# Selling Sheet Pilings on the Dutch Hydraulic Engineering Market

Bachelor Thesis

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WOODGUIDE

PREMIUM WOOD PRODUCTS

Hogeschool VAN HALL LARENSTEIN

ONDERDEEL VAN WAGENINGEN UR

Hochschule für Forstwirtschaft Rottenburg

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## Bachelor Thesis

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## Preface

This market study was carried out on behalf of Dold Holzwerke GmbH between May and December of 2010. Dold has been interested in entering the Dutch hydraulic engineering market for quite some time and decided to have the preparatory research done in the form of bachelor thesis. Having studied in the Netherlands myself and having gained previous related experience, I was lucky to receive this assignment.

Several people facilitated my work enormously. Fredrick toe Laer from the Woodguide agency provided insight, contacts, lots of feedback and a very comfortable and productive working environment. His advice always gave me a place to start. I would like to thank him very much for the time and energy he has spent on me.

Matthias Huber from Dold provided me with this assignment, feedback and an internship coupled with the thesis. His help was invaluable and is deeply appreciated. I would also like to wholeheartedly thank Guy Geudens, who supervised the thesis.

Of course, people from all interviewed companies took their time to answer questions and to share relevant data. At this point in time, the economy is slowly picking up again from the crisis that started in 2008, and people have been very nervous about their personal and their company‘s future. Those who took their time to talk to a student rather than brush aside “unnecessary” things like that deserve special gratitude. Thank you!

Michael Klink

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## Abstract

Dold, a medium-sized sawmill in south-western Germany, wishes to explore new business opportunities. One possibility is to enter the Dutch hydraulic engineering market and sell softwood sheet pilings used to fortify rivers and canals. Dold likes to cover niche markets that ask for special dimensions, and sheet pilings are such a product. The purpose of this thesis is to provide a market study that outlines risks and opportunities for a possible market entry.

Interviews with research and certification institutes, potential customers, traders and administrative bodies were conducted in order to develop an overview of this market. They were asked about its specificities and size, grading rules, certification, legal aspects, typical dimensions, substitute products, customer relationships and their assessment of future developments. Their analysis and key statements provided core elements for this thesis.

In general, most participants found this specific market to be rather unpredictable and difficult to evaluate. There is, however, a long-term steady demand for wooden sheet pilings. The market for sheet pilings in hydraulic engineering is estimated at about 20,000 cubic meters of wood per year, about 20% of which are softwood.

Legal provisions define quality and certification of sheet piling products. With regard to quality, a new EU norm unifies all national grading rules and stipulates that the German sorting grades of sawn timber S7, S10 and S13 may be directly translated into the strength classes C16, C24 and C30 respectively. The desired classes for sheet pilings are C18 and C24. Dold is PEFC-certified and thus eligible for exports to the Netherlands which endorses the German PEFC label under the Dutch Public Procurement Policy.

Though one of the findings was that a wide range of dimensions is important, there is a trend towards certain sizes. Some of them should be used by Dold in order to make best use of the special planing tool that must be acquired specifically for this product.

Although sheet piling constructions can also be made of steel or concrete, both are different in nature and use and do not endanger the share of timber.

Based on a careful evaluation and assessment of the market situation and technical aspects, this thesis recommends Dold to further pursue the project of selling sheet pilings in the Netherlands.

# 1 Introduction

## 1.1 Company description

Dold started as a modest Black Forest framesaw sawmill over a hundred years ago. It has slowly grown ever since to a business of respectable size, selling to customers all over Europe and sometimes even further away. There is an additional manufacturing division in Estonia, producing one- and three layer solid wood panels. Today, the whole site in Buchenbach comprises a sawmill, a planing mill, a multilayer board production facility and an energy/wood pellet factory. The annual cut is around 350,000 cubic meters of roundwood, consisting of about 75% Norway spruce and 25% Silver fir. All of Dold‘s logs come from a 100 km radius around the sawmill. Dold is CE and PEFC certified.

