truck twice a week for delivery to the scrap dealer.

The yard is an eyesore, always full of drums waiting to be flattened, piled up very chaotically (which constitutes a hazard).

The Company's MD is furious because the chaos in that yard can be seen from the public road. Many minor injuries occur rather often. Furthermore, there are some doubts about the economics of the operation (in spite of the "black", un-taxable money collected from the scrap dealer).

The problem

It can be described as follows:

"The yard in which scrap drums are flattened is always in a messy condition: this is unacceptable. Many minor injuries occur. The cost of flattening and scrapping is suspiciously high".

Likely causes:

Lack of space - no room for dumping drums - lack of organisation and supervision - non-optimal flattening method - excessive handling.

Management wants to find a rational and possibly "**lean**" solution to the problem.

Targets: tidy site - increased safety - considerable costs reduction (at least 50%)

Constraints and Limitations:

- no new equipment to be bought
- only simple alterations to be done "in-house" are acceptable
- overall expenditure (of non-capital nature) = max. 1 year overall cost saving
- no more than two weeks to implement the proposed improvement

Additional information

- a fully equipped Civil Works Dept. is available in-house
- boilermaker and welding shops available in-house
- wood-working shop available in-house
- heavy handling equipment (cranes, fork-lifts, etc.) available in-house
- the complex's Transport Dept. is equipped with a large variety of transport vehicles: from simple pick-ups, to trucks, lorries, mechanical horses and trailers, etc.

What would you propose to improve and make "leaner" the present state?



World-Class, Lean Performance Tutorials - Tutorial 06 deploying lean principles in non-manufacturing operations the case of 200 l. drums become unusable conclusions

Analysis

The **lean** approach always looks at things from a *value-adding/non-value-adding* angle of view. In the present state, there are numerous non-value-adding (NVA) activities, some necessary some totally redundant:

- Off-loading of returned drums - NVA, but necessary
- Inspecting/checking returned drums for damages, etc. - NVA but necessary
- Positioning unusable drums on concrete slab - NVA
- Rolling drums down to yard - NVA
- Stockpiling drums in the yard - NVA (and offensive from an house-keeping point of view)
- Bringing drums from yard stockpile to press for flattening - NVA
- Removing flattened drums from press and stockpiling same waiting to be loaded on truck - NVA
- Loading truck with flattened drums for onward transportation to scrap metal dealer - NVA (arguable)

Therefore the bulk of the waste is in handling/double-handling.

[NB: other items of activities could be questioned, from the collection of drums at clients' premises to the actual selling of unusable drums as scrap. A solid brainstorming session would come up with very interesting and intriguing ideas (as it really happened in this case), but this falls out of the scope of this tutorial.]

Without going into futuristic and super-star-galactica technology solution & conclusions (anyhow not acceptable under the constraints set by management), the lean solution & conclusions points at eliminating as much handling as possible.

Since there are 3 actors in this story (the drums inspector and the 2 flattening labourers), one initial thought focuses on the "who is really adding-value and really necessary in this scenario". The answer is very simple: the only really necessary actor in this case is the inspector: necessary, because someone has to decide whether a drum can still be used and filled with product again, or should rather be scrapped. And the 2 labourers? The 2 labourers mostly reshuffle **waste**.

