CASE STUDY

#1

RAIL STOCKS: Logistics to Weld Rail tank

Romania

Logistics to support the fabrication – fixing and rotating of cylinders, driving welding head

LOGIN
Logistics Technologist

Logistics to support the fabrication

Description

Rail stock industry is strongly connected to Logistics due to:

- its products, which are tools for the supply chain,
- the logistic component of the fabrication, which aims to support all the involved fabrication processes

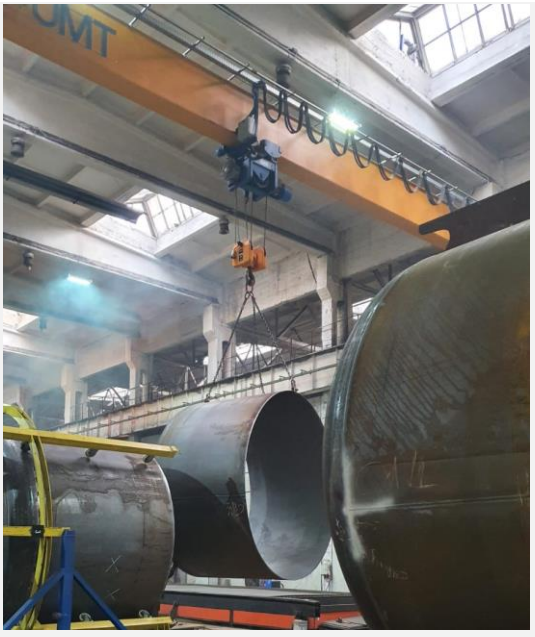
Rail tanks are welded structures with which various liquid substances are transported. They can be more or less corrosive, and transport conditions are characterized by low to medium pressures.

A rail tank is composed of 2 or more cylinders or shells, butt welded together, and two heads to close the tank. The welding of these components is done by using different types of welding processes, arc welding being the most preferred. The cylinders are brought in position by using cranes and accommodated on different devices. The implementation of the welding process is done in mechanized mode, mainly. In such mode the welding head is moved by a specific device, which is a logistics tool. In the same time, to position and fix and rotate the cylinders block of roles are used, and they are logistics equipment, as well. The human resources involved in the fabrication process is composed of welding operator and logistics devices operators. The information system specific to fabrication is composed of the design sheets and fabrication and logistics procedures.

Moving basic and rolled steel sheets

Description

The cylinders and the heads are built of steel sheets, having different thicknesses. The sheets have standardized dimensions and they should be cut in design dimensions. After the cutting process, they should be transported to the rolling equipment, in order to apply plastic deformation to create the cylinders. After the plastic deformation, the cylinders should be moved to a specific location to be longitudinally welded. In the end, all cylinders are put together to be circular welded. All these moves mean logistic activities and they are done by using specific devices driven by trained operators.



To lift steel sheets, cranes with magnetic or vacuum catchers are used. They are able to move the sheet without accidental deformations.
Specialized and certified personnel can use such devices. The entire flowing of the operations are done according to approved procedures, which are listed and posted to the sites where the operations are foreseen to be applied.
The movement should be done by following very well-designed route, in order to be avoided any risk of accidents.
Just-in-time (JIT) concept is, normally, applied, in order to assure that machine or personnel works without not-programmed pauses.

Supporting and rotating cylinders

Description

The cylinders are put on blocks of roles, in order to be correctly positioned and rotated for the welding process. The roles are coherently rotating and they rotate the cylinders with specific speed, which is the speed of welding. The movement is a process parameter, and it is performed and controlled by auxiliary device (the block of roles).

The block of roles should have enough length to assure high stability for the cylinders. During the rotation of the roles, the cylinder is rotated and the welding process is on. The involved personnel are formed of the operators of the block of roles and the auxiliary personnel, helping in the manoeuvring of the blocks.
The operation of the block of roles is done according to approved procedures, which contains the main parameters related to position and movement parameters.

Travelling the welding head

Description

Most of the times, the welding process is done in mechanised or automated regime. Rare situations involve, nowadays, manual welding. To longitudinally weld the rolled steel sheets in cylinders is, generally, done with fixed rolled sheet and moving welding head. The movement is done using welding trucks or welding columns or welding portals. They are equipment to apply logistics operations.
When the cylinders are put together for welding, circular butt welds will be done with rotating cylinders and fixed welding head.

The welding equipment is positioned out of the welding area, in safe place. The head, only, is in the welding area, being connected to the welding machine by long package of electrical cables, welding wire and tubes for cooling and shielding gas (if required).
The personnel involved in welding is the welding operator, very well trained and certified personnel. Auxiliary personnel could be required, to help for the setting of all involved devices.
Each welding process is done according to an approved / qualified welding procedure specification.
Specific safety is required for all involved personnel.

Informational - Quality documents

Description

Welding procedure specification is a mandatory quality document. It contains all the required parameters to perform the welding process.
The document is designed by the Welding Coordinator in preliminary form and, after the verification of the weld done according to it, the procedure is considered as being approved.
The document is received by the welders or by the welding operators, and they will use it to perform the welding process.

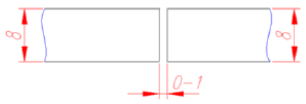
SPECIFICATIA PROCEDURII DE SUDARE WPS NR. 08UP ED NR 2
(EN ISO 15609-1)

Procedura de sudare .....08UP.....
WPAR nr.....
Producator:
Loc :
Tip transfer/arc:
Procedeul de sudare.....121
Tipul imbinarii.....BW, bs
Detalii de pregatire a imbinarii:
Desen.....

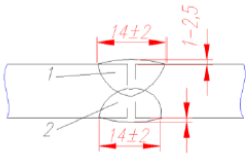
Metoda de pregatire sau curatare.....
SABLARE; PRELUCRARE MECANICA;POLIZARE
Specificatia mat.de baza...
GR.1.1;1.2 EN ISO 15614-1; CR ISO 15608

Grosimea mat.(mm)...s1=8 mm
S2=8 mm
Diametrul ext.(mm).....
Pozitia de sudare.....PA

Schema de pregatire a imbinarii



Succesiunea operatiilor de sudare



Detalii de sudare

Rind	Proced.	Mat.de Adaos (Ø mm)	I (A)	U (V)	CC/CA + / -	Vit.sirma (cm/min)	Vit.sud. (cm/min)	Energie Liniara (J)
1	121	3	500±10	30-31	CC+	196,6	57,5	16.173
2	121	3	450±10	31-32	CC+	170	41,6	20,769

Mat.de adaos-marca...EPP3
Codificare .....S3, EN 756.....
Prescriptii pt. uscare...350ºC/2 ore.
Gaz/flux: FB TT(SAFB155ACH5.EN760)
De protectie tip/debit... .....
La radacina tip/debit.....
Tip/dimens.el wolfram.....
Detalii pt. scobire/suport la radacina.....
ARC-AER;POLIZARE

Temp.de preincalzire.....
Temp.intre straturi.....150ºC

Dehidrogenare /temp.mentinere.....
Tratam.termic dupa sudare.....
Timp,temperatura, metoda.....
Viteza de incalzire/racire.....

Alte informatii
De ex.pendulare (latime max.)
Oscilatii:ampl.,frecv.,timp mentinere:
Detalii cu sudare cu impulsuri
Distanta duza de contact-piesa:
Indicatii pt. sudare cu plasma:
Unghi de inclinare cap de sudare:

Observatii :
- se vor respecta indicatiile din desenele de executie

- control vizual 100%

VERIFICAT-SUDOR SEF	INTOCMIT
	A. RAESCU
REVIZIA NR.	
VERIFICAT-SUDOR SEF	INTOCMIT

Other quality documents, which are used, are:

- The entire sheet related to the implementation of a quality system
- The entire sheet with the design specifications
- All the fabrication procedures
- All personnel qualifications records
- All documents related to the equipment maintenance
- All documents related to health and safety system
- Other.

CASE STUDY

#2

SHIPBUILDING: Building river ships

Romania

Logistics to support the fabrication – warehousing for materials and volume sections, cranes, trucks for driving welding head

LOGIN
Logistics Technologist

Logistics related to fabrication of ships

Description

Shipbuilding is domain offering large products, from the small boats, to static pontoons, different types of ships or oil maritime platforms. The fabrication of all these products cumulates a specific number of technologies and processes: plastic deformation, mechanical processing, casting, welding, cutting, sand blasting, and more. Each process is applied using materials resources (equipment, auxiliary devices, materials, consumables, etc.), human resources (qualified personnel to implement the involved operations), power resources (energy supply) and informational resources (design and quality documents)

The river ships are metallic structures having around 100 m length and 6 m width. They are composed of successive volume sections, which are separately built and assembled together by welding. Having high masses, each component requires specific support to be built on and specific devices for lifting and turning and moving.
To such construction, qualified personnel is allowed to work, only.
The quality is continuously checked by specialized surveyors, and they work according to specific shipbuilding codes.
A shipyard should assure appropriate warehouses for the required materials and consumables.

