



TAMPERE POLYTECHNIC

BUSINESS SCHOOL

FINAL THESIS

**Developing the transportation process at
Metso Minerals Inc, Tampere Works**

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International Business
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THESIS ABSTRACT

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This thesis is about developing the transport process in Metso Minerals Inc., Tampere Works capital equipment order office. The need for development has occurred due to rapid increase of production and therefore also export. The volumes have doubled over the past few years and so far the only solution for the increased workload has been adding personnel.

The transport process is explained very detailed further in this thesis. When investigating the processes it is obvious that something needs to be done to make the process more simple and clear. Selecting the best logistics service providers for different geographical areas can do that. In my thesis I will concentrate on the areas with highest volumes; North America, Asia, Australia and Europe in general.

For this thesis I have been going through historical data to see the volumes and types of products that are most common for certain areas. I have also studied our processes, which has in a way come along while working as logistics coordinator in the order office. Being able to develop my own work while writing my thesis has been really interesting and educating. The biggest issue has been constant high workload at work that has taken a lot of my energy. However that proves the real need for developing the transport process.

Keywords: Incoterms, International transport, Logistics, Supply Chain Management, Transport modes

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1. Introduction

1.1 Introduction of the thesis

This thesis gives an overview of the transport process at Metso Minerals Inc., Tampere Works capital equipment order office, which is responsible for shipping approximately 1000 units all over the world per year. The product characteristics and general dimensions are presented in the appendix 2.

Some basic concepts of logistics in general, especially transportation is also presented, the focus being in outbound logistics due to the nature of the subject.

Incoterms play quite a big role in international transport process and international trade; therefore they are also introduced, some in greater detail based on their significance to the company in question.

Since developing the transport process is the sole purpose of this thesis, I have explained the current issues and proposals to solve them. The development in practice has already begun and will go on little by little.

1.2 Company introduction

Metso Minerals forms part of Metso Corporation – a €6 billion-a-year group (2007) listed on the Helsinki Stock Exchange – that also includes Metso Paper and Metso Automation. Metso Minerals accounts for approximately 44% of Metso's consolidated net sales.

Metso Minerals is a global supplier of solutions, equipment and services for rock and minerals processing. Its expertise covers the production of aggregates, the processing of ores and industrial minerals, as well as construction and metal recycling.

Metso Minerals' operations are divided into three business lines: Construction, Mining, and Recycling, that channel their sales through market areas.

The Construction business line serves quarries and project-based crushing and screening operations providing services to aggregates and construction industries, contractors processing rock or soil for the construction and civil engineering industries, and engineering and consulting companies.

The Mining business line provides services to mining and industrial minerals companies extracting, processing and transporting ores and minerals, as well as to mining contractors, and engineering and consulting companies.

The Recycling business line mainly serves the metal recycling industry including ferrous scrap operations, automotive industry, aluminium industry and foundries.

Most of the product and service offering is sold through our sales and service units, or through authorized distributors and agents around the globe.

Headquartered in Helsinki in Finland, Metso Minerals has annual net sales of over 2.6 billion (2007). Personnel number is over 10,000.

The company has 38 manufacturing plants, and 146 sales and service units in 45 countries. Including authorised distributors and agents this gives a local presence in over 100 countries worldwide.

Metso Minerals Inc., Tampere Works manufactures jaw and cone crushers, as well as track-mounted and wheel-mounted crushing and screening plants.

Manufacturing of crushers started in Tampere already in 1921. The factory has produced over 10 000 jaw crushers and over 2000 cone crushers since 1921.

Nowadays there are 25 track-mounted and 10 wheel-mounted models in production. More than 4000 mobile crushing plants have been produced since the launch of the first Lokotrack in 1985.

Metso Lokomo Steels Oy, manufactures foundry castings at the same site.

The Tampere plant employs approximately 1000 employees.

1.2.1 Financial figures

In 2007 Metso Minerals' number of personnel grew strongly in Finland, France, Chile, the United States, India and Russia as a result of growth investments. The increase is shown in the table 2.1 below.

Metso Minerals' net sales rose by 19 percent on the comparison year and totaled EUR 2,607 million. The growth was strongest in the Mining business line. Net sales of the Construction business line also increased clearly, by over 10 percent on the previous year. The Recycling business line's growth was slightly below 10 percent. Metso Minerals' services business grew by 12 percent, and accounted for 40 percent of the net sales (43% in 2006).

The operating profit of Metso Minerals increased to EUR 362.6 million and was 13.9 percent of net sales (EUR 297.7 million and 13.5%). This improvement was mainly due to the strong growth in net sales, offsetting the negative impact of cost increases and the growth in the relative share of project deliveries. All business lines improved their operating profit on the preceding year. It is estimated that the continued strengthening of the Euro decreased Metso Minerals' operating margin for 2007 by almost one percentage point.

The value of orders received by Metso Minerals increased by 16 percent and totaled EUR 3,075 million. The growth in order intake was strong across all business lines. From the beginning of 2007, Metso Minerals applied a new customer-oriented operating model, which had a favorable impact especially on the order intake of the Construction business line. Geographically, the growth was strongest in Eastern Europe, South Africa and China. The order backlog increased by 32 percent on the end of 2006 and was EUR 1,690 million at the end of 2007.

EUR million	2007	2006	Change %
Net sales	2,607	2,199	19
Earnings before interest, tax and amortization (EBITA)	367.1	302.1	22
% of net sales	14.1	13.7	
Operating profit	362.6	297.7	22
% of net sales	13.9	13.5	
Orders received	3,075	2,655	16
Order backlog at end of period	1,690	1,277	32
Personnel at end of period	10,446	9,433	11

Table 1.1

Metso Minerals in relation to Metso Corporation

	2007		2006	
	EUR million	% of orders received	EUR million	% of orders received
Metso Minerals	3,075	44	2,655	46
Metso Corporation	6,965	100	5,705	100

Table 1.2

(Financial statements review... 2008)

1.3 The capital equipment order office

Metso Minerals Inc, Tampere Works capital equipment order office handles all the orders concerning units manufactured in Finland, which includes the factory in Tampere and subcontractors in five different locations. The capital equipment order office handles some of the orders for the factories in Tianjin, China, Sorocaba, Brazil and Columbia, USA.

The orders come from sales and service offices (SSO) from all over the world who sell the machines further to their customers or dealers. The sale through authorised distributors is increasing rapidly in Europe. At the moment there are 13 distributors in Europe, one in Australia, New Zealand and South Africa each. The order office responsibilities include production planning, order handling, logistics and invoicing.

1.3.1. Order Office in the scope of Metso Minerals Inc.

Chart 1.1 below shows the position of Tampere capital equipment order office in the organisation of Construction business line. Global transportation and logistics manager negotiate major logistics decisions and contracts, even though the logistics coordinators at the order office can make individual operational decisions.

