TRANSPORT OF SPECIAL LOAD - THE EXAMPLE OF DISTRIBUTION OF GLASSWORKS PRODUCTS

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Summary: The paper presents the specificity of transport service of products of the selected glassworks. It describes the procedures and specific equipment essential for carriage and protection of large-size glass sheets and defines responsibility of carriers for shipping goods in the process of transport loading and unloading at the goods receiver's.

Key words: transport, special load, glass

1. The Specificity of Transport and Warehousing of Glassworks Goods

Warehousing in the glassworks constitutes, right next to transport, the most important element of the logistics system. It is complex due to continuous character of production. The assembly line is not stopped even for a while. Moreover, rather wide range of goods for sale additionally makes it difficult to manage the warehouse efficiently. The process of warehousing starts before the production of glass is begun. Raw materials for production have to be kept at the level allowing for the assurance of production continuity for at least 2 weeks. Managing the stock of raw materials essential for glass production is not complicated. Thanks to belt conveyor flight the components for glass production are loaded into the furnace according to FIFO principle. The system monitoring the level of stock informs Purchasing Department on the stock of the selected raw material straight away.

The general diagram of warehouses of the glassworks of Czestochowa is presented in figure 1. Office rooms are connected with the plant floor and the internal storage warehouse. The area of the glassworks has been designed in such a way that it is to enable its functioning to a maximum.

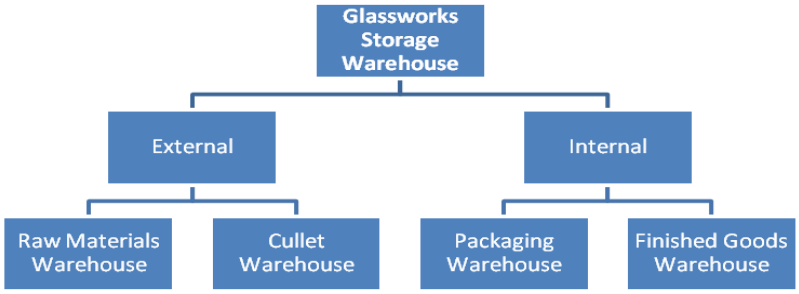

Figure 1. The main division of the glassworks storage space [3.]

Managing the internal storage warehouse is the most complex. Ready glass arrives in here and expects for further treatment or it is ready to be transported. The entire surface of the internal storage warehouse occupies the area of more than 40000 square meters.
A very important function in the field of the warehouse is performed by the storage racks on which the glass of Jumbo size (3210x6000 mm.) is stored. A large amount of storage racks is placed not far from the assembly line since glass is stored on them before it is appropriately labeled and sent to the proper location (figure 2.).

Figure 2. The rack for storage and transport of Jumbo-size glass sheets [4.]

Glass on storage racks is divided into so called 'packages' labeled with bar codes including all the information such as: the exact time of manufacturing, kind, amount, thickness and shift of employees responsible for production. All this data is also written below a bar code thus the scanner for decoding information is not always necessary.
The storage rack is adapted to the proper semi-trailer thus maximum mass of glass on the rack cannot exceed the limit of 20 gross ton. The rack is delivered to the final goods receiver along with the content. In spite of the fact that it is the structure made of highly durable metal, with the passage of time damages to the rack occur. Therefore, every time an empty rack is being accepted, its condition is examined. The glassworks have 50 racks at its disposal, 80% of which is constantly being used. Specialized trucks made by Hubtex Company (figure 3.) are used for shipment of glass racks. The glassworks 'X' possesses four such trucks. All the vehicles are fed with accumulators since they move mainly in the closed surface of poor ventilation.
Office workers, contrary to laborers, from the selected departments are present only Monday to Friday from 8 a.m. to 4 p.m.. Therefore, store-keepers must be assigned to their tasks in advance so as not to complicate the work of other departments. The biggest problem arises with glass rotation while following FIFO principle. Glass being 120 days old is old glass and ought to be sold immediately. Therefore, a problem arises, which consists in such warehouse organization that older glass is taken from the warehouse primarily. Thus, close cooperation between Finished Goods Warehouse and Material Planning and Logistics Department must exist. Both units utilize Microsoft Excel computer software and the program working with Barcode Scanners v2.