Warehousing materials and components

Description

The river ships are composed of sequence of volume sections welded together in specific order. The sections are built of sheets of different thicknesses and laminated profiled members. They are cut in dimensions and shaped by plastic deformation before welding. Until the processing the materials and consumables should be stored in appropriate conditions, free from humidity, dust, and various fats. They should be deposited on specific devices, built of metal or wood, and they should be packaged and labelled according to specific procedures. The access to these materials and consumables should be available with various types of lifting and moving devices, as cranes, forklifts, etc.

The volume sections, as components of the ships, should be warehoused or deposited in specific conditions, depending on the types, dimensions and moment of assembling in the structure of the ship.
Depending on the stored materials and consumables and ship components, the warehouse should assure appropriate environment (temperature, humidity, etc.)
Specialized and certified personnel can organize the warehouses.
Digital systems to operate the warehouse is recommended to be used.

Lifting devices; Cranes

Description

Shipbuilding deals with large volumes. Fabrication process requires specific lifting and turning and rotating and movement of those volumes. Cranes or auto-cranes, and forklifts and wheeled supports are often used to assure the logistics operation which are necessary for an appropriate evolution of the fabrication. These logistics operations are vital for the fabrication, and they are very judicious designed, in order to help and not to negatively affect the fabrication. The used equipment is as mobile as possible, in order to assure as many as possible operations. It should take care that no technological operations will be done when the half-products are sustained by the cranes or forklifts, and that is a measure resulted from the health and safety rules.




The involved personnel should be qualified according to relevant procedures.

The logistics operation should be done according to specific approved procedures.

Health and safety measures are primary conditions to put when the lifting or turning or tilting machines are used.

Warehouse conditions should be according to approved procedures, avoiding the negative influence of the stored products quality.

Travelling the welding head

Description

Mechanized welding is applied in shipbuilding for panels and decks fabrication and for the coupling of the volume sections. Mechanization, in those cases, means to move the welding head along the seam, by using specific trucks. The movements are technological movements, but the operation of movement is logistics operation. The used equipment is considered as logistics tools relevant for the fabrication process. They are operated by the welding operators, who apply adjustments of the welding parameters and of the travelling parameters.

The welding equipment is positioned out of the welding area, in safe place. The head, only, is in the welding area, being connected to the welding machine by long package of electrical cables, welding wire and tubes for cooling and shielding gas (if required).
The personnel involved in welding is the welding operator, very well trained and certified personnel. Auxiliary personnel could be required, to help for the setting of all involved devices.
Each welding process is done according to an approved / qualified welding procedure specification.
Specific safety is required for all involved personnel.

Informational – Warehousing conditions

Description

Conditions inside a warehouse for consumables are to be checked daily because the temperature and humidity influence the quality of the deposited products. The measured data are recorded in databases according to specific procedures. Equipment for the measuring operation should be calibrated and periodically verified. Other parameters could be required to be recorded and keep in specific domains.

	FORMULAR PROCEDURĂ OPERAȚIONALĂ	Cod:	F-01.PO-16
verni&fida	FIȘA DE MĂSURĂTORI TEMPERATURĂ ȘI UMIDITATE	Ed:	1
		Rev:	0
		Data:	01.07.2019
		Pag:	1 din 2

FIȘA DE MĂSURĂTORI TEMPERATURĂ ȘI UMIDITATE

Nr.: .....

Locație: Magazie depozitare consumabile de sudare

Zi	Luna, An	Ora	Temp., °C	Umid., %	Ora	Temp., °C	Umid., %
1		08.00			14.00		
2		08.00			14.00		
3		08.00			14.00		
4		08.00			14.00		
5		08.00			14.00		
6		08.00			14.00		
7		08.00			14.00		
8		08.00			14.00		
9		08.00			14.00		
10		08.00			14.00		
11		08.00			14.00		
12		08.00			14.00		
13		08.00			14.00		
14		08.00			14.00		
15		08.00			14.00		
16		08.00			14.00		
17		08.00			14.00		
18		08.00			14.00		
19		08.00			14.00		
20		08.00			14.00		
21		08.00			14.00		
22		08.00			14.00		
23		08.00			14.00		
24		08.00			14.00		
25		08.00			14.00		
26		08.00			14.00		
27		08.00			14.00		
28		08.00			14.00		

Cod Formular: F-01.PO-16

The recordings will be stored for period specified by the legislation, as proof of the respecting of the imposed conditions.

CASE STUDY

#3

Inventory Management: Tool for warehouses

Source: www.dreamstime.com

Portugal

Auxiliary activities of logistics - how to organize the inventory in an internal warehouse

LOGIN
Logistics Technologist

Auxiliar Logistics

Description

Sara was appointed as the new inventory management supervisor for the tool steel regional warehouse. She had previously worked in other companies after she finished her university degree. One constant problem Sara had complained about when she was in another company was the difficulties, she had with the warehouse replenishing supplies for her areas of responsibility. She was sure the problem was not hers.

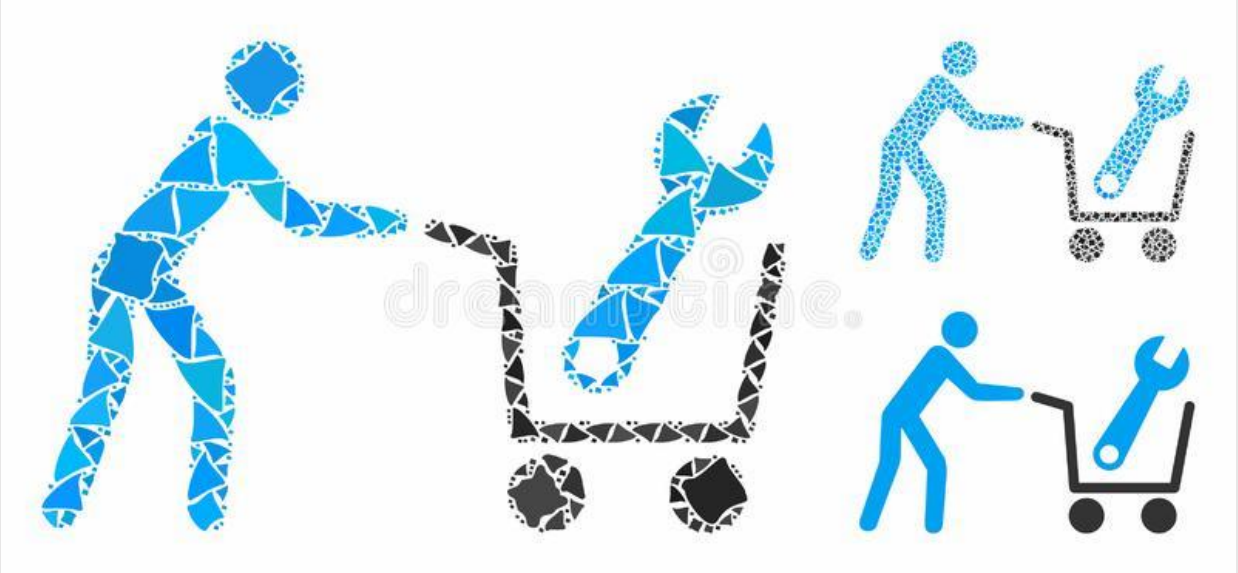
The store used point-of-sale terminals, in which the cash register doubled as a computer, instantly recognizing inventory movement. She also realized that shoplifting and other forms of loss were a constant problem in retail stores, so she instructed all her clerks to spot count inventory in their areas of responsibility whenever there was a “lull” in store traffic.

The store computer had a built-in program to suggest replenishment orders when the stock reduced to a certain quantity. Sara had learned, of course, that these were only suggestions, since she knew that some items were “faddish” and would have to be ordered sooner or not reordered at all depending on how the fad was progressing. Some items were seasonal in nature, which needed to be accommodated, and she was also aware when an item would go on sale or have a special promotional campaign.

These were announced well in advance during the monthly managerial meetings, and she had good estimates as to the projected impact on demand.

It was because she was so effective at managing the inventory in her area that she was so vocal about the problems at the warehouse. It seemed that almost everything she ordered for replenishment from the warehouse was a problem.

Some items were late, occasionally by as many as six weeks. Other items were replenished in quantities far larger or smaller than what was ordered, even if they were occasionally delivered on time. It finally seemed to her that every warehouse use delivery was a random event instead of the accurate filling of her orders.