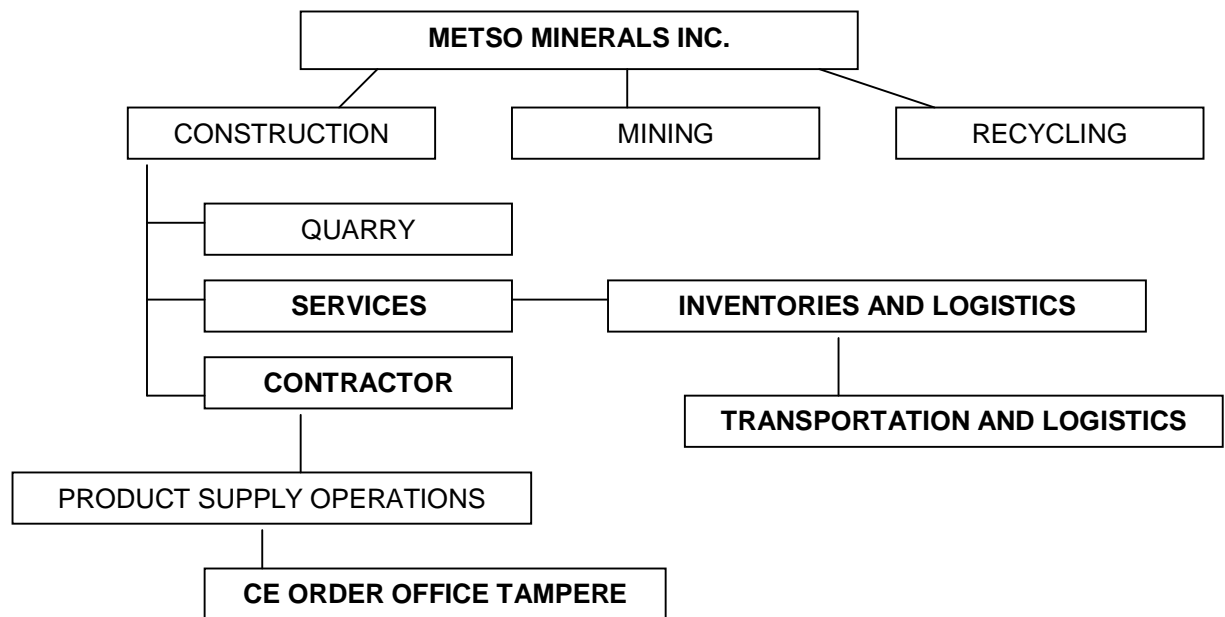


Chart 1.1

2. Logistics

2.1 Important concepts

Logistics can be defined as the integrated management of forecasting, inventory control, transportation, warehousing, order-entry and customer service, and production planning functions. (Supply Chain Management... 1997) The goal of good logistics planning is to have the right thing, at the right place, at the right time.

Transportation management includes planning, implementation, and control of transportation services to achieve organisational goals and objectives. (Logistics / Prentice-Hall, Inc. 2002)

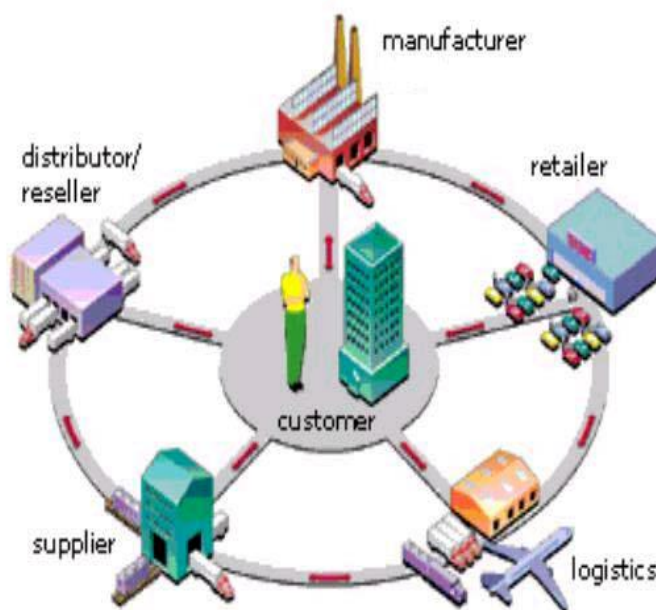
Transportation causes often the highest cost in the whole supply chain, therefore careful transportation planning is extremely important.

Supply chain management is the process of planning, organising, and controlling the flow of materials and services from suppliers to end-users.

This thesis concentrates on the outbound part of supply chain, that is delivery of the ready-made product from the manufacturer to the customer. *Inbound logistics on the other hand* is the movement of products and components into a firm. (Logistics 2002)

Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements. (<http://cscmp.org/AboutCSCMP/Definitions/Definitions.asp>)

Picture 2.1 shows supply chain as a circle. The customer is located in the middle, as without a satisfied customer there is no business for any of the other links of the chain. In the scope of Metso Minerals Inc., the manufacturer is Tampere Works, the distributor is local sales units, retailers could be the dealers, suppliers are the component providers national and even worldwide and customers are the end users.



(Essentials of Supply Chain... 2004)

Picture 2.1

2.2 Transport modes

There are five modes of transportation in general: road, sea, air, rail and pipes. The choice of transport mode depends on the nature of goods, access to carriers, price, speed or transit time, security of goods and government regulations. (Logistics / Prentice-Hall, Inc. 2002)

The benefits of road transport are accessibility and flexibility. The road network in general is wide and well maintained, in the western world anyway, and the goods can be delivered almost at any time depending on national regulations. Road transport however is quite polluting and the volumes per truck are not that high.

Trains can carry higher volumes with less environmental effects compared to trucks. Accessibility is the biggest issue though. The rails can only take the goods as far as they go, so rail is practically always combined with road transport. In the international transport the rail width is the issue. From Finland there is direct rail connection only towards east, to Russia.

Water covers major amount of the earth. Sea transport is possible practically all year round, but the rivers are inaccessible during floods, or dryness, in the north during winter. Oceans have become real highways for transporting goods. The vessels are full wherever they sail and orders for new vessels are keeping docks busy especially in South Korea and China. Some shipping lines have even needed to enlarge their current vessels to amplify their capacity faster.

Due to the nature of goods Metso Minerals Inc. produces, I will ignore the air and pipes modes in this thesis.

Multimodal transport is a combination of two or more transport modes. It has become more cost efficient due to containers that can be transported by vessels, trains or trucks. De-stuffing the containers is time taking, so the possibility to transport the goods to the end destination with only one stuffing / de-stuffing saves time and money. The products delivered by Metso Minerals Inc., capital equipment order office are however usually not suitable for containers due to heavy weight and dimensions.

Transportation costs are often the biggest expense in the logistics chain. Therefore the careful choice of transport mode and precise transport planning can save a lot for the company that has its markets worldwide.

2.2.1 Transport equipment – sea transport

There are several types of vessels for transporting different kinds of cargo. Modern fifth generation container ships can carry up to 8000 TEUs meaning 8000 20 feet standard containers. As mentioned before, the products of Metso Minerals In. Tampere Works are not usually suitable for containers.

RoRo stand for roll on - roll off, stating that the products are driven to the vessel either with a ramp on a vessel or ramp provided by the port. The Lokotrack models introduced later on this thesis are shipped by RoRo vessels when ever possible. Also static colis can be transported by a RoRo vessel by stuffing them on a Roll-Trailer, known as mafi. Bigger lokotrack models quite often include static colis, for example conveyors or a crusher unit.

LoLo, load on – load off vessels need cranes for loading the cargo. The ports or stevedoring companies acting at the ports usually provide the cranes. Static crushers of Metso Minerals Inc., Tampere are often transported as break bulk cargo, stuffed on flat racks, shipped in LoLo vessels. Appendix 1 presents these transport platforms.

2.3 The modal selection at Metso Minerals Inc., Tampere Works

Due to the logistical location of the Tampere factory and the fact that the customers are all over the world, the mode of transportation mostly used is sea. The smaller units are transported by trucks or trailers to European destinations, albeit the trailers quite often use the vessel connection to Germany instead of driving through the Baltic states or Sweden. Also there is no direct access by rail from Finland to elsewhere but Russia and former Soviet Union countries due to difference in track width. In Russia there are destinations where rail is the only possible way of transport due to poor infrastructure. Metso Minerals Inc. has its own department, which handles

orders and deliveries to Russia and former CIS (Commonwealth of Independent States) countries; therefore it will be ignored in this thesis.

2.4 The transportation planning in Metso Minerals

Metso Corporation has a nation wide transport team, which negotiates contracts with service providers. It also offers training and shares information about happenings all over the world that might affect transport process for example strikes or huge sport events. Some contracts are corporate wide, some local. The global transportation and logistics manager can negotiate also international contracts which makes the transportation process easier to control; both ends having their own contacts within the service provider.

In the capital equipment order office the mutual contracts are taken advantage of, but many transport decisions can be made by the logistics coordinators based on long term relationships with service providers. It is important to be able to compare prices and service levels of different companies every once in a while. Contracts make the daily work easier due to predictability of transport price and already known service of the renowned service providers.