A special perk of Dold is its strategy to cover niche markets, serving customers who demand sizes and quantities that they cannot get from other sawmills, especially Nordic ones. Any sizes from 20x30x1300 mm to 300x300x12000 mm in any quantity from half a parcel to several truckloads can be delivered. This outstanding flexibility requires a lot of effort, but ensures Dold to survive successfully in an ever growing competition.


*Figure 1: Dold Holzwerke GmbH*

## 1.2 Dutch hydraulic engineering market

It is commonly known that the Netherlands have lots of rivers and waterways. In comparison, Germany has a total area of about 357,000 square kilometers of which 8,350 km$^2$ are covered with water[1]. The Netherlands, a much smaller country (approx. 41,500 km$^2$),

1 CIA World Factbook. https://www.cia.gov/library/publications/the-world-factbook/geos/gm.html

has almost as much water surface (7,650 km$^2$)[2]. By proportion, that is about eight times more than in Germany. The Dutch water boards (Waterschappen in Dutch) are responsible for 20,000 km of rivers and waterways[3]. Waterschappen are the oldest government bodies in the Netherlands and are responsible for flood control, water management and maintenance of waterways. In addition, there is a second authority in the form of Rijkswaterstaat that maintains the bigger water control structures as well as the large rivers such as the Rhine. As 25% of the country are below sea level and two thirds threatened by flooding, fighting against flooding has always been essential in Dutch history.

Those many rivers and canals sometimes make fortifications necessary. The Netherlands therefore have great need of fortifications that are usually made from steel, concrete or, most often, wood. While there are several ways to construct this kind of protection, the most common one is the sheet piling or damwand in Dutch. They generally consist of thick wooden boards of usually 3-6 meter length. Figure 2 shows a picture of a sheet piling wall made from tropical timber. Notice that this particular wall is reinforced by steel bars. This is sometimes necessary, but has no further impact on the sheet piling manufacturer.

*Figure 2: Tropical timber sheet piling wall*[4]

2 CIA World Factbook. https://www.cia.gov/library/publications/the-world-factbook/geos/nl.html
3 Interview with Waterschap
4 Image from Prins Houthandel

In order to ensure continuous protection, the Netherlands will always need such fortification and associated material, be it for new constructions or for repairing existing ones.

### 1.3 Purpose and aim of the study

The purpose of this study is to find out whether Dold should start selling wooden sheet pilings for hydraulic engineering works in the Netherlands. The aim is to assess the associated risks, opportunities and the market as a whole in order to provide a recommendation.

### 1.4 Research questions

**Main question**

Is it feasible and economically beneficial for a Germany based sawmill (Dold) to introduce timber sheet pilings for hydraulic engineering purposes to the Dutch market?

**Subquestions:**

• What is the legal framework for products used in this industry?

• What kind of products exist already? What material / species and dimensions are used?

• What are the advantages and disadvantages of silver fir for this product?

• What does the market look like? Who are the customers and competitors? How do distribution channels work?

• Does the market bear enough potential for Dold? How could this potential develop within the next few years?

• If the decision to enter into this market is positive, which strategy should be followed?

## 2 Methodology

There is hardly any written information about wooden sheet pilings available. Therefore, the information compiled in this thesis largely relies on personal interviews conducted with a significant number of experts in this field. These experts (see list of references) ranged from a research and certification institute, end users like water administrations, potential customers, tradesmen and the producer himself. All these experts have been

consulted in order to get a fully fledged picture of this industry. Additionally, some subject-specific literature was used for information about sheet pilings and Silver fir.

• SKH was chosen because it certifies companies by the voluntary KOMO© standard and employs very knowledgeable specialists.
• Rijkswaterstaat and Waterschap are the two administrative bodies in the Netherlands responsible for safety and maintenance of waterways. They will not buy sheet pilings directly, but provide useful data about the market and its development.

Since this study focuses on the question whether a specific product can be sold in a clearly defined market, a selection of potential customers was asked about their demands and wishes. They were chosen because they are either big and important suppliers of the final product or they share close connections with Woodguide (or both). These characteristics make those customers desirable for Dold to do business with.