Source: www.dreamstime.com

Her complaints to general management stemmed from the impact of the warehouse problems. Customers in her area were complaining more often and louder as stockouts of various items became a pattern. Several customers had vowed to never again shop at tool steel Mark because of their frustration.

In other cases, the quantity delivered was two to three times the amount she ordered. She would often have to hold special “unannounced sales” to avoid being burdened with the excessive inventory, especially since one of her performance metrics was inventory dollars.

Of course, one of the major performance metrics was profitability, and both the stockouts and unannounced sales impacted that adversely.

Finally, after one particularly frustrating day, she told the general manager, “Maybe you should put me in charge of the inventory over at the warehouse. I can control my own area here—I bet I could put that place back in shape pretty fast!” Two weeks later, she was notified she was “promoted” to inventory management supervisor for the warehouse.

The Current Situation

One of the first issues Sara faced was some not-so-subtle resentment from the warehouse general supervisor, Lary. Lary had been a supervisor for over 10 years, having worked his way up from an entry-level handler position.

The inventory supervisor position had been created specifically for Sara—Lary had previously had responsibility for the inventory. Their mutual boss had explained to Lary that the reduction in overall responsibility was not a demotion, in that growth in the warehouse made splitting the responsibilities a necessity. Although Lary outwardly acknowledged the explanation, everyone knew that in reality he felt the change was a "slap in the face." That would normally be enough to cause some potential resentment, but in addition, as Lary expressed in the lunchroom one day, "It's not enough that they take some of my job away, but then look who they give it to—a young, inexperienced college kid, and a female at that! Everyone knows you can't learn how to run a warehouse in some stupid college classroom—you have to live it and breathe it to really understand it." Sara knew that the Lary situation was one she would have to work on, but in the meantime, she had to understand how things were run, and specifically why the warehouse was causing all the problems she experienced at the store.

Her first stop was to talk to the responsible for processing orders from the store. The processing responsible, Clara, explained the situation from her perspective. "I realize how much it must have bothered you to see how your store requests were processed here, but it frustrates me too. I tried to group orders to prioritize due dates and still have a full truckload to send to the store, but I was constantly having problems thrown back at me. Sometimes I was told the warehouse couldn't find the inventory. Other times I was told that the quantity you ordered was less than a full box, and they couldn't (or wouldn't) split the box up, so they were sending the full box.

Then they would find something they couldn't find when it was ordered a long time ago, so now that they found it they were sending it. That order would, of course, take up so much room in the truck that something else had to be left behind to be shipped later.

Those problems, in combination with true inventory shortages from supplier-missed shipments always seems to put us behind and never able to ship what we are supposed

to. None of this seemed to bother Lary too much. Maybe you can do something to change the situation." Sara's concern with what Clara told her was increased when she asked Clara if she knew the accuracy of their inventory records and was told that she wasn't sure, but the records were probably no more than 50% accurate. How can that be? Sara asked herself. She knew they had recently installed a new computer system to handle the inventory, they did cycle counting on a regular basis, and they used a "home base" storage system, where each SKU had its own designated space in the warehouse racks. She realized she needed to talk to one of the workers. She decided on Carlos, who had been with the company for about five years and had a reputation for being a dedicated and effective worker. Sara told Carlos what she already knew and asked him if he could provide any additional information. According to Carlos, "What Clara told you is true, but what she didn't tell you is that a lot of it is her fault. If she would only give us some advanced warning about what she wants to send for the next shipment we could probably do a better job of finding the material and staging it. What happens, though, is that she gives us this shipment list out of the blue and expects us to find it all and get it ready in very little time. For one thing, she doesn't understand that it's very impractical to break boxes apart in order to ship just the quantity she wants. We don't have a good way to package the partial box, and an open box increases the chance for the remaining goods to be damaged or get dirty. Even if we had a way to partially package, the time it would take would increase the chance we wouldn't make the shipment on time. "Then there's the problem of finding material. When supplier shipments come in, they are often for more goods of a given SKU than we have room for on the rack. We put the rest in an overflow area, but it's really hard to keep track of. Even if we locate it in the system correctly, someone will soon move it to get to something behind it.

That person will usually forget to record the move in the heat of getting a shipment ready. Since the cycle counts don't find it in the designated rack, the cycle counters adjust the count so the system doesn't even know it exists anymore. You might think we should expand the space in the rack to hold the maximum amount of each SKU, but we would need a warehouse at least double this size to do that—and there's no way management would approve that. I guess the only good thing about the situation is that when we do find some lost material that was requested earlier, we ship it to make up for not shipping it earlier."

Sara was beginning to feel a tightening in her stomach as she realized the extent of the problem here. She almost had to force herself to talk to Cristina, who worked for the purchasing department and was responsible for warehouse ordering. Cristina was also

considered to be experienced, capable, and dedicated to doing a good job for the company. Cristina added the following perspective:

"We have good suppliers, but they're not miracle workers. Since we beat them up so badly on price most of the time, I can understand why they're not interested in doing more than they already are. The problem is we can't seem to get our own house in order to give them a good idea what we need and when we really need it. To do that, we would need to know what the warehouse needs and when, and also the existing inventory of the item. We seem to have no idea what we need, and the inventory records are a joke. I spend most of my day changing order dates, order quantities, or expediting orders to fill a shortage—and often the shortage isn't really a shortage at all. Our only hope has been to order early and increase our order quantities to ensure we have enough safety stock to cover the inventory accuracy problems. I've complained to Lary several times, but all he says is that it's my job to pull the suppliers in line, that the problem is obviously theirs." At least by this point Sara had a better perspective about the problems. Unfortunately, it was now up to her to fix them. She wished she had never opened her mouth to complain about the problems. Too late for that—she now had to develop a strategy to deal with what she had been handed.

Source: www.dreamstime.com

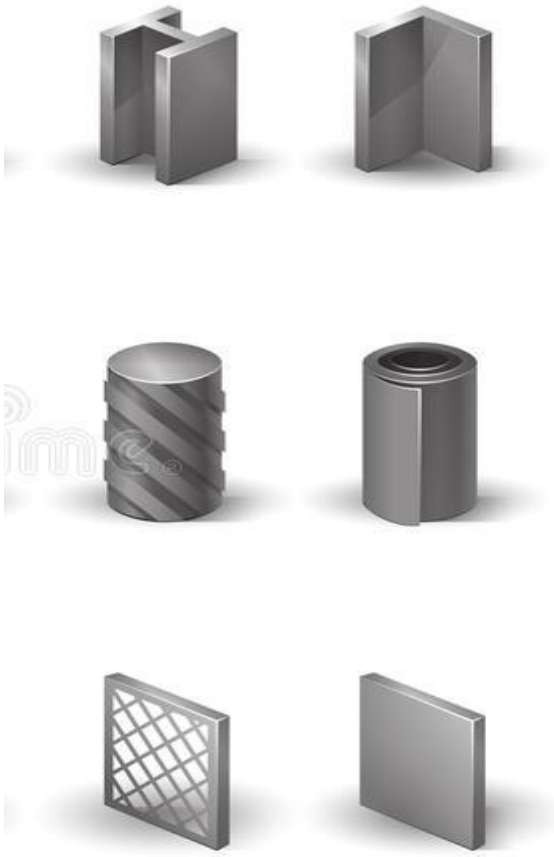
Case Analysis

1. Structure what you think the problems are. Be sure to separate the problems from the symptoms.
2. Assume Sara needs to build a data-based case to convince her boss and start to "win over" Lary. What data should she gather to help her build the case?
3. Develop a model of how you think the warehouse should work in this environment.
4. Develop a time-phased plan to move from the present situation to the model you developed in question 3.