3. Incoterms

3.1 Introduction to Incoterms

Incoterms 2000 refers to International Chamber of Commerce (ICC) official rules for the interpretation of trade terms. They define parties' obligations and reduce the risk of legal complications when the terms of a deal are agreed. (Incoterms 2000/ICC Publishing SA)

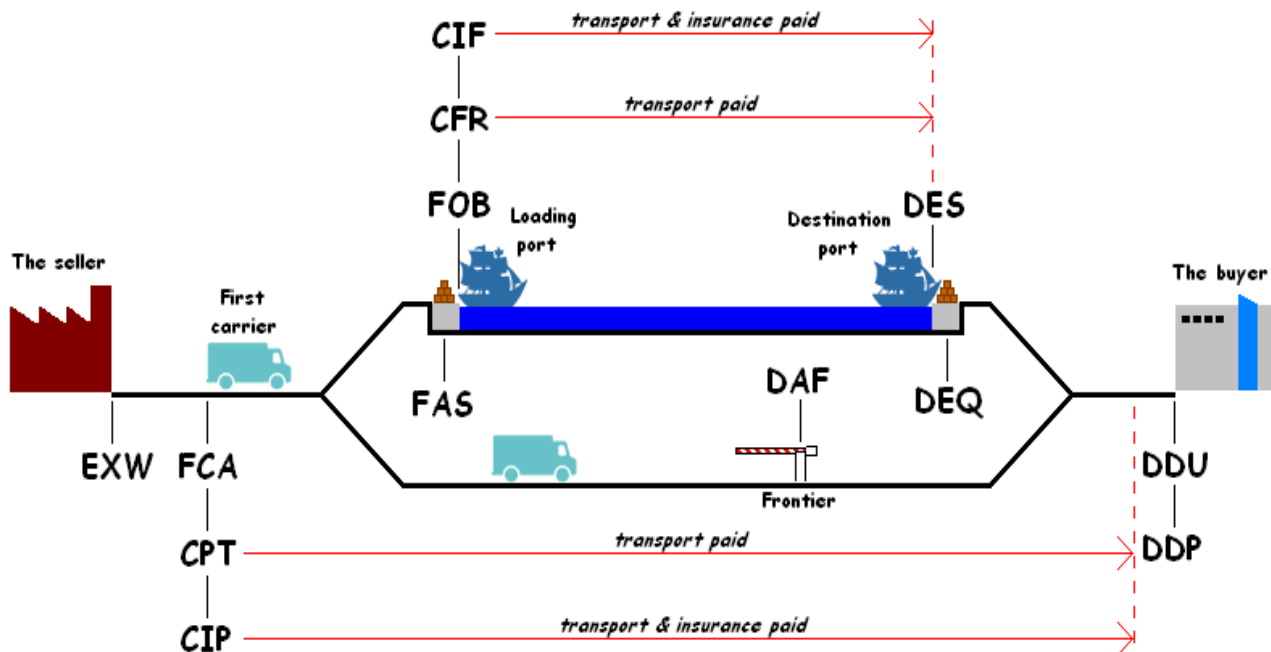
The Incoterms are also used to define the mode of transportation. The table 3.1 indicates the possible modes for each Incoterm.

TRADE TERM	MODE OF TRANSPORT					
	Sea	Road	Rail	Air	Container	Combined transport
EXW	+	+	+	+	+	+
FCA	+	+	+	+	+	+
FAS	+	-	-	-	-	-
FOB	+	-	-	-	-	-
CFR	+	-	-	-	-	-
CIF	+	-	-	-	-	-
CPT	+	+	+	+	+	+
CIP	+	+	+	+	+	+
DAF	-	-	-	-	-	-
DES	+	-	-	-	-	-
DEQ	+	-	-	-	-	-
DDU	+	+	+	+	+	+
DDP	+	+	+	+	+	+

Table 3.1

The Incoterms can also be adapted as agreed by both parties of the deal. It is not necessary to follow each rule of a particular Incoterm when the parties wish to transfer some responsibility from one to another. The decision to alter the basic rule has to be mutual though.

Incoterms 2000: Transfer of risk from the seller to the buyer



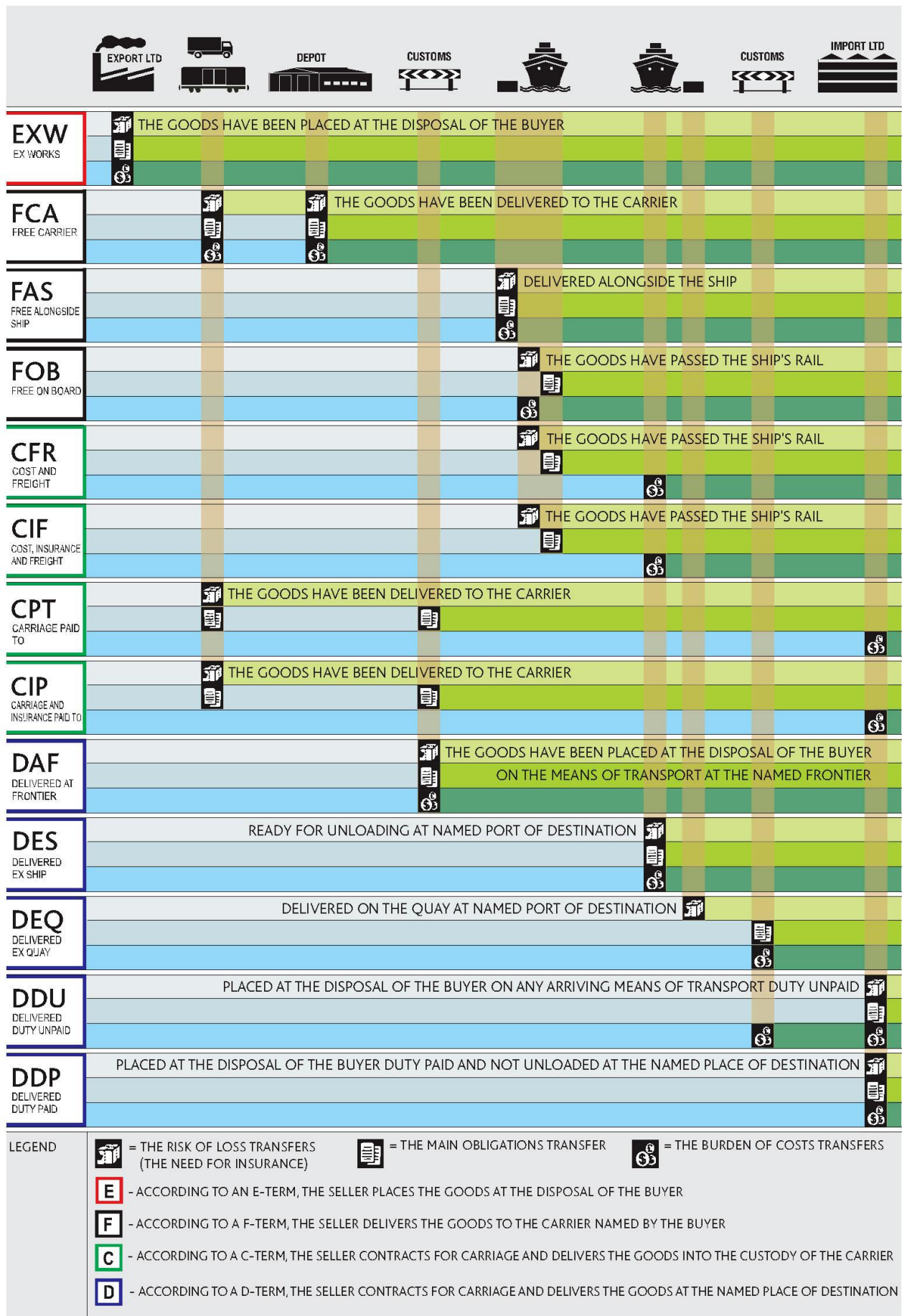
(<http://en.wikipedia.org/wiki/Incoterm>) Picture 3.1

Picture 3.1 shows the transfer of risks in different Incoterms. When the customer is a Metso Minerals sales unit, the transport insurance of the company is always effective. The risk in this case only means who will handle the claim in case something would happen.