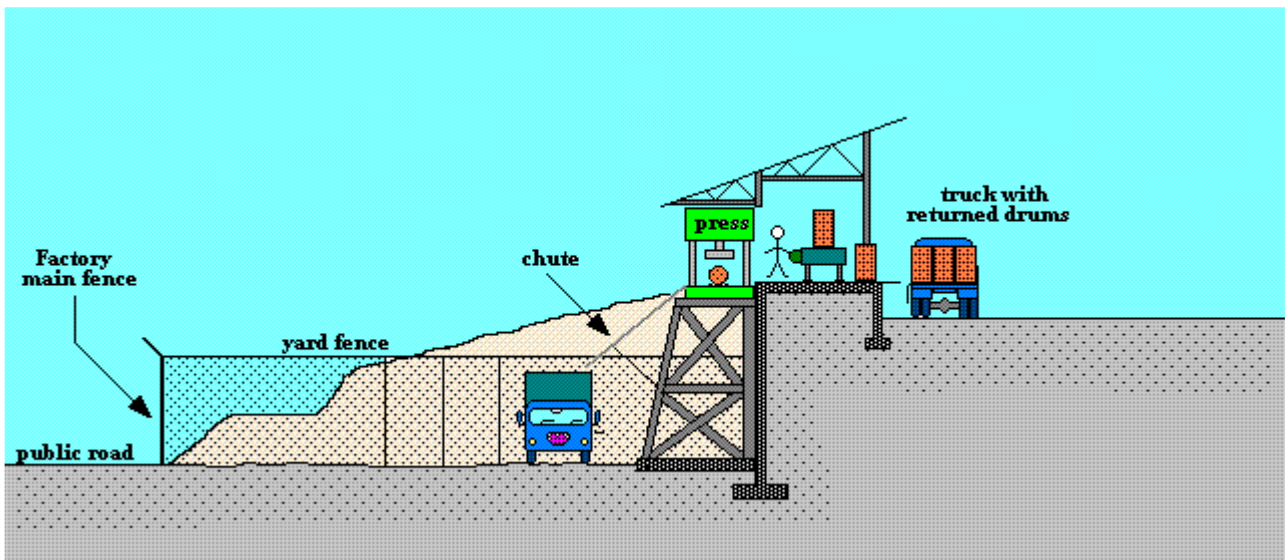
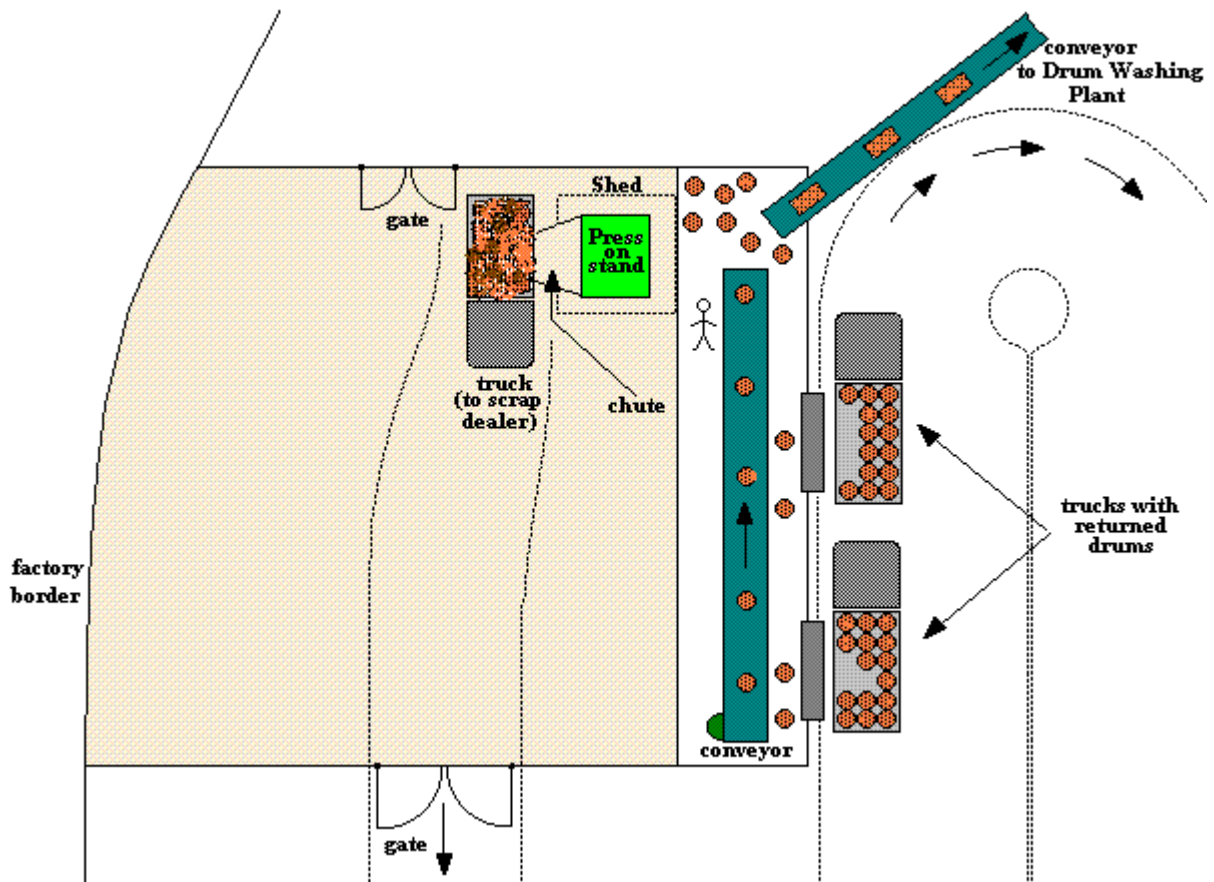
Brainstorming challenge (the famous Edward De Bono's *Creative Challenge*): *can we conceive a system in which the drums inspector, alone, could run the entire show?*

Remember! The inspector checks, inspects AND physically handles each and every returned drum: either to put it on the conveyor to Washing Plant (good drums), or to put it on the concrete slab (unusable drums).

How could he handle the entire process, in (almost) **continuous flow** mode?

Simple: by re-locating the press as close to him as possible!

Hence the *lean* solution & conclusions that was actually proposed as **future state** and then approved and immediately implemented. See the *future state* plan and side views here below:



The proposed *future state* is **lean** because:

- The bulk of the *waste* (all handling, rolling, stacking, re-handling, piling and loading) has been removed: all is left is minimal handling (after each drum inspection) to position it either on the conveyor to Washing Plant (good drum) or directly onto the press (unusable drum)

- The *flow* is practically *continuous*: the inspector activates the press - each flattened drum (very short flattening cycle-time) is then simply thrown out of the press onto a chute by the inspector (with a metal stick). The flattened drum falls straight onto the truck (or, even better: a trailer!!) that will go to the scrap metal dealer once full.

The proposed *future state* meets constraints and limitations because:

- There is no longer any mess in the yard (it could now be used to plant trees and shrubs.... which actually was done)
- There are no more injuries, due to the elimination of all handling, especially of flattened drums
- It's economical: building another concrete slab - building a steel frame structure on top of it - re-positioning the press onto the frame structure - fabricating a sheetmetal chute - and doing some minor electrical wiring - costs much less than 2 years' salaries for the yard workers
- It's rather fast to implement (in actual fact, it took about one month.....)

And the 2 yard workers?
They were redeployed elsewhere.

A final comment:

When I assign this case study as a team exercise during my courses and seminars, there is a strong and distinct tendency (+- 60%) to go for what I call "super-star-galactica" solution & conclusions: all sorts of fully automated handling/flattening/loading lines (costing an arm and a leg) are "invented" in the half an hour I normally give to come up with a lean solution & conclusions.
Not so good!

Remember! In a lean environment:

- **people first**
- **methods (lean) second**
- **technology third (only third)**

And remember as well! Gravity (the force of gravity) is fantastic: it's everywhere, abundant, and free-of-charge!!!

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