CASE STUDY

#4

METAL Corp.*



Source: www.dreamstime.com

Portugal

Auxiliar process and their Logistics to support the fabrication

LOGIN
Logistics Technologist

Auxiliar Logistics

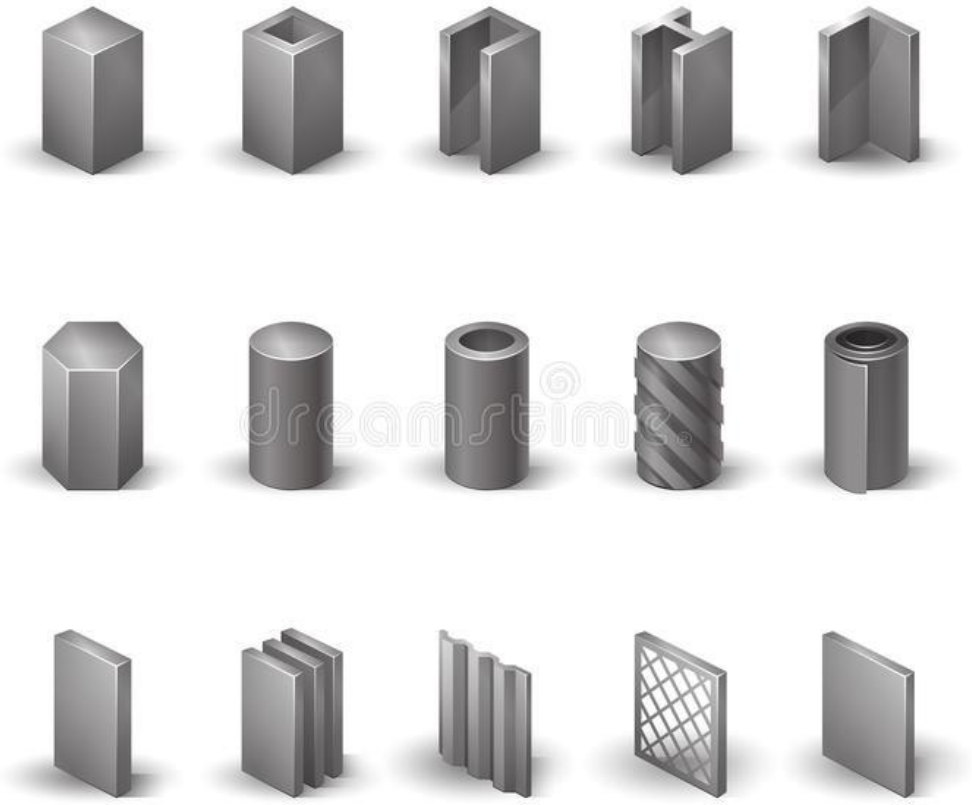
Description

Metal corp is a wholesaler of specialty metals such as stainless steels and tool steels. The company purchases its stainless steel from a mill located some 200 km away. At present the company operates its own truck. However, the truck is in need of repair, and this is estimated to be about 20,000 €. Annual operating costs are 30,000€ and the line-haul costs are 2.20€ per km. Joana Jones (JJ), the traffic manager, wants to reduce the cost of bringing in the stainless steel, and because of the impending repairs, she feels now is a good time to look at alternatives. She has solicited a number of proposals and has narrowed her choices down to a motor carrier and a rail carrier.

Heavy Metal Transport (HMT), a contract motor carrier, has an excellent reputation for service and reliability. It has submitted an incremental rate, 4.00€/cwt., for shipments weighting less than 150 cwt., 3.80€ for shipments between 150 and 200 cwt., 3.60€ for shipments between 200 and 250 cwt., and 3.40€ for shipments over 250 cwt. up to a maximum of 400 cwt.

Midland Continental Railway has submitted a piggyback rate of 3.25€ per cwt. with a minimum load of 200 cwt. The piggyback rate includes pickup by truck at the steel mill, line haul by trailer on flat car, and delivery by truck to Metal Corp. warehouse. They are considered to be a reliable carrier as well.

The finance department estimates that Metal corp. annual inventory carrying cost is 20%, the cost of inventory in transit is 10%, and the cost of capital is 8%.
The cost of placing an order for stainless steel is estimated to be 40€ per order.
Stainless steel presently costs 300€ per cwt.



Source: www.dreamstime.com

Case Analysis

5. JJ has to make a decision soon. Given the information provided, what would you advise her to do?

CASE STUDY

#5

Soap Production: Equipment of a new warehouse

Austria

Hardware equipment of a finished goods warehouse of a soap manufacturing company

LOGIN
Logistics Technologist

Logistics related to appropriate warehouse equipment

Backround story

Rainer, the junior logistics manager at SoapProd GmbH, had got his job a few months ago. He had previously studied logistics management. Since he still had little experience, his supervisor Mathias M. thought one day to give him a task. So, he asked him into his office and announced: "Dear Rainer, as you know, our warehouses are bursting at the seams. We absolutely need a solution for this. I have spoken to the owner of the neighbouring property and he has agreed to sell the property. We will start building a new warehouse for finished goods there as soon as possible. I have hired architects to design the warehouse building. Your job is to consider what hardware we need in the warehouse to move our products efficiently and make it easier for the pickers to pick.

The aim is to create efficient and modern processes, so that we don't have to throw everything overboard again in a few years. Since we got the property for a small price, you don't have to skimp on the warehouse equipment, but it shouldn't be too over the top either. The investment should be worthwhile. I expect you to start planning immediately, I'll forward you the e-mail with the rough structure of the warehouse that I've already received from the architects.

Rainer was more than confused in view of his new, delicate task. The previous warehouse was small and was more or less run manually. This new warehouse was going to be so much better and more efficient than the old one... But how do you make such a plan? What does he have to consider?
At first, Rainer thought he would write down everything he knew about **the company and its products:**

The company SoapProd GmbH mainly produces soaps, shower gels and shampoos in a sustainable production method. The company was founded in the middle of the 20th century as a small soap manufactory and has grown steadily ever since.

Today, the company is one of Europe's leading companies for sustainable, certified soaps, shower gels and shampoos that are 100% vegan and produced without any animal testing. The customers are mainly in Europe, but also occasionally in North America and Australia. The articles are packed in boxes of 6 or 10 pieces each (minimum order quantity per order!).

The articles are picked and, depending on the size of the order, packed on Euro pallets or smaller disposable pallets. The company serves large drugstore chains, but also small selected sales representatives, as well as four own shops in Austria with locations in Vienna, Salzburg, Graz and Linz. The company headquarters and production are located in Steyr, where the new warehouse is also being built.

Now to the new warehouse. During his studies, Rainer also learned something about intralogistics and warehouse equipment. However, he does not seem to have internalised this knowledge very much, so that he is now looking for his work documents from that time, perhaps they will shed light on the various possibilities. After all, Rainer wants to convince his superior of his abilities as a junior logistics manager.

Until Rainer gets to his study materials of that time, help him and answer the following questions. Since there are always several correct answers or alternatives, Rainer always asks for 2-3 possible alternatives for each question. Please also justify your solutions and tell Rainer advantages and disadvantages of each solution.

Your task

- What different systems does Rainer have to consider regarding the hardware equipment of a warehouse?
- Which transport systems are most efficient for the items mentioned above?
- What type of storage / shelving should Rainer consider? (Also consider any products with best before dates).
- Which storage strategy should be chosen?
- Which picking strategy should be chosen and why? (Consider shortest possible distances, efficient processes)

CASE STUDY

#6

Screw Production: Installing a new picking system

Austria

Picking systems for medium-sized production company

LOGIN
Logistics Technologist

Installing a new picking system

Backround story

Marion Mayer, the managing director of ScrewsProd GmbH, is in despair. The complaints about picking errors and the resulting wrong deliveries are becoming more and more frequent. Just talking to the employees who carry out the picking process down doesn't help either. She has already tried this more than once in vain. The problem is obvious to her. The company ScrewsProd GmbH produces screws, nuts and other small tools. The products are very different, but yet they look very similar to the naked eye. The employees simply cannot tell at first glance whether the screws are 15mm or 14mm long, or whether the nails are 2, 3 or 4mm in diameter.This is why errors occur! The warehouse of the medium-sized company has been operated manually up to now, the warehouse layout and equipment have not been reconsidered for years. Picking is done completely manually with the help of printed pick lists. But this is to be put to an end now, Marion Meyer wants her customers to be satisfied. What is to be done now? First of all, she calls Tabea Müller into the office. Tabea is the company's logistician, she will know what options they have. After Tabea arrives at the office, she explains the situation to her. Tabea says: "That's great, nobody can stand these constant complaints any more, it's good that you decided to have something new installed. I'll immediately start looking for ways to organise the picking process in such a way that as few errors as possible occur! Marion Mayer, happy about Tabea's enthusiasm, slows her down a bit: "Unfortunately, our financial means are not unlimited, we can't afford to build the warehouse from scratch, so to speak, we need an alternative how we can retrofit our existing warehouse that is efficient but also affordable for the company". Tabea agrees with Marion, but points out that a picking system alone will

Picture source: pixabay

not be enough. In order to work efficiently, and to avoid picking errors, it is essential to have the appropriate software as well!

This are your tasks:

- Research which type of picking is most optimal for this area of usage and explain why! (Always keep in mind that it has to be affordable for the company).
- What software did Tabea talk about?
- Which functionalities does this software have to have and how is the picking system connected to the software?