When the customer is an authorized dealer or the end customer collects the unit themselves, the insurance obligation depends on the Incoterms in use. That is why it is important to have the correct Incoterm in all transport documents.

The Incoterms handled in this thesis are Ex Works (EXW), Free Carrier (FCA), Free on Board (FOB), Cost and Freight (CFR), Cost Insurance and Freight (CIF), Delivered Ex Quay (DEQ) and Delivered Duty Unpaid (DDU).

The picture 3.2 shows the obligations and responsibilities of the buyer and the seller when using different Incoterms.



(<http://www.if-insurance.com/web/...>)

Picture 3.2

3.2 Incoterms in detail

Ex Works and Free Carrier (...named place)

The seller only needs to put the goods at the disposal of the buyer at the named place. It is of good behavior to give notice of the loading place and possible time well in advance. Seller's responsibilities related to any risks or costs ends when the buyer takes hold of the goods. The buyer collects and loads the goods, and bears all risks and costs after that. If the buyer needs the seller to handle loading and export formalities, the Incoterm is **Free Carrier**. When using EXW or FCA all modes of transport are possible.

Free on Board (...named port of shipment)

The seller must deliver the goods on board of a buyer nominated vessel at the named port of shipment. The seller also takes care of export clearance, his responsibility ends there. The buyer bears all the risks and costs after the goods have passed the ship's rail. Only waterway transport is allowed.

Cost and Freight and Cost, Insurance and freight (...named port of destination)

The seller delivers the goods on board a vessel and pays the costs up to the named port of destination. However, the seller's risks end after the goods have passed the ship's rail at the port of shipment. The buyer must collect the goods from the carrier at the port of destination, and bear all the risks after the goods have been loaded on the vessel. Waterway transport is the only possible mode of transport. In case the seller provides also marine insurance, the Incoterm used is **CIF**.

Delivered Ex Quay (...named port of destination)

The seller delivers the goods up to the quay at the named port of destination. The goods are of the risk of the seller until unloaded from the vessel at the named quay. After unloading, the buyer is responsible for the goods in all ways.

Delivered duty Unpaid (...named place of destination)

The seller places the goods on a mean of transport to the disposal of the buyer at the name destination. The seller bears all risks and the costs of the actual carriage up to the destination. The buyer is responsible for unloading the goods at the named destination and taking care of all the costs occurred by importing the goods. (Incoterms 2000/ICC Publishing SA)

4. Historical data

4.1 Volumes by geographical areas

The volumes of different units and different areas vary year by year. There are areas where large projects are sold every once in a while and areas where the demand is quite constant. In the below pictures the volumes by countries can be seen for all crushers and all lokotricks in 2006 and 2007. These pictures include also the smaller jaw and cone crusher deliveries, which are not special transport deliveries.

The total number of lokotricks delivered in 2006 was approximately xxx based on a table filled by logistics coordinators. As can be seen from table 4.1, USA was the biggest market for lokotricks.

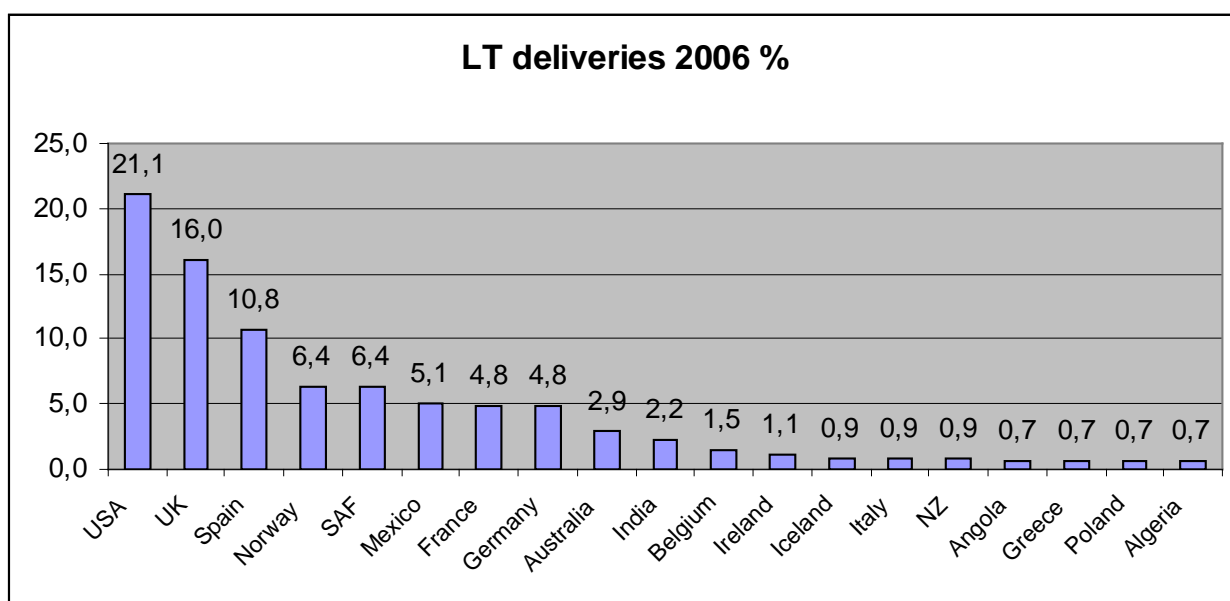


Table 4.1

Most of the lokotricks delivered to United Kingdom are sold through dealer network.

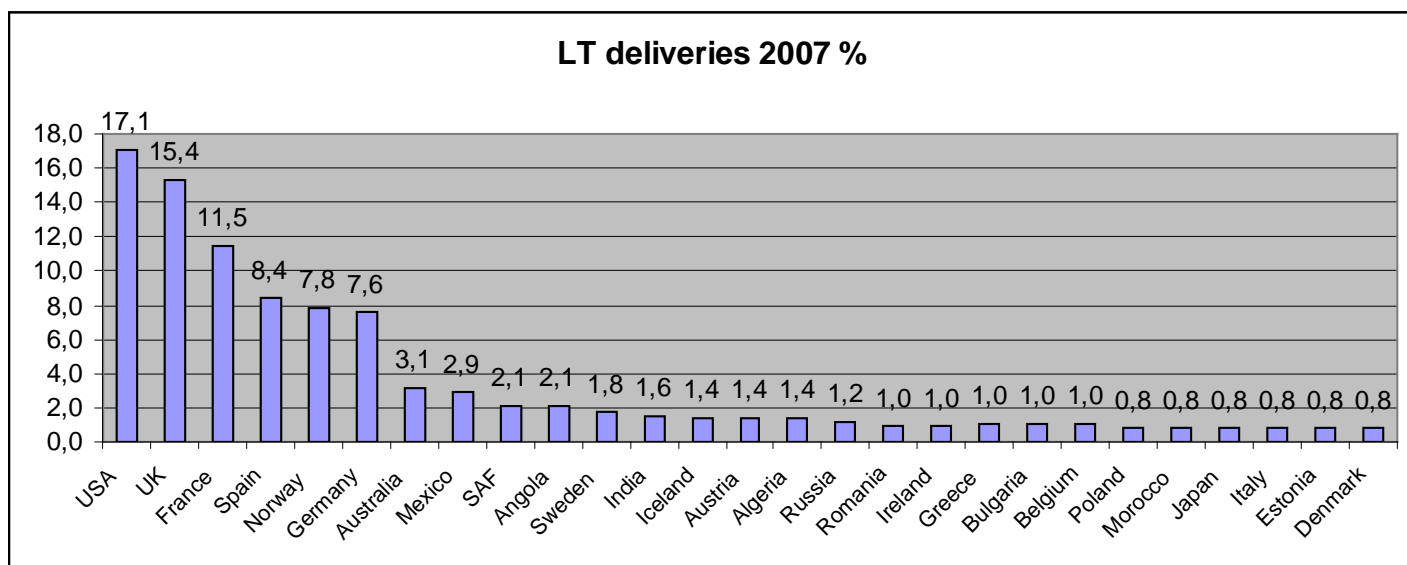


Table 4.2

In 2007 almost 15 % more lokotracks were delivered worldwide. Again USA was number one.