Figure 3. Truck made by Hubtex Company designed for shipment of glass racks [5.]

All the actions connected with warehouse processes are realized within the framework of internal activity. Only the area of glass shipment was outsourced. The specificity of glass shipment enforced finding the best carriers, which own the appropriate stock of road vehicles and have considerable experience in the area of glass shipment. Employees responsible for vehicle loading take care of shipping planning, however, shipment to the destination itself belongs to the outside companies. Glass manufactured in the glassworks ends up not only in Poland but also in the countries of Europe and Asia. Therefore, it is essential to keep up with delivery schedule at the highest level.

The purchase of stock of road vehicles adapted to glass shipment as well as the employment of workers responsible for shipment realization would be connected with bearing considerably high costs on the side of the glassworks. To focus on the most important targets, which is maintaining the highest quality of manufactured glass and the promptness of deliveries, the decision was taken to entrust the professionals with shipment. Consequently, the glassworks won good reputation among clients, who attach great importance to the promptness in the sphere of shipment. Providing the optimum shipment for the glassworks involved bearing investment expenditures for specialized stock of road vehicles by the carriers. A truck-tractor itself does not differ from the other ones running on roads whereas a semi-trailer is adapted only to the shipment of the largest glass sheets.

Specific design of a semi-trailer made it possible to place inside, between its walls, some glass sheets which are placed on a rack. These may be the racks of A type on which glass is placed on both sides or the racks of L type where glass is placed only on one side of a rack. To make rack shipment possible, a semi-trailer cannot possess classic axles under the floor of classic loading area. A semi-trailer without a frame is empty inside, gutter-shaped, in which a glass rack is inserted (figure 4.). It constitutes a sort of frame which fills a semi-trailer while simultaneously stiffening and stabilizing it. Optimizing the weight of a semi-trailer itself was also successful. It is equipped with six independently mounted semi-axles. Maximum axle load amounts to 4.5 ton, which amounts to the total of 27 ton and 12 ton of clutch bung load. Therefore, the total loading mass with a semi-trailer may even amount to 39 ton. Semi-trailer kerb weight is 8 tons. Such low weight was possible

to gain by using steel of increased durability, which allowed for reducing the thickness of the applied steel profiles.

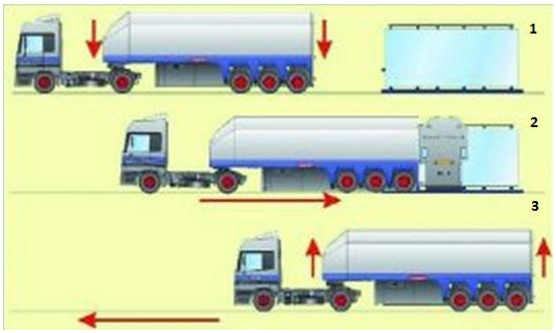

Figure 4. The stages of placement of a glass rack inside a semi-trailer [6.]