Picture source: pixabay

CASE STUDY

#7

FROM FACTORY TO RETAIL DISTRIBUTION

Romania

Connecting the new production lines, with the existing equipment, as well as with the logistic warehouse for storing the finished product

LOGIN
Logistics Technologist

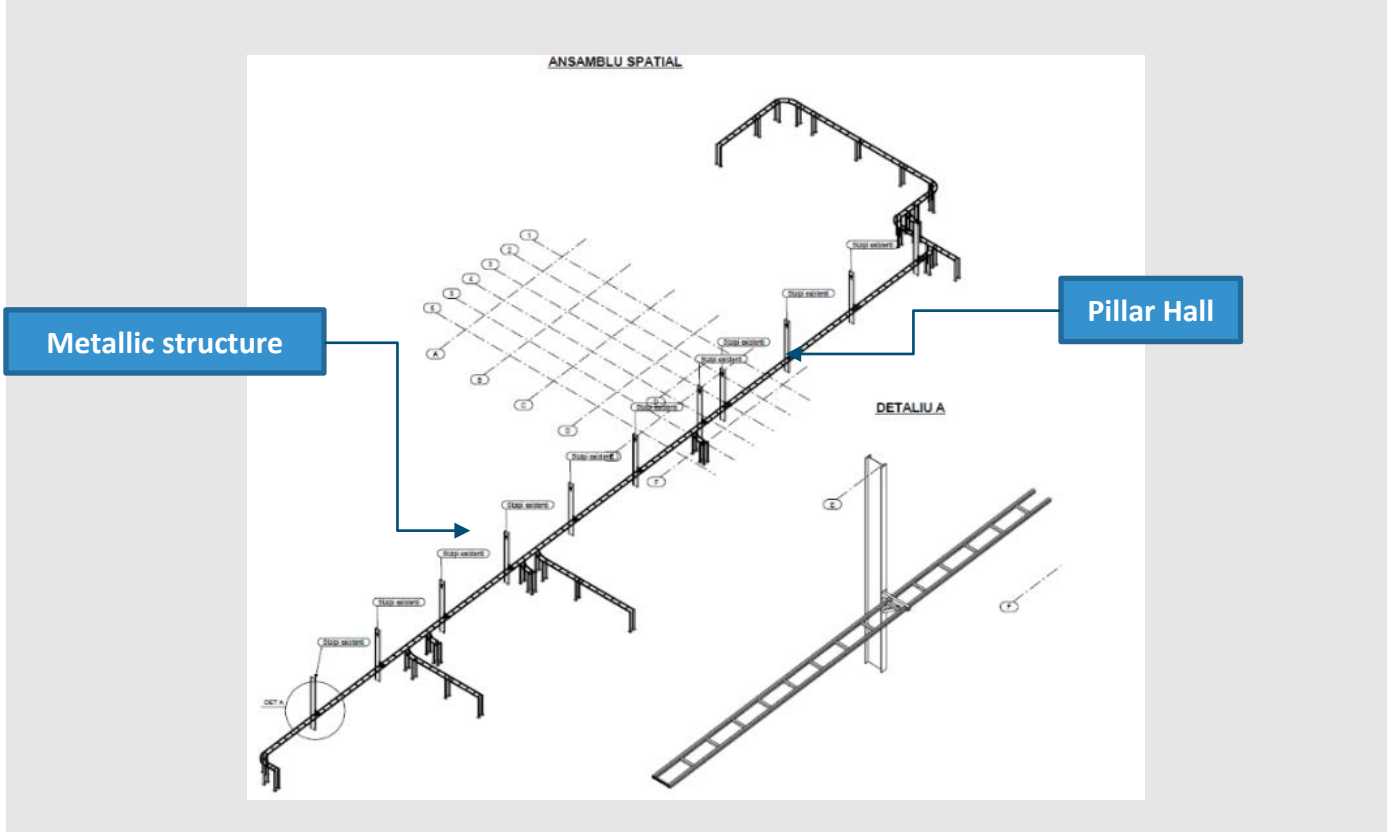
Description

In the lines below you can find a case study regarding a project, which started in 2013 and continues to be developed even today. This project is the result of the collaboration between a team of professionals from the beneficiary side, representatives of a multinational from the Tobacco Industry, and a Romanian company, integrator of automation solutions in the field of industrial production and intralogistics. The Romanian company, which is in a continuous expansion, demonstrates through these projects the capacity of Romanian specialists to implement high quality technical solutions, at the level of high international standards.

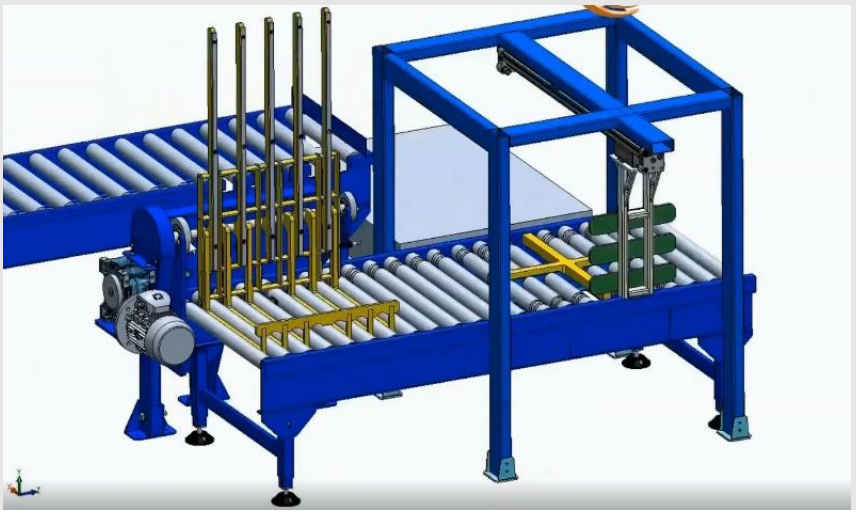
Following an auction, the Romanian company won the automation project in 2013, for the new factory, with the aim of connecting the new production lines, with the existing equipment, as well as with the logistics warehouse for storing the finished product.

PHASE 1

Specifically, the project consisted in making connections with each production line, as well as transporting the products to the factory warehouse, using conveyors, elevators, handling, automation and control elements.



Subsequently, the finished product is palletized, wrapped and labelled according to European standards, based on SSCC labels and 1D barcodes, applied on both sides of the pallet.
The technical solutions have been implemented during the last seven years, being designed so as to meet the requirements of the beneficiary, to ensure a high level of efficiency, to be flexible and easily adaptable to future requirements.

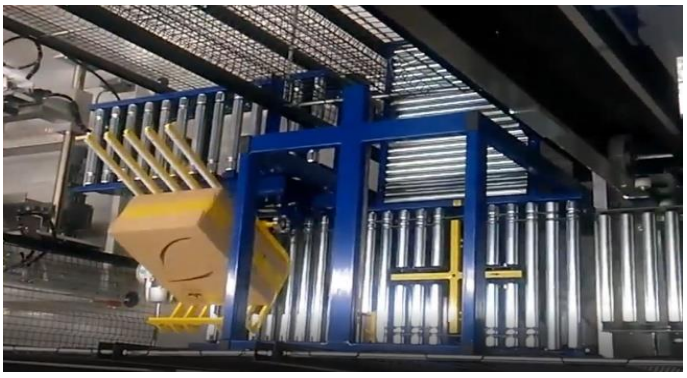


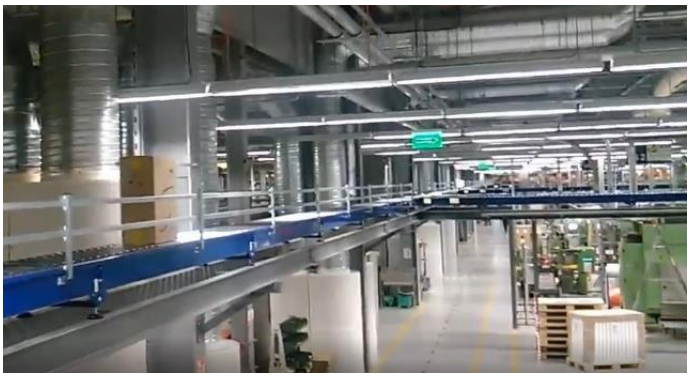
Currently the implemented solution enjoys a real success and serves the production absorbing all the capacity without causing bottlenecks in the transfer process.
Along with the implementation of the connections - of the transport and handling solutions from the new factory, the gradual modernization of the connections on the existing lines in the old factory took place, a process that ended in 2017.