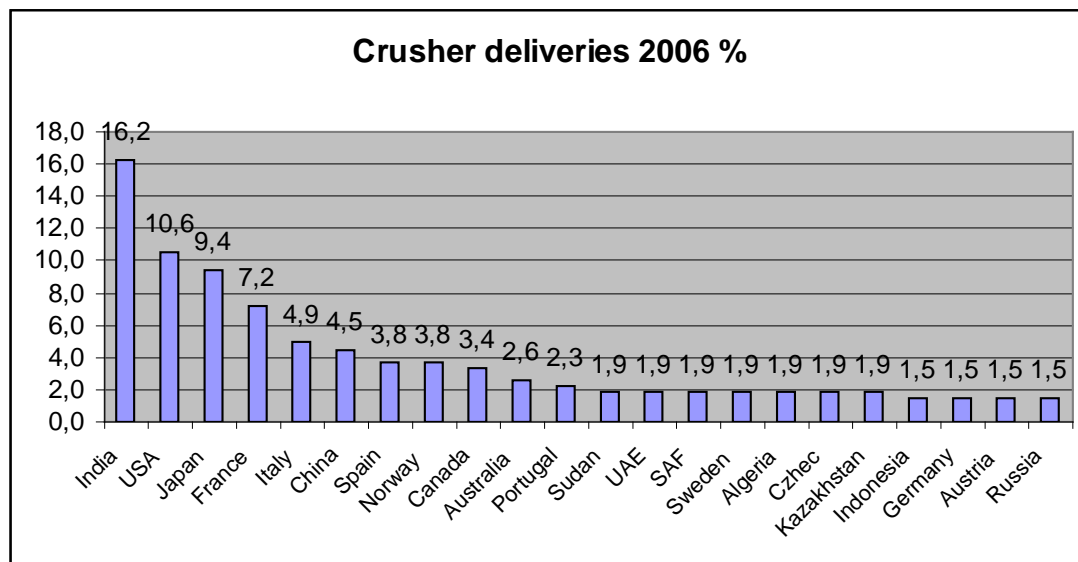


Table 4.3

In 2006 altogether xxx crushers were delivered compared to xxx in 2007. The growth was 5 %. The decrease in the amount of crusher delivered to Japan, is due to the factory in Tianjin, China being able to support the

dealer in that area. Also the factory in Sorocaba has started to supply crushers directly to sales units all over the world.

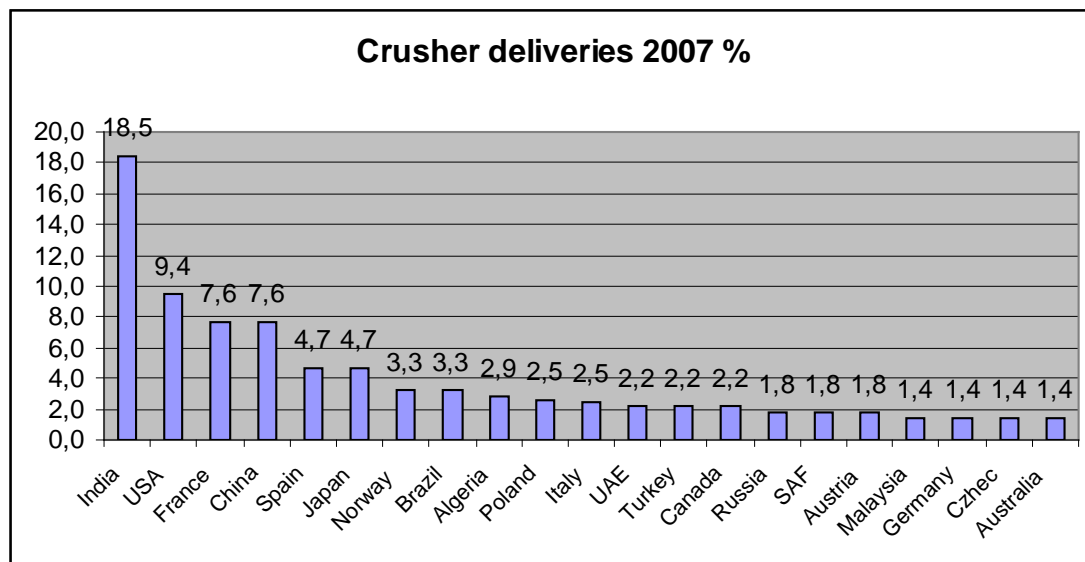


Table 4.4

India is the most important market for jaw crushers, most of that are being installed on nordwheelers manufactured in Bawal factory.

4.2 Volumes of Speedline units in 2007

Speedline is a production line in Tampere factory where following Lokotrack models are assembled

- LT96 / LT96S
- LT106 / LT106S
- LT1213 / LT1213S
- LT200HP

The factory in Columbia, South Carolina has also started producing LT106 for North American markets and LT200HP to global markets. The general transport dimensions are presented in appendix 2.

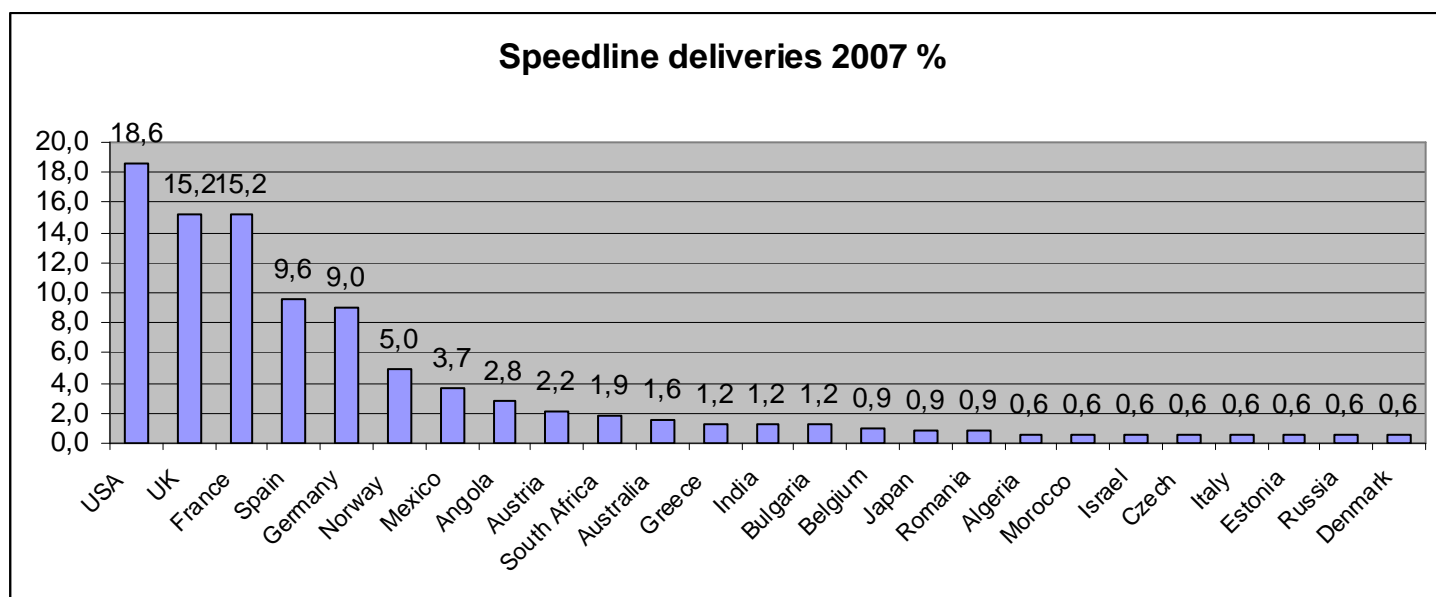


Table 4.5

What these models have in common is, that their transport dimensions are constant, only the weight varies depending on the specification. For these units it is easy to have standard transport prices, and we have price lists for certain areas, those are mentioned in the chapter 6 of this thesis.