To secure safe shipment of such fragile load which glass is, the semi-trailers of inloader type possess a device securing the load against relocating during the transport process. The device is equipped with special 'arms' the task of which is to press down the glass on both sides of the rack and keep the sheets in a position it was loaded. Pressing elements made of vertically placed platens, about two-meter long, two on each side appear the most often but it is also possible to assemble six pressing platens on each side depending on changing overall dimensions of the transported load. The system is also equipped with its own pump, electric motor, oil tank and manual pump used in case of break-down.
The placement of a glass rack (frame) inside a semi-trailer takes place by using the electro-pneumatic system which enables its lifting or lowering. Before loading is begun a driver has to approach the glass rack and lower the semi-trailer to the height of about 9 cm. When the semi-trailer back door is open, the driver, while reversing the vehicle has to drive onto the rack which is inserted into the semi-trailer gutter like a drawer. When the frame is placed inside, the driver lift the semi-trailer to the height of about 45 cm and closes the door. In such a position glass is shipped all the way to its destination.
A very important role is also played by the back door of the semi-trailer which, when closed, couples both sides of the semi-trailer while additionally stiffening and stabilizing it. It is activated with the help of the pneumatic mechanism and it is protected against opening during carriage with the blocking mechanism. The semi-trailer usually possesses a canvas cover which is able to protect the entire cargo against the detrimental action of weather conditions since frequently glass covered with a special coat is carried and the coat, when brought into contact with moisture, corrodes. As little as just a few drops of rain, which gets inside the semi-trailer, may irreversibly damage glass. Therefore, it is absolutely essential to maintain the semi-trailer in a perfect condition. Lacquering the semi-trailer is performed while following the recommendations of the glassworks since the set will move mainly with glass manufactured in the selected plant. Thus, it is possible to place company colors and logo. The additional internal canvas cover, made of cotton, which is placed under the roof, is also frequently used. Its task is to protect the glass against the condensing water. Some semi-trailers also possess the installed system of ventilation enforced to maintain the proper level of humidity inside the semi-trailer during carriage.
The loading of the semi-trailer of inloader type is not very complicated and it lasts for a very short time. Depending on the skills of the driver it may take from 10 to 15 minutes. Drivers come at the appointed time with the accuracy to 15 minutes. If a vehicle arrives at the plant area too early, it will have to wait until the appointed time of loading whereas if a driver

is late more than 15 minutes, there is a risk that they will not have an opportunity to load for the next few hours due to the precise plan of the processes in the warehouse. That is why punctuality on the side of carriers and drivers plays such an important role in the process of loading.
The process of loading begins at the entrance gate where a driver obtains the ID badge from the security workers. Registration numbers of a truck-tractor, the name of the driver and the exact time of arrival are registered. Then, the driver receives the instructions on which loading gate they are to get to. This action is followed by the security telephoning the specialist on transport who prepares the proper shipment documents. At that time a driver begins loading which does not involve the help of the warehouse workers. However, it is important to underline in here that a driver has to get out of a vehicle thus they have to follow all the precautionary measures concerning safety. When the loading is over, the documents are taken. If they are complete and correct, the vehicle heads for the departure gate. Registration numbers and the time of the departure of the vehicle outside the plant are registered once again. The security guard is also obliged to check the compatibility of the shipped cargo with the documentation. When positively verified, the vehicle sets off on the previously appointed destination.

2. Reponsibility of a Shippnig Company for Transport of Special Cargo

The glassworks 'X' makes use of the services of a few carriers, which take big responsibility for the entrusted cargo. Unfortunately, there are situations when the carrier has to bear the blame for negligence connected with cargo shipment. These are sporadic situations and the objective is to minimize them since it is connected with costs for the carrier and the glassworks. It happens very rarely that the blame is on the side of the glassworks itself. So far only a few such cases have been noted.
Road carriers are entrepreneurs entitled to running business in the field of road carriage. In practice, carriers are responsible only for cargo shipment but not for its arrangement. At the moment of the acceptance of such an order, the carrier enters the legal relationship of the contract of carriage as so called the agreed carrier and their responsibility is regulated by transport law or the ***Convention*** on the Contract for the International Carriage of Goods by Road (***CMR***). Even if the order is resold to another carrier, the one who signed the contract is burdened with the possible effects of the damage during the carriage. The carrier is responsible for partial or total damage or disappearance of goods which takes place between their acceptance and delivery. The carrier is also responsible for delay in delivery and negligence and activities of their employees and further carriers they committed carriage to and for their own negligence and actions. The carrier is discharged from liability if disappearance, delay or damage is caused by the fault of the authorized person, their order, which does not result from the fault of the carrier, defect in goods or circumstances the carrier was not able to avoid and prevent their after-effects. The circumstances the carrier is not able to avoid and the after-effects of which they cannot prevent are among others: [1.]