Phase 2

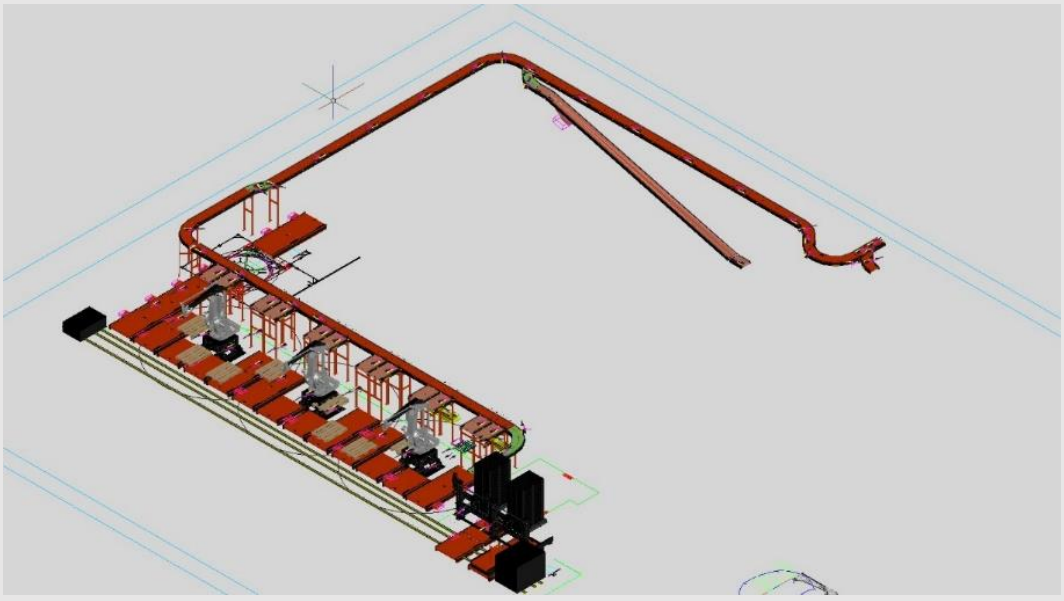
In 2017, the new production plans involved the expansion of the factory and led to the birth of a new project, consisting in designing and implementing a transport solution for eight production lines, as well as modernizing existing transport solutions that no longer met capacity requirements and operational efficiency.

After extensive analysis and simulations, the foundations were laid for a new transportation strategy, including new technologies. The solution implemented later managed to manage volumes from 30 production lines, providing 40 boxes / minute / line and 60 pallets / hour.





The manufacturing company is working on a new specification, having as object a new development this time in the area of storage of finished products, containing a modern solution of automatic palletizing using articulated robots, according to the image below:



The successful completion of the 2017 automation project within the factory was a challenge but also an evolution. The implementer had to come with nozzles to create three automatic warehouses to serve the distribution of the finished product nationwide.

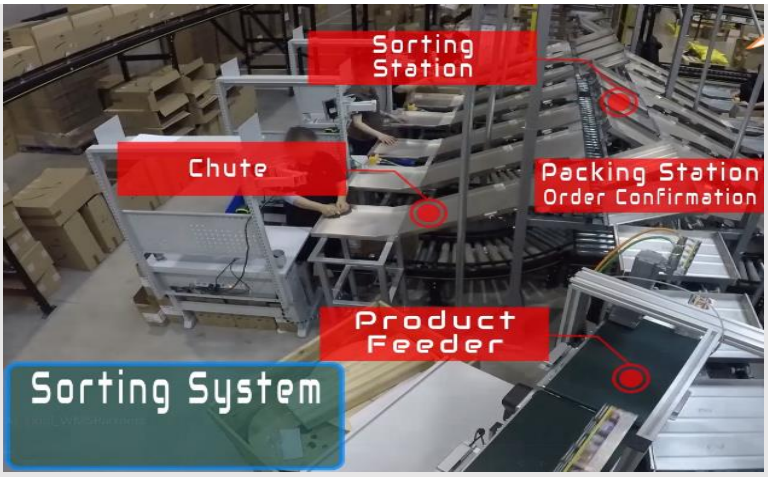
This new project was studied, conceived and implemented starting with the end of 2017, until March 2018. Although characterized by a high level of complexity and very high requirements, the project was completed according to the specifications offering results beyond expectations.

The challenge in this project, besides the high level of technicality, was both the implementation requirement in a very short period of time, and the fact that the operations were outsourced by the client company to a specialized logistics operator for such in-house services.

Requirements

The theme of this project was the following: The finished product, made in the factory, had to be transported from the factory warehouse to the logistics warehouse. The latter has been completely redesigned to meet the new requirements. The finished product, which arrived in the warehouse at pallet level, had to be distributed piece by piece to all retailers in the country, based on a process as simple and fast as possible, but which, at the same time, to ensure a high-level product traceability and order accuracy according to European standards in force.
An important restriction in this project was the need to fit in a very limited space. On the existing land, the building can no longer be extended and the automation had to be included in the available surface.

The main processes that had to be ensured were the following:
- A storage volume of products for a day and a half
- Picking the box
- Picking the piece
- Scan at individual code level
- Sort by orders
- Packing
- Sealing and labelling according to traceability requirements
- Low sorting at the delivery route level
- And other.



In just four months, at least one sorting and packing line had to be started in Go Live.

Implementation and barriers welcome

The installation started in May, 2018, the first line being completed at the end of August, with certain difficulties:

• the main component of the line, a Swiss-made sorting module, managed to reach only 75% of capacity.

• The need on the part of the Swiss manufacturer to redesign part of the solution was obviously imposed, which ended with a retrofit at the beginning of 2019.

• The logistics operator encountered a series of problems in the formation of the operation team taking into account the lack of human resources in the market

• Adjusting the working speeds of the maximum picking heights and the size of the picking locations were also aspects that were adjusted along the way.

• Identifying and optimally setting the solutions for printing and pasting delivery labels on packages was a challenge that was solved taking into account space restrictions.

Based on experience and new technologies used, the integrator has managed to achieve an impressive project, even internationally. The client made sustained efforts to support the implementation team and the two companies assisted the logistics operator to make an easy transition from the management of operations to prepare orders for distribution, from the production company to the logistics operator.

From 2019 until now, the distribution of the three warehouses is ensured at national level, reaching a sorting capacity of over 200,000 units per day, in a single exchange, with approximately 120 operators at the level of the 3 warehouses, strategically positioned for a efficient customer supply.

The implementation of these new solutions and strategies in the distribution chain, brought a series of benefits to the company such as:

- precise product traceability
- precise inventory location with high stock accuracy on location
- keeping separate replenishment and picking flows with an impact on increasing speed
- reduction of process errors
- reduction of human resources involved in the activity in the warehouse

- reduction of human resources involved in the cross-docking activity in the regional warehouses

CASE STUDY

#8

CAR SERVICE: Tyres' waste

Romania

Logistics related to the management of the tyres waste in a car service shop

LOGIN
Logistics Technologist

Logistics to support the waste management

Description

Cars and road transportation, as well, record huge volume of tyres waste. A car service shop produces thousands of tyres waste per year, and, due to the implemented quality management it is forced to assure appropriate waste management. That means, that the car service shop should be able to identify and extract the out of use tyres, to manipulate and store the tyres waste, and to assure transportation of the waste to the recycling facilities.

The selection of the tyres to be recycled, from the entire storage, is done by using specific measurement devices to detect the height of the friction surface, and by visual testing of the surface, in order to evaluate the existence of any imperfection and/or defect. Those which cannot be used anymore, they will be stored until specific number of tyres is reached. The tyres will be transported, in their form, to the recycling company, or they are milled, put in bags and transported as pellets to the recycling service.

All these steps require specific devices to measure the tyre surface, forklifts to manipulate and transport the tyres inside the car service shop, specific storing shelves and racks, and if the number of the tyres is too high a specific arranged yard for storage. If the tyres are milled before sending to the recycling facility, then equipment for milling is required.

The transportation is done by trucks carrying tyres or bags with pellets.

Replacing tyres – involved equipment

Description

Replacing the tyre consists of distinct steps: unscrewing the wheels, lifting up the car, extracting the tyre from the wheel, inserting the new tyre, inflating the new tyre and equilibrating it in dynamic conditions.
To apply the car lifting operation partial lifting device or integral lifter are required

To lift steel sheets, cranes with magnetic or vacuum catchers are used. They are able to

Storing tyres

Description

1. Cleaning of tyres

Before storage, the new tyres are cleaned by dust and fats, and different types of chemical substances. For a correct cleaning detergent, water, and a soft brush are used. After the cleaning, the tyres are allowed to dry.

No specific dressing is applied, because it is considered as not being necessary.

The used tyres are not cleaned when are introduced into the store.

2. Use a plastic bag for protection

Each new tire is protected using a plastic bag, before introducing within the store. The used tyres are not stored in such bags

3. Avoiding the UV rays

Even if the tyres are used, it is recommended to be stored in areas protected against UV rays.