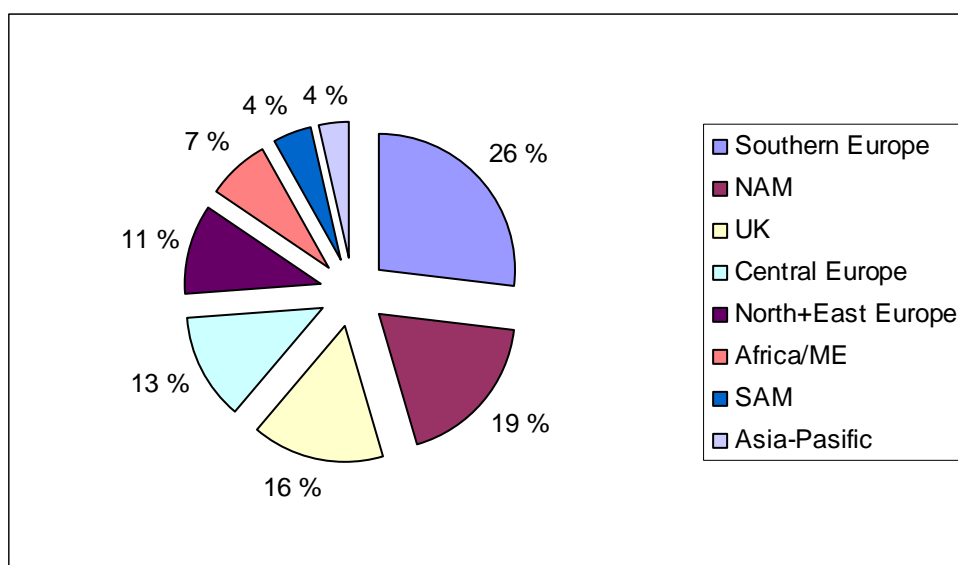


Table 4.6

As can be seen from tables 4.5 and 4.6 above, USA is the biggest individual market area for Speedline products. In UK, France, Germany and Spain most of the speedline units are sold through the dealer network. For

all these high volume areas the order office personnel arrange the transport.

4.3 The volumes by ports

The Finnish ports mostly used are Turku and Rauma. Turku is the port where feeders to Bremerhaven, Germany departure. There are good connections from Bremerhaven to North America and Australia.

Rauma is the departure port for most shipments to Europe. There are weekly departures to Antwerp, Belgium from where units are taken by trailers to Spain and France. Basically all units to France go via Antwerp and also units delivered to Spain on DDU basis. There is also a direct connection from Rauma to port of Santander in Spain. All of the speedline units to UK are also shipped from Rauma to Hull. Lokotrack deliveries to India are often shipped from Rauma to Antwerp and from there further.

Port of Helsinki is used for deliveries to Germany and Hanko is most often the port of loading for units to Mexico. The volumes from other ports like Kotka, and Hamina are very marginal, only few shipments per year. There are good connections from those to Bremerhaven and Tilbury, but they are located so far from Tampere it is often not time effective enough to ship through them.

4.3.1 North America

From Bremerhaven the North American units are shipped to the named destination, in 60-70 % of cases to Baltimore. The Wallenius Wilhelmsen routes can be seen in the below map.

In 2007 20% were shipped to West Coast ports Tacoma and Port Hueneme together.



www.2wglobal.com Map 4.1

4.3.2 Mexico

The shipments to Mexico often sail from Hanko to Zeebrugge and from Zeebrugge further to Veracruz. A connection Turku via Bremerhaven to Veracruz is also possible.

4.3.3 Australia

Also units to Australia are often shipped from Turku to Bremerhaven. From there 40 % of the units to Australia were shipped to Brisbane in 2007, 25% to Sydney and 20% to Fremantle. In 2006 the number of units to Brisbane and Sydney were the same, both covering approximately 40%.

4.3.4.India

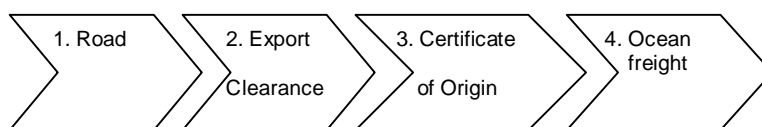
The units to India have been shipped mostly from Hamburg to Nhava Sheva (53% in 2007). Other destinations in India are Mumbai and Chennai, outside India Singapore (20%).

5. The current transport process

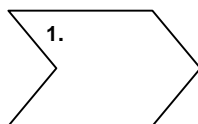
5.1 Description

In this part the current transport processes are explained in great detail.

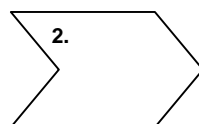
5.1.1 India C105/C106 CFR POD



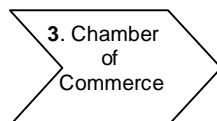
The whole transport process is practically always taken care by a forwarder in Germany. They have delivered dozens of C105 crushers for Metso Minerals and the process goes well, since there is no need to explain all the basic things every time. The C106 crushers to India are always with same dimensions and weights, so we usually have a firm price for some months at a time.



1. The crushers are collected from the factory by trucks of which drives them to Hamburg.



2. A forwarder having office in Tampere does the export clearance. All we need to do is send a commercial invoice by fax or email, and they send us the electronic export document by email link. The system requires information of the truck and place where the units cross the border of EU.



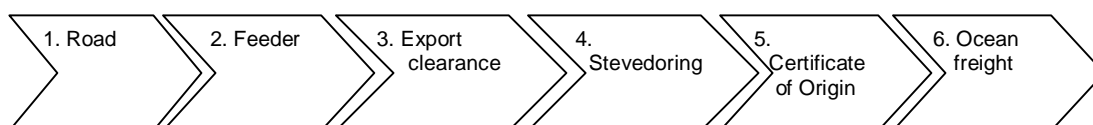
3. India requires a certificate of origin and it issued by Tampere chamber of commerce. That is usually done within a week after the crusher has been collected.



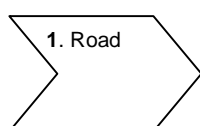
4. The forwarder arranges the ocean freight and the shipping line depends on vessel availability. The shipping line issues the Bill of Lading according to instructions given by the customer. The forwarder is always in between, sending us drafts before issuing the originals.

Since the sales with Metso Minerals (Singapore) Pvt. Ltd. are closed with Ex Works price, we invoice the actual costs from them. MM Inc.Tampere Works issues invoices and packing lists as well.

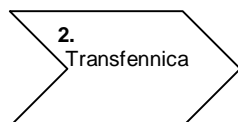
5.1.2 India Lokotricks (LT106 and LT1100) CIF / CFR POD



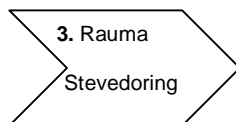
The organiser of transport varies. Usually it is a German or, Belgian forwarder. In both cases the units are shipped from the Port of Rauma via Antwerp to the destination. These two Lokotrack types are sold and transported together.



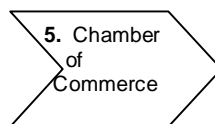
1. The transport as whole is organised by the forwarder we choose depending on the prices and schedules they can offer. When shipping via Rauma, the forwarder contacts Rauma Stevedoring and they inform us who will collect the unit. Usually it is Kuljetus Torsti Järvenpää or Havator Transport.



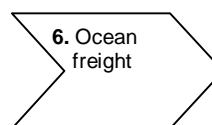
2. The feeder vessel is Transfennica from Rauma to Antwerp.



3. and 4. Rauma Stevedoring takes care of export clearance, using a commercial invoice. They are also in charge of stevedoring activities at the Port of Rauma.



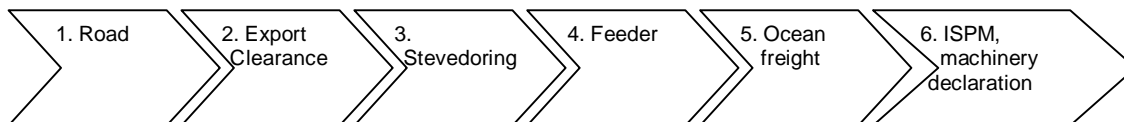
5. Tampere Chamber of Commerce issues certificate of Origin.