• Diderich Houtimport brought up the whole topic and has been a close partner to Woodguide for many years.
• Stiho is a large wood trading merchant which sometimes deals with sheet pilings and is well connected to Woodguide.
• Foreco has a wide product range of sheet pilings for hydraulic engineering purposes.
• Van der Sijde is a close partner of Diderich Houtimport and deals with sheet pilings as well.
• Woodguide: a pure selling agency. Has plenty of market knowledge already and helped putting pieces of information into a larger picture. Dold‘s sales partner in the Netherlands.

Several other contacted companies or institutions did not reply to inquiries or were not in a position to make appointments. These include:

• Sneek: did not reply
• Reefhout: did not feel responsible because they only sell hardwood sheet pilings
• Van Swaay: was of the opinion that they were not able to provide useful information
• The administrations of the cities of Arnhem, Amsterdam, Purmerend and Alkmaar: no appointments could be made. They could have provided additional information since they issue the public tenders for sheet piling construction works.
Overall, the information gathered appears to be representative and viable. The great diversity among interviewees required a flexible approach and questionnaire[1].

1 See annex A: Questionnaire

# 3 Product

## 3.1 Specifications

There are a lot of different dimensions for softwood sheet pilings used in hydraulic engineering. These dimensions are independent from species. Figure 3 demonstrates the three directions of any timber board.

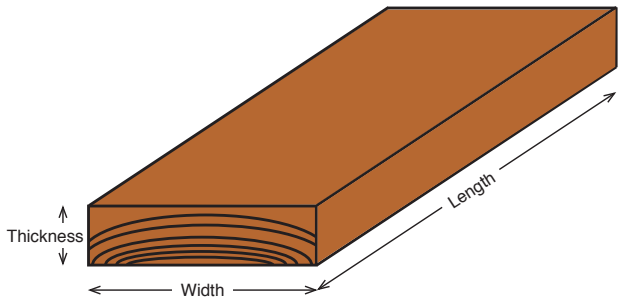


*Figure 3: Dimensions of a board*

Table 1 shows common dimensions of sheet pilings as offered by companies.

| Length [m] | Thickness [mm] | | | | | | |
|---|---|---|---|---|---|---|---|
| | 30 | 40 | 50 | 60 | 70 | 80 | 100 |
| 1.00 | | | | | | | |
| 1.25 | | | | | | | |
| 2.00 | | | | | | | |
| 2.50 | | V | | | | | |
| 3.00 | S | FSV | F | F | F | F | |
| 3.50 | S | S | F | F | F | F | |
| 4.00 | S | SV | FSV | FSV | F | F | |
| 4.50 | | | FS | F | F | F | |
| 5.00 | | | FSV | FSV | F | F | |
| 5.50 | | | F | F | F | F | |
| 6.00 | | | F | FSV | F | F | |
| | | | | | | | |
| | | | | | | | |
| Legend | | | | | | | |
| | Common dimensions as suggested by "Damwandconstructies" | | | | | | |
| F | Offered by Foreco | | | | | | |
| S | Offered by Sneek | | | | | | |
| V | Offered by Van Swaay | | | | | | |

*Table 1: Obtainable damwand dimensions*

The width is flexible. It is obvious that while there are plenty of sizes, some of them are offered by almost all suppliers, making them more frequently used than others. These sizes are 40x3000, 40x4000, 50x4000, 50x5000, 60x4000, 60x5000 and 60x6000 mm.

Figure 4 shows the proportions of the product more specifically.

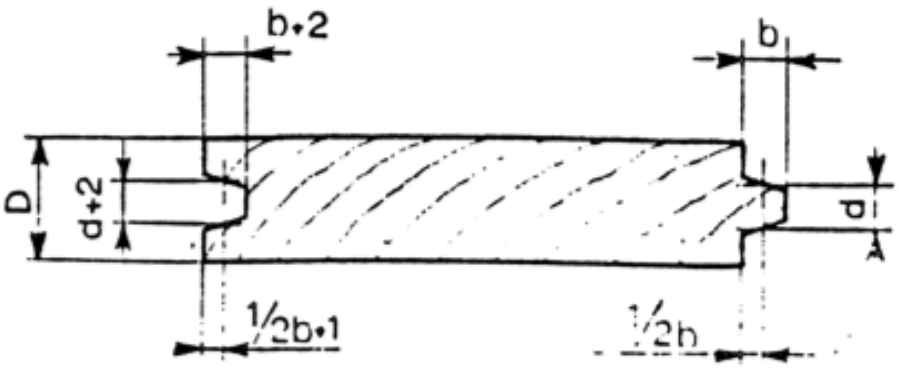


*Figure 4: Damwand proportions by SKH*

These numbers are set by SKH for the KOMO© certificate[1]. Even though only Foreco and Van Swaay have this certificate, it is advisable to stick to the dimensions set by SKH in order to provide a safe and legal product.