4. Avoid chemical exposure

Any tyre, used or not, are stored in conditions to avoid the contact with different chemicals. The worst substance is the Ozone (which is produced by generators, compressors, furnaces and others)

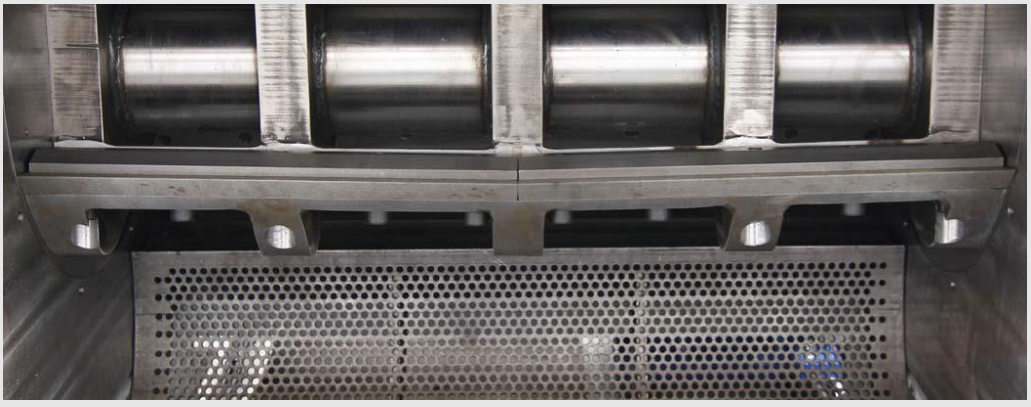
Conditions to avoid the contact with solvents and fuels and lubricants are, also, assured.

Milling the welding head

Description

For appropriate recycling, the used tyres are introduced into specific mills to cut and mill down to pellets / chips having dimensions between 100-200 mm. If necessary, chips of 4-5 mm diameter can be produced by milling.

The objective of tire recycling is to break down the used tires into their individual components: rubber, steel wire and textiles. The plant can recover the raw materials in a three-stage recycling process, which reaches the highest levels of purity.
Initially, the tires are separated into large fragments - primary chopping - then a granulation line reduces the size to 4 mm granulation. The final stage is a process of separation and careful cleaning, which ensures the optimal quality standards of the final product. Depending on the type of product, up to 60% of the raw rubber can be recovered.



CASE STUDY

#9

Warehouse processing: Final products

Croatia

Logistics of the product to deliver – Final products

LOGIN
Logistics Technologist

Logistics of the product to deliver

Description

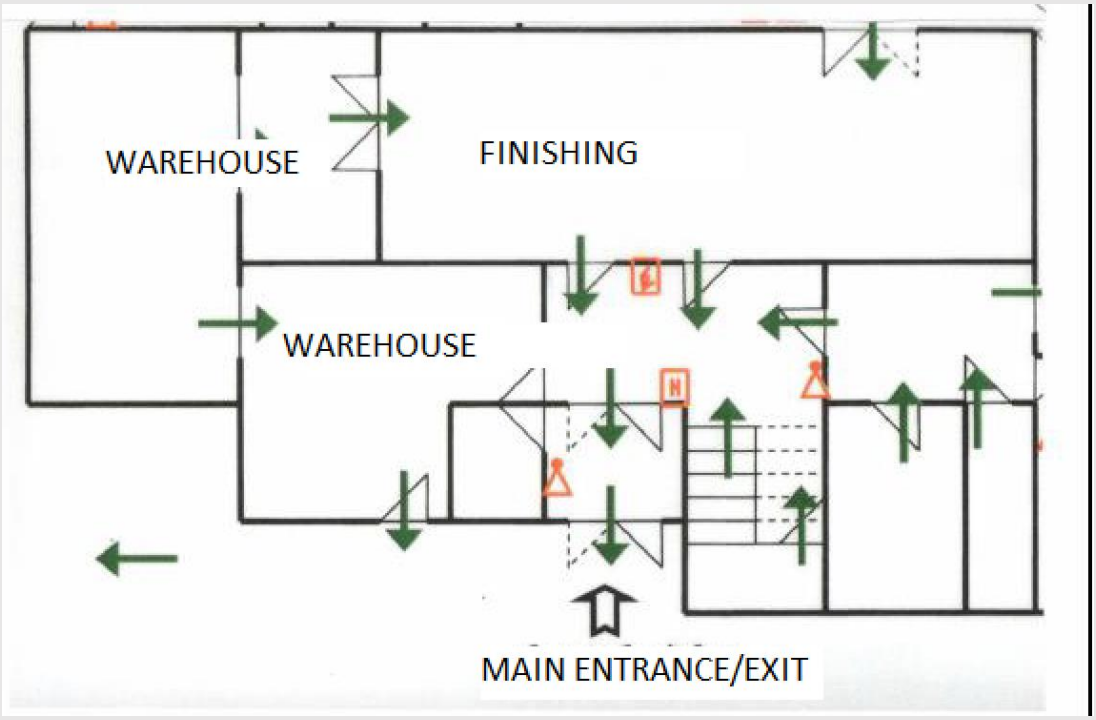
About warehouse

The warehouse in company XZ is about 60 m^2 and 3.6 meters high. Indicates a place arranged for temporary and safe storage and issue of finished goods. Warehousing of goods is a process necessary to make the goods as economical as possible before delivery to the final customer. The warehouse is of the rack type, with the possibility of floor storage and manual hanging transport.
In terms of function, this warehouse belongs to the category of industrial warehouses, since it is used to store goods that are processed in the same plant. According to the type of goods stored in it, it is a general-purpose warehouse for several types of goods. It is also ground level, enclosed and low mechanized. According to the purpose, it is a warehouse for issuing goods.

Procedure for movement of goods

In shelf racks, material is stored directly on the shelf, with or without means of forming unit loads (pallets, boxes). The shelf is a shelving element consisting of inserts made of wood or metal (usually sheet steel). The inserts are placed on the shelf supports of the rack in such a way that they form a full insert, usually a horizontal surface. This is a warehouse and floor storage, and the main feature of such a warehouse is that there are no storage means (equipment used to store materials). Storage units are designed depending on the type of material, the method of operation or the type of transport system.
During floor storage, the material may be disposed of:
a) free filling or piling of material on a certain surface (piles)
b) free disposal, without a certain arrangement of the piece material
c) stacking storage units (applied in case of larger assortment and smaller quantity of the piece material)
d) stacking storage units (used in case of smaller assortment and larger quantity of the material)

Suspended transport includes self-propelled and freestanding single or double-track suspended conveyors. They can be designed as driven circular conveyors or free line handling systems. However, in this warehouse there is a manual hanging transport composed of ordinary hanging levers without springs that are moved manually along the wire. In this warehouse, the goods enter the warehouse from the finishing phase together with the related orders which contains details of model, size and colour. The warehouseman sorts the goods by shelves according to the dana received, and then packs them in boxes. The necessary notes, the so-called inter-warehouse requests, must be written on each box, so that the buyer / transferee knows what is in each box.



This is followed by the release of the goods to the central warehouse. When dispatching the goods, the following documentation is required: delivery note, delivery note for the central warehouse, inter-warehouse request for material storage and a pass / delivery note for everyone entering the warehouse with material goods, i.e. leaving the warehouse. Storage costs need to be taken into account. These costs are minimized in this warehouse by manual transfer and storage of the goods themselves and not using machines or conveyors. Of course, this is not possible in every warehouse, but in this case it is tailored to the specific product line for each order. Therefore, the paperwork is

the same every time in order to be able to keep track of where each piece of goods is and in order to book everything correctly.

Internal transport

The internal transport of a warehouse includes transport in production, storage, transport between production and storage, transport between production facilities and transport between warehouses.
XZ company's warehouse system consists of the following phases:
- arrival of goods on trucks from the buyer / customer - reloading from the truck to the warehouse
- domestic transport, movement and production of goods
- reloading of the finished product from the warehouse to the truck.
The goods that come into the warehouse consist of the length of material, i.e. the basic material, and the auxiliary material (threads, fasteners, buttons, labels, packing bags). The warehouse workers at the plant manually take the goods out of the truck manually, and the goods are also loaded in the same way. Customers rent the trucks and XZ company does not provide transportation or insurance for the goods. The fleet consists of one van which is used to transport machines from one plant to another and to deliver spare parts for these machines.

CASE STUDY

#10

Warehouse processing: Perishable goods

Croatia

Logistics of the product to deliver – Perishable goods

LOGIN
Logistics Technologist

Logistics of the product to deliver

Description

Fruits and vegetable storage analysis

Fruit and vegetable warehouse is a ground floor warehouse where goods are sorted according to the type of packaging of the items (boxes and bags), according to the groups of items oriented by branches and then according to the turnover of goods according to entry / exit of the items. The storage units are arranged in blocks and not in racks for reasons such as high turnover of goods, large quantities of the same goods, characteristics of the goods and the company's aim to keep the goods in stores as fresh as possible in order to attract customers. Consequently, the procurement service orders the quantity of goods according to the market demand of the customers, which is important given that these fruits and vegetables have a short expiration date.