6. The forwarder books space from an ocean vessel according to vessel availability. Therefore the shipping line varies. The shipping line issues the Bill of Lading which is forwarded to us by the forwarder.

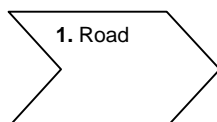
Currently the LT106s and LT1100s are sold CIF so the freight price is already included in the sales price. That is about to change, due to big variance of the freight costs.

5.1.3 Australia CFR POD

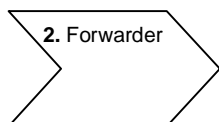


The transport inquiries are made ex Turku up to CFR Port of destination directly from two different shipping lines or their representatives.

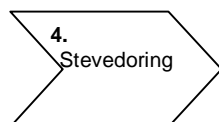
Order Office takes care of ISPM declaration, a document stating that the wooden packing material is free of any insects. machinery declaration and other documentation possibly needed.



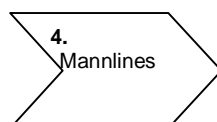
1. Order office books the road transport which is usually handled by Kuljetus T. Järvenpää, or Havator Transport, when the unit weighs over 56 tons.



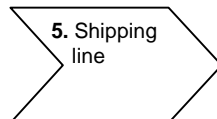
2. The issuer of the export clearance depends on which shipping line is chosen.



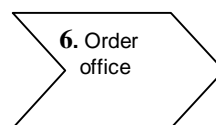
3. There is a contract for handling the stevedoring activities in the departing port.



4. The feeder vessel is usually Mannlines ex Turku in both cases.

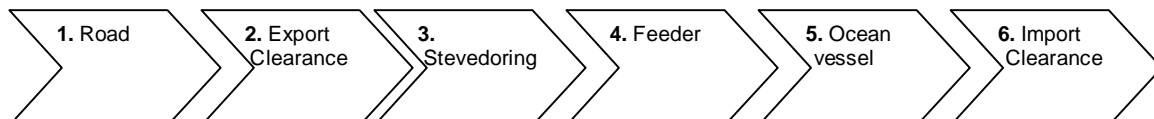


5. The shipping line issues the Bill of Lading. The difference is that the customer needs an original B/L to get hold of the unit, while with sea waybill a copy is sufficient.

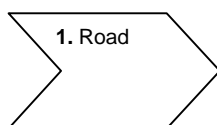


6. Australian authorities require a certificate that the packing materials are clean from insects and worms, and that the machines are new and unused and contain no soil. Order office issue these documents.

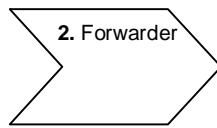
5.1.4 North America CFR POD



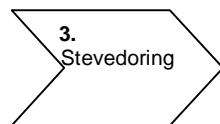
We have a Shipping Line contract regarding ocean transport to North America. They charge us ex FOB Turku.



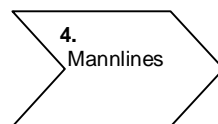
1. Road transport is taken care by Kuljetus T.Järvenpää with most units, the units weighing over 56 tons, the road transport is carried out by Havator Transport.



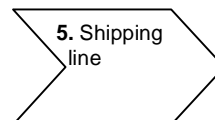
2. A Tampere based forwarder does the export clearance for units booked via the shipping line.



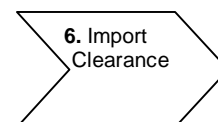
3. Since we have contract with a stevedoring company, they take care of the stevedoring at the port of Turku.



4. The feeder is Mannlines vessel Estraden from Turku to Bremerhaven.

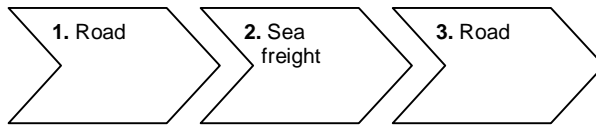


5. Ocean vessel is one of the contract shipping line's, which have regular routes from Bremerhaven to several ports in North America. The ports can be seen in Map 5.1 in part 5.3.1 of this thesis. The shipping line also issues the sea waybill.



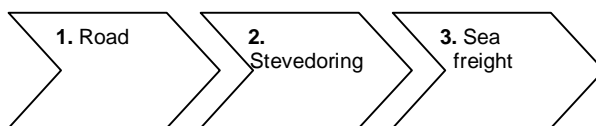
6. Import clearance in USA is organised by Schenker International and in Canada by Livingstone International.

5.1.5 German dealers DDU

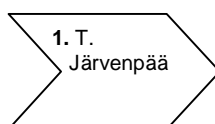


The entire transport process is carried out by German forwarder. They often use Finnlines vessels from Hanko or Helsinki to Travemuende. They also apply for road permits in Germany, which might take up to two weeks; therefore early booking is essential.

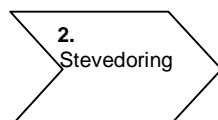
5.1.6 German dealers DEQ Travemuende



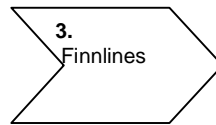
Some of the dealers in Germany prefer to let their customers collect the units from the Port of Travemuende.



1. The road transport in Finland is booked from T. Järvenpää. He drives the unit to the Port, usually Helsinki.

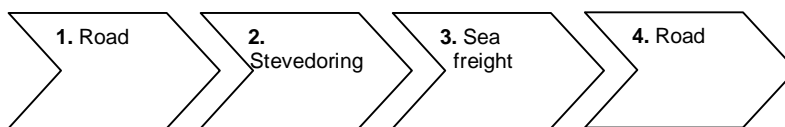


2. The contract stevedoring company handles stevedoring at the port. They also issue the Liner waybill, which allows the customer to collect the unit.



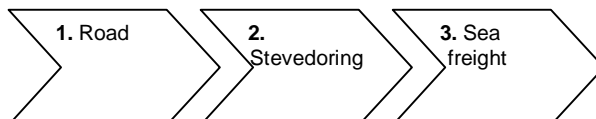
3. The vessel is booked directly from the shipping line, whom with we have a yearly contract price, only BAF (Bunker Adjusted Factor) and Marpol vary.

5.1.7 Spain DDU



The transport as whole is ordered from a Belgian forwarder, based in Antwerp. They ship the unit from Rauma to Antwerp and deliver it by trailer or lowloader from Antwerp to the destination in Spain. The process is the same whether the customer is Metso Minerals SSO or authorised dealer Emil Import.

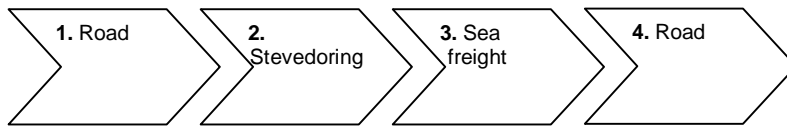
5.1.8 Spain CFR



The whole process is dealt with a company in Rauma. We have a yearly price list with them from Rauma to Santander.

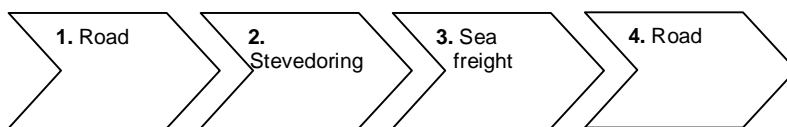
If a customer wants the unit to an other port, for example Bilbao, the transport may be organised by shipping line directly.

5.1.9 France dealers DDU



The transport as whole is ordered from a forwarder in Antwerp, Belgium. They ship the unit from Rauma to Antwerp and deliver it by trailer or lowloader from Antwerp to the destination in France.

5.1.10 UK dealers DDU



The transport as whole is ordered from a forwarder in UK. They ship the unit from Rauma to Tilbury or Hanko to Hull and deliver it by trailer or lowloader from the port to the destination. When shipping via Rauma, the road transport is arranged by a forwarder in Rauma, when via Hanko, a local Hanko based company collects the units from the factory.