- robbery, theft,
- natural disaster (hurricane, flood, thunder),
- theft with burglary,
- the fault of a third party (e.g. the damage of cargo due to a road event caused by another driver),
- theft of a vehicle along with the goods.

Proving the fact that the damage appeared due to circumstances the carrier was not able to predict and the after-effects of which they cannot prevent rests with the carrier. It is worth mentioning that in practice it is possible to discharge from the liability for the theft of the cargo in specific situations e.g. when a vehicle was left at the monitored parking lot.
According to CMR, the evidence of concluding the contract of carriage is the bill of consignment. However, in practice it turns out that such confirmation of the conclusion of the contract is the accepted order for the carriage if it proves that the order refers to the carriage of the cargo. Therefore, it is not important who was put on the bill of consignment as a carrier from the perspective of the assessment of reliability for the damage. If, for any reasons, performing the contract of carriage on conditions included in the bill of consignment becomes impossible before goods are delivered to their destination, the carrier is obliged to demand the instructions from the logistics department of the glassworks. However, if there are circumstances allowing for the carriage on the conditions different from the ones from the bill of consignment and if the carrier does not obtain the instructions in good time they ought to take steps they regard the most beneficial for the people authorized to managing the goods. While declaring value by the buyer, cargo value is put on the CMR bill of consignment. In case there is no such entry it is accepted that value is not declared unless the contract provides otherwise. In case of any damage, the buyer will demand the compensation in full value of goods from the carrier. If goods are not fully insured, the burden of covering the damage beyond the limit will rest on the carrier. The declaration of cargo value is connected with an extra payment which mainly consists of extra insurance premium. Therefore, it is essential for the carrier to know that early enough to be able to agree on the amount of insurance premium in advance and inform the ordering party about that [2.].
Unfortunately, there are situations which are unpleasant both for the glassworks and the carrier. Each case of damage to the shipped glass is both logistic and financial problem. In most cases damaged glass goes to the bump, though it is sometimes possible to resell it as sub-standard glass. The problem is also to manufacture another batch of glass and maintain good relationship with a client who has an opportunity to purchase products from the competitors. The glassworks and its carriers make efforts to cooperate in such a way that financial losses are minimized although it is not possible to eliminate them completely. Glass damage may appear while loading and unloading goods. The glassworks has made a note of cases of damage of cargo and a vehicle as early as in the area of the warehouse. It was caused by improper service of the driver who, having loaded goods and closed the door of the semi-trailer of inloader type, left with no lifting it. The consequence was breaking the door with the rack and cracking the glass inside of it. In that case there were no doubts concerning who was guilty of that accident. The losses had to be covered by the carrier the driver directly was subordinate to. Also, it is not important if this event was the result of fatigue, lack of experience or just depth in thought of the driver. Fixing a specialized semi-trailer is very expensive and time-consuming. The glass was successfully cut into smaller pieces, which were sold to another receiver. However, there is not always such an opportunity. The value of the shipped glass fluctuates between 40 and 120 thousand zloty. Therefore, the responsibility is big and the losses significant for both the glassworks and the carrier. The blame is not always on the side of the carrier. The glassworks is responsible for maintaining the glass racks in proper technical condition on account of the contact with water and snow from the lower part during the carriage. Moreover, the blockades protecting glass against movement are exposed to powerful forces. Therefore, the metal structure undergoes the wear and tear. It is important to control the technical condition and make necessary repairs on time. If a rack floor is damaged and damp gets into the semi-trailer during carriage, the glassworks will take responsibility. The driver is not obliged to control glass racks. This duty belongs to store-

keepers and the employees of the logistics department. Unfortunately, the cases of rack damage appear the most often since there is no possibility to control all the racks at the same time.

Another case, when the blame was on the carrier's side was an event which took place in 2010. A driver carrying a glass rack was forced to get the daily rest back. Therefore, he stopped at the appropriate place. Pouring rain made the nearby river (not far from the parking lot) overflow. The driver was not able to react properly to the situation and leave since he was fast asleep. When he woke up, he noticed that the water level was so high that the glass had been flooded. Unfortunately, it was the kind of glass which was not to get in touch with damp as it was covered with special metallic coat. The carrier reported this incident to the insurer, the glass was given back to the bump but the client still had no goods they ordered. Unfortunately, they were waiting for too long and gave up the order. The money from the insurer was paid but the losses were sustained by the carrier and the glassworks.