In the left (larger) part of the warehouse shown below there are storage positions where the goods are sorted in boxes, while in the right (smaller) part of the warehouse shown in the second figure there are storage positions where the goods are sorted in bags. Bananas are sorted placed in a special room that requires a higher temperature than other fruit and vegetable items, to be ready for retail. The temperature in the fruit and vegetable warehouse is between 9°C and 12°C, while the temperature in the room where the bananas are stored is between 14.5°C and 16.5°C.

Storage of goods begins with the goods inspector scanning the barcode pasted on the pallet and on the scanner screen the system shows instructions as to which storage position the goods should be stored. He picks up the goods with a forklift and transports them to the specified storage position where he places the goods into storage.

When he places the goods in the designated position, he confirms this in the scanner. He performs the specified action for each pallet that needs to be moved to the designated storage location.

CASE STUDY

#11

THYSSENKRUPP elevators – Digitization for intelligent services

Spain

Introduction of innovative and smart technologies and services to advance digital transformation 4.0

LOGIN
Logistics Technologist

Main target: Digitization

Description

Thyssenkrupp Elevators can be described, in brief, as an innovative story that aims to make cities better places to live. In order to carry out this objective and to be able to offer an intelligent assisted service, both experts and analysts along with digital technology such as the Internet of Things, Machine Learning and Big Data have come together to allow modifying their own business processes.

Digitization is the keyword for Thyssenkrupp, as it considers it essential to advance the digital transformation of its services. Thanks to digitization, all company operations are integrated and interconnected. The Internet of Things (IoT) together with Machine Learning, for example, allow an intelligent connection of the different data and systems, to later apply the corresponding algorithms. Big Data, on the other hand, is applied depending on the needs of the clients and after the data has been processed.

Company presentation

Thyssenkrupp Elevators enters the market by focusing and basing its efforts and objectives on the development of innovative technologies, products and services for urban mobility. It has managed to establish itself in more than 150 countries with 1,000 centers, hire more than 50,000 highly qualified employees and in 40 years it has become one of the world's leading lifting companies by combining engineering and technology, and offering products and personalized smart services.

In Spain, Thyssenkrupp employs around 5,000 employees, has several production plants for escalators, electrical systems and elevator control, two logistics centers and an R + D + i center. The company is committed to new product innovation and digitization of the lift industry. Therefore, it comes to change the way elevator and escalator repair and maintenance service is delivered to customers by focusing on service excellence through the introduction of two digital technologies: 1. MAX, a predictive maintenance system that monitors and collects information to process it in the cloud and 2. digitization and automation of the supply chain, which goes from production to delivery, allowing a faster and more efficient delivery of necessary spare parts to the maintenance team.

Technology 1 - MAX

Thyssenkrupp elevators launched MAX in 2015 with the purpose of executing predictive maintenance or in other words, improving failure prevention. It is considered the first maintenance solution for elevators and escalators and combines both Big Data and cloud computing with machine learning to consolidate all data and reduce downtime more or less by half as well as anticipate any breakdown in the system so that the elevators are always in optimal condition. All this will lead to a significant increase in the efficiency of cities.
With this technology, the elevators are connected to either the Microsoft or Apple cloud, which will allow deep control of all its functions and analysis of all data through an algorithm capable of sending accurate diagnoses to maintenance technicians "in real time."
On the other hand, MAX clients are able to predict maintenance problems and advise of changes or repairs that have to be done long before parts and systems life cycles' end. With this, it is possible to check the status of the elevators and make any repairs, gaining time, competitiveness, and efficiency. The image below shows the connectivity in real time, where the status of the facilities and the process of digital transformation 4.0 can be seen.

Technology 2 – Spare parts' automated planning

Another key aspect in which 4.0 technology is transforming and optimizing this company's production process is that of automatic spare parts planning. As we have seen, MAX allows real-time monitoring of the status of an elevator's parts thanks to Big data, cloud computing and machine learning. However, all this information can also be used to streamline and optimize the production and logistics process of spare parts. As a result, it allows having a part ready to be replaced and thus avoiding breakdowns or minimizing the waiting time for repair. All this is achieved by centralizing the management of spare parts and planning the demand thanks to the information received by the technologies mentioned above. It all starts in the Spare Business Centre (SBC), the company's central warehouse, where, thanks to the processing of information with an automated demand analysis tool, the necessary spare parts are forecasted, linked with a technician and adapted to their consumption and their usual route.

The warehouse workers receive this information and carry out the order, which is labelled with a QR code with all the necessary information for shipment. This process, like all those of the central warehouse of the company's branch in Spain and Portugal, is controlled by warehouse management software, 100% integrated with theenterprise resource planning (ERP) of the higher level.

As a result, the warehouse operates optimally, with a capacity of more than 9,000 SKUs. The SKUs with the highest turnover are located on one side of the warehouse, in a pick-by-light

system, and these SKUs are mainly fed by the via speed stacker crane with omega technology (which reaches speeds of between 3 m/s and 6 m/s, depending on whether it is being lifted or moved along, respectively). The remaining SKUs are picked at the head of the automatic system by put-to-light or by the order picker in the warehouse.

If an order has spare parts from different areas of the warehouse, the different parts are routed to a consolidation station, in the correct order, through a sorter system, where the operator prepares the shipment. Occasionally, if the order includes extra dimensional material from the manual areas of the facility, a second consolidation of the order will be necessary.

However, the improvement and optimization process does not end with the organization of the warehouse based on the demand received by 4.0 technologies in real time. These new technologies also enable greater interaction between the maintenance technician andthe SBC. This also makes it possible to optimize the technician's troubleshooting; for example, in the traditional process, the technician had to travel to the company's regional office, which is usually located in the region’s main city. This process slowed down the repair process, as the technician was forced to get to the regional office, pick up the spare part, and head for the place where the breakdown is found, which could be kilometres away.

The enhancement of the technician-SBC interaction allows them to specify a pick-up point at an agreed delivery point to pick up the spare part. Like this, the technician has the part at his disposal at a more convenient location for him (thus speeding up the repair)—in addition, they have real time information on the shipment, thus being able to organise and plan their schedule. Therefore, some technicians are able to save more than 100 km of travel time to go to pick up a part in case they are far from the regional head office.

Conclusions

In this case study we have seen how 4.0 technology has completely disrupted both the production processes and the supply chain in ways that were unconceivable just 20 years ago. We have seen how this company has evolved from breakdown repair to foresee and anticipate them thanks to real-time information provided by technologies such as IoT, Big Data and cloud computing.

The reception and management of these huge volumes of information are used to plan the organization of the warehouse. This has multiple benefits, such as process optimization, reduction of stock-outs risk and has also crucially impacted on avoiding preparation and shipment errors.

In addition, it has managed to put both ends of the chain in direct contact (technician and the SBC) skipping unnecessary steps related to the spare parts' order management, saving time (and money) for the company and making technicians daily work easier and safer. And this is thanks to increased END to END traceability in the supply chain.

All this has resulted in an enhanced service to the customer, for whom elevators are becoming extremely safe, breakdowns are less frequent (since they can be anticipated)and repairs are much faster. But the company's workers and its customers are not the onlyones who benefit—this optimization also has an impact on, for example, the reduction of CO_2 emissions thanks to the reduction of kilometers traveled by technicians, as well as a small contribution to the decongestion of large cities thanks to the possibility of making deliveries at convenience.

Exercises

1. **A. What has been the effect on the company's workers as a result of theimplementation of the 4.0 technologies we have seen in this case study?**
   B. Do you think that the implementation of these technologies has facilitated or worsened their working conditions? Consider this for both warehouse operatorsand maintenance technicians.

2. **A. What have been the environmental impacts of the application of the company's 4.0 technologies, both in the production process and in the supply chain?**
   B. Do you consider these technologies sustainable, green and environmentally friendly in the long term?

3. **Taking into account the two technologies presented in this study, suggest a third proposal that leads to an improvement in the company's ecological footprint.**

4. **A. This report has not considered the risks associated with 4.0 technologies. Do you think that a greater importance of these technologies in the production and logistic processes necessarily leads to a greater vulnerability of the company to cyber-attacks such as malware or phishing?**
   B. What kind of initiatives would you implement to make this company more cybersecure?

5. **Do you consider this a good model to follow? If you were the CEO of an elevator company in any other European city, would you adopt the same technologies or just some of them? Justify your answer.**

Erasmus+

LOGIN
Logistics Technologist

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