5.2 Delivery terms used country by country

Table 5.1 shows how the shipment responsibilities have been divided between the customers and order office in the past. There are customers for whom Incoterms used are constant, for some order office arranges transport only occasionally. EXW and FCA are in the same category, because in some cases the order office takes care of the export clearance and loading of the goods even though the goods are sold on EXW bases.

Country / Customer	EXW/FCA	DDU	DEQ	CFR	CIF
Barloworld / South Africa	X				
DGM / Denmark	X	X	X		
Emil Import / Spain		X			
French dealers		X			
German dealers		X	X		
Greek dealers	X			X	
UK dealers		X			
Hitachi / Japan	X				
Mimico / New Zealand				X	
Screenmasters / Australia				X	
MM Australia				X	X
MM Austria	X				
MM Brazil	X				
MM Chile	X			X	
MM Czech Republic	X	X			
MM France	X				
MM Germany	X	X			
MM Hong Kong/China				X	
MM India				X	X
MM Italy	X	X			
MM Japan				X	X
MM Mexico	X				
MM Netherlands	X	X			
MM Norway	X				
MM Poland	X				
MM Portugal	X			X	
MM South Africa	X				
MM Spain		X		X	
MM Sweden	X	X		X	
MM Turkey / Turkish dealers	X				X
MM UK	X				
MM USA				X	

Table 5.1

As the table shows, most of the dealers require some assistance in the transport process.

6. Contract base and allocation of costs

6.1 Current contracts and price lists

Metso Minerals Inc., Tampere Works has currently few contracts and additionally some yearly price list to support the project transports. The price lists are for areas where mostly Speedline models are sold on regular bases.

Below the contracts and price lists and their coverage are listed.

6.2 The cost structure

		USA	AUSTRALIA
LT106	road	8,61	0,03
	export clearance	0,71	0,29
	stevedoring	2,38	1,55
	FOB	11,71	5,18
	ocean	88,29	94,82
LT3054	road	18,53	7,21
	export clearance	0,36	0,19
	stevedoring	2,29	1,09
	FOB	21,17	7,21
	ocean	78,83	91,51

Table 6.1

The allocation of costs in the transport process in percentages is shown in table 6.1. I have used two different Lokotrack models and destinations as examples based on previous deliveries. In all four cases the delivery term is CFR, so they include costs from Tampere up to the port of destination. The costs are not fully comparable due to different specifications of the units, that is different transport weights and dimensions. The stevedoring costs in Finland also vary in different ports.

It is obvious that the cost of ocean freight is higher to Australia than to North America. The reasons are longer distance and the contract there is to North American markets. The proportion of FOB costs is relatively higher in deliveries to North America due to that.

7. The development needs

7.1 The issues in the current process

The biggest issue in the transport process in general is lack of rules between Tampere order office and the customers. Delivering spare parts from Tampere Distribution Centre along with the units also adds the workload, sometimes quite suddenly.

The lack of rules causes customers to collect their units with very short notice, or changing the delivery address after the unit has been collected. That may cause problems along the way, when the road permits are no longer valid and applying for new permits may take time and causes additional costs. Short notice also adds stress and working in a rush may lead to mistakes, which sometimes end up being expensive.

Inquiring for transport prices and schedules is time taking and comparison is not always easy. There can be differences in terms, currencies and in the parameter used to calculate freight costs. Lack of time to concentrate on these issues causes delays in booking transports, which may delay the delivery even more.

In many current processes there are too many parties involved. Even though the process as such works well, for example to North America, too many parties causes many invoices, and handling those invoices is time taking.

7.2 *Proposals to solve issues*

There are already some development plans in process. There will be a carrier management contract with a global forwarder to North American customers. The process as such will not change that much, the road transport, stevedoring and ocean transport organisers will remain the same, but the forwarder will hold the strings, and will be the only party to invoice Metso Minerals Inc., Tampere Works.

The idea is to find suitable service providers to handle the whole process to certain market areas, like India and Australia. For those areas there are no clear processes or companies we could always trust to be able to give good price and service. When the most commonly used routes are handled more simple, there will be more time to concentrate in challenging projects.

For the co-operation between order office and customers, some rules will be introduced. The productisation of Incoterms most commonly used will be the most important factor in that area. There will also be written rules for transport for Ex Works cases as well like; valid road permits, suitable transport equipment, information of the collection date and special requirements of the dismantling of the unit must be informed in advance.

There are always ways to do things better and more efficient in order to offer better customer service. When things go smoothly, both customers and personnel are more satisfied with the co-operation.

Summary

Metso Minerals forms part of Metso Corporation along with Metso Paper and Metso Automation. Metso Minerals Inc., Tampere Works as part of the construction business line, is the unit manufacturing mobile crushing plants and stationary crushers for market area covering almost the entire world.

Supply chain management is a logistics process covering the whole chain from planning the process to delivering the product to an end customer. Outbound logistics is the part of transportation when the readymade product is actually been delivered.

There are five modes of transportation; road, sea, air, rail and pipes. Sea is the most cost-effective, though time-taking mode, and is the main mode used at Metso Minerals Inc., Tampere Works.

Incoterms are official rules for international trade defined by the International Chamber of Commerce. They are used to define parties' rights and obligations and to define the transport mode.

North America is the biggest individual market area for drivable lokotracks. Almost 20 percent of the lokotracks delivered in 2007 went to North American markets. India and Asia in general were driving the static crusher markets on the same year.

The transport process at Metso Minerals Inc., Tampere Works is quite scattered at the moment. Regarding deliveries to other continents there is proper contract only to North America, other areas are handled by several forwarders and the booking process is often time taking.

What needs to be done, is gathering more precise information of the shipments in the past and listing the positive and negative aspects of each service provider. Based on that experience some proper partners in cooperation may be found. It has been noticed that the biggest, best known forwarders may not be able to provide the best service for the order office or to the customers. Therefore it is highly important for the persons at the operative level to be able to affect on the selection of the future partners.

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Appendix 1

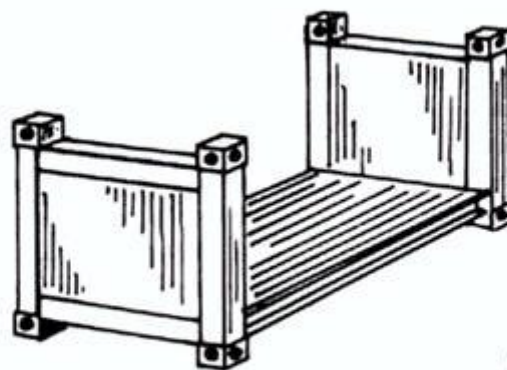
Maritime transport platforms



(<http://www.2wglobal.com/www/productsServices/staticCargoAndEquipment...>)

Roll trailer is used to shipping of heavy and large static cargo in RoRo vessels. The sizes vary from 20 to 80 feet. Also tailor-made Roll trailers can be made when needed. The capacity of the biggest roll trailers is up to 120 tons.

20' Flat Rack Container



Payload: 39, 160 lbs

Interior
L: 19' 6"
W: 7' 5"
H: 6' 9³/₄"

(www.oceanairlogistics.com/containers_20ftflatrack.html)

Flat Racks are used in maritime transport for static cargo. In practice they are container platforms without sides and with open top. The ends are usually removable, so the piece can also be over dimensional. In general there are 20 and 40 feet flat racks. Compared to roll trailers, the capacity is quite low, even on 40' flat rack only about 26 tons.

Appendix 2

General transport dimensions of Speedline units

Machine	Dimensions m			Weight / kg
	L	W	H	
LT96 (H8-9) short	12,45	2,50	3,10	29000
LT96S	14,80	2,50	3,10	34000
LT1110 (H10-10)	14,40	2,50	3,40	32000
LT1110S	17,70	2,75	3,40	39300
conveyor (static)	9,36	1,52	1,65	1300
LT200HP	16,75	3,00	3,40	34000
LT200HPS	18,97	3,00	3,40	40000
LT106 (H10-14) long	15,25	2,80	3,40	41500
LT106S	17,35	2,80	3,40	46000
LT1213 short (H12-9)	15,60	3,00	3,60	41000
LT1213S	18,10	3,00	3,60	52000