| Thickness D | Tongue width b | Tongue thickness d |
|---|---|---|
| 30 | 11 | 10 |
| 40 | 13 | 13 |
| 50 | 17 | 16 |
| 60 | 18 | 19 |
| 70 | 22 | 23 |
| 80 | 24 | 26 |
| 90 | 24 | 29 |
| 100 | 24 | 33 |
| 110 | 24 | 36 |
| 120 | 24 | 39 |

*Figure 5: According numbers to the proportions in figure 4*

1 BRL 2905: Evaluation of European softwood species for hydraulic engineering purposes

In addition, the commonly trapezoid tongue and groove deserve special attention. While it is possible to offer sheet pilings with angular tongue and groove[1], it is important to keep in mind how sheet pilings are being brought into the earth (see figure 8). Angular tongue and groove will cause the sheet pilings to topple easily, making the construction process more difficult. It is therefore a lot more common to use a trapezoid shape as seen in Figure 6.

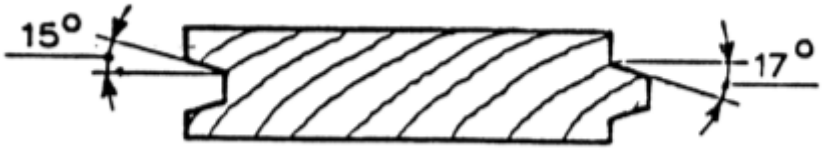


*Figure 6: Trapezoid tongue and groove*

A special feature of sheet pilings is the seeker. This is a piece of timber at the bottom of the board that is sawn off so the sheet piling may be rammed into the ground in very close proximity to the adjacent sheet piling. Figure 7 demonstrates what the seeker looks like. Figure 8 shows how it is used during construction. According to SKH, the length of the seeker should be three times the width of the board[2].

*Figure 7: Seeker*

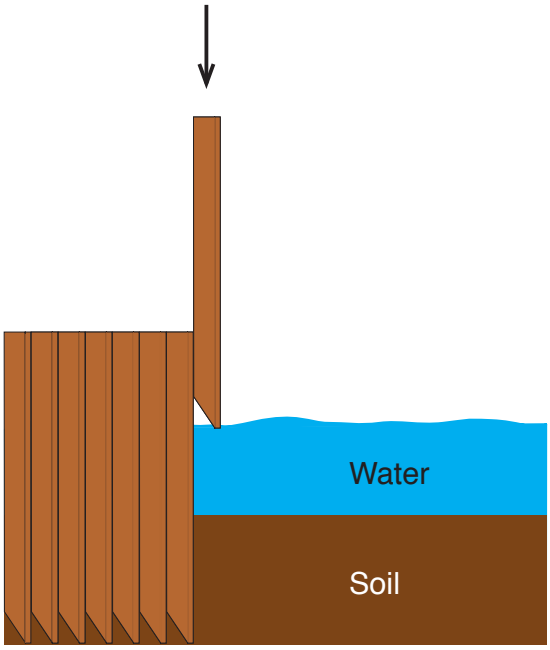


*Figure 8: Seeker with construction example*

1 BRL 2905, p. 5
2 BRL 2905, p. 6

### 3.2 Legal aspects

#### 3.2.1 Quality

Quality requirements for structural use were previously regulated in NEN 5466[1]. This Dutch norm defined four types of quality, ranging from A (best) to D (worst). Quality C was the desired quality for sheet pilings[2]. NEN 5466 is attached for information as annex C (company version only) because some customers may still refer to it. However, it was officially replaced by a European norm, EN 338[3]. EN 338 stipulates that the German grading system may be directly converted into the European one. Therefore, Dold does not have to adjust its grading system.