Each noted case is deeply analyzed to somehow prevent it in the future if it is possible. Incidents connected with poor technical condition of a semi-trailer are caused by negligence of the carrier. The drivers do not always know that a canvas cover has been damaged. However, if it happens during carriage and glass gets wet, the carrier ought to take full responsibility.

The presented figure 5. specifies the number of incidents in which the glass has been damaged. Most cases are impossible to avoid. Neither the glassworks nor the carrier affects them. However, it is necessary to pay attention to the fact that there are the cases when either the carrier or the glassworks are responsible for negligence and as a result the cargo is damaged. On the basis of each case the report is drafted which includes all the circumstances of the event. The employees think about how to diminish the amount or fully eliminate the mistakes in the future though it is not completely possible. Sometimes the equipment fails and sometimes the people do. Sometimes the incident is the resultant of many factors. All the time the actions are taken to minimize the losses. Making use of the service of a few carriers, the glassworks ensured the safety of the continuity of delivery of the manufactured glass. In case of bankruptcy of one of the carriers, the remaining ones are able to take over some of the cargo by the time of ensuring the cooperation with a new one. In extreme cases when the carrier dictate too high rates or does not fulfill the entrusted duties properly, the glassworks has a possibility to resign from further cooperation. It would be very unreasonable to become dependent only on one carrier.

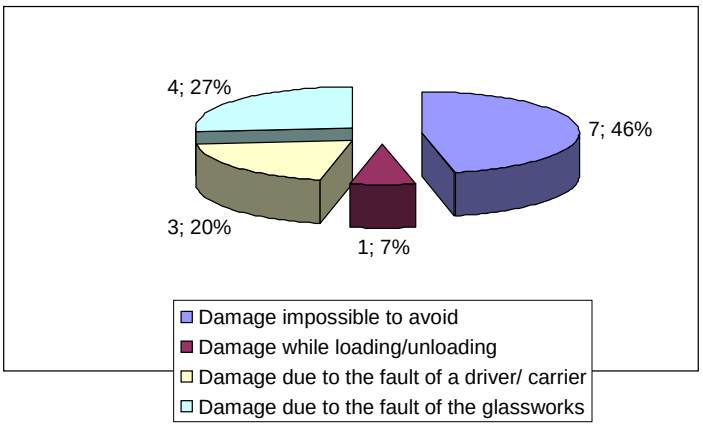

Figure 5. The reasons of glass damage during the carriage within 6 months [7.]

The glassworks 'X' has been making use of the service of the same carriers right from the beginning of its existence. It is not said, however, there will always be like that. It may happen that the glassworks will seek cooperation with other carriers. Such decisions cannot be taken too rashly. Long-term relationship between the carriers and the glassworks are gradually strengthened. so far, both sides have been satisfied with the cooperation and hope they will be in the next years.

3. Conclusions

With no doubt it is possible to state that transport and storage play a very important role in a logistic system of the glassworks. The key processes are connected with them and qualified people, who face difficult and complex task are responsible for them. Working with glass is connected with the danger of the loss of health or even death. However, the safety of the employees during work is the priority of the glassworks.
The outsourcing of the transport system was a high risk for the glassworks. It was not possible to clearly/explicitly predict how these services would be realized by the carriers. Fortunately, the decision on the cooperation with the specialists in this field turned out to be a right decision and the glassworks was able to focus on its basic activity, which is maintaining the quality of production at the highest level. The proper transport management deserves a special attention. The people responsible for carriage advise the managers and take a wide range of very important decisions. Therefore, the specialists dealing with transport management have to possess the knowledge on law, finances and the abilities to manage capital and human resources. Each decision must be carefully thought over since it significantly influences the functioning of a company.

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