| EN 338 Strength Class | German Grading Classes (DIN 4074-1, Visual Grading) |
|---|---|
| C30 | S13 spruce, S13 fir |
| C24 | S10 spruce, S10 fir |
| C16 | S7 spruce, S7 fir |

*Table 2: Assignment of German grading classes to European strength classes*

However, sheet pilings for hydraulic engineering purposes must be either C18 or C24. Dold currently grades S7 and S10, corresponding to C16 and C24[4]. Only those boards graded C24 may be used for this product, unless Dold starts grading C18 specifically. This would have a significant impact on the internal workflow, however.

#### 3.2.2 Certification

The Netherlands have a new timber procurement policy since 2010. It is therefore committed to procurement of timber that is entirely sustainable. The responsible committee has endorsed PEFC-labelled products from Germany under this policy[5]. Dold is PEFC-certified and may thus sell its products to the Netherlands without constraints.

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1 "Quality requirements for timber - External characteristics of European soft wood"

2 Stiho reported that all inquiries for sheet pilings asked for this quality. Also, Foreco mentions its softwood for sheet pilings to be of C quality during their online ordering process. Sheet pilings from Van Swaay are C quality, as well.

3 See annex B

4 SKH

5 http://www.tpac.smk.nl/

### 3.3 Materials and Substitutes

#### 3.3.1 Wood

Both hardwoods and softwoods are used in sheet pilings. Common softwood species are Norway spruce, European larch, Scots pine and Douglas fir. For hardwoods, European oak, black locust (robinia), Azobé and Angelhim vermelho are used most often by far. It is interesting to note that Silver fir is not mentioned in the list above. This species is hardly ever considered in Dutch hydraulic engineering, and it is not included in the species list of the voluntary KOMO© certificate. However, all companies interviewed did not favor any particular species when concerning softwoods. Also, NEN 5466 explicitly includes Silver fir.

Silver fir deserves special attention because of Dold‘s interest in using this species for sheet pilings. Several sources speak of Silver fir timber in connection with hydraulic engineering, however never so in a scientific manner. The comprehensive “Holzatlas” mentions earthworks and hydraulic engineering purposes among the appropriate uses for Silver fir and also states that it is commonly sold together with spruce[6]. An article of the “Bayerische Landesanstalt für Wald und Forstwirtschaft” (Bavarian Public Agency for Forest and Agriculture) says that “for hydraulic engineering purposes, Silver fir is clearly superior to spruce due to its fair durability under water”[7]. Another article mentions that “Silver fir timber is favored in areas that are permanently wet or alternating between wet and dry, e.g. [...] hydraulic engineering. Old Amsterdam rests on pillar foundations of oak and fir.”[8] “Nature-oriented hydraulic engineering” says the following: “When using timber [...] [for hydraulic engineering purposes], larch, fir and oak have a higher life expectancy than other domestic species. Constructions which are underwater permanently are more durable than those in transition areas [i.e. those areas within the ever-changing water level]. Timber constructions that are wet and dry on a rotating basis rot quickly. In those areas, the aforementioned species should be used, even if they are slightly more expensive than spruce or ash.”[9] Also, it is commonly known that in the Black Forest, Silver fir has often been used in wet environments such as water wheels.

In addition, the kiln drying time of Silver fir is longer than that of spruce. This is the reason why German sawmills pay less for fir than they do for spruce when buying the

6 Holzatlas, p. 734
7 Die Weißtanne – ein Baum mit Zukunft, p. 58
8 LWF - Wissen 45, p. 93
9 Nature-oriented hydraulic engineering, p. 342

timber from the forest. Sheet pilings may not be dried below the fiber saturation point[10] because they would swell when placed in the water again, causing massive problems with expanding and therefore cracking. In result, Silver fir should have a small price advantage compared to spruce.

Two aspects may be concluded from the information provided in the paragraphs above. Firstly, Silver fir is commonly found suitable for wet and underwater purposes, specific scientific data on this hardly exists however. Even an interviewed professor from the Rottenburg University of Applied Forest Sciences and a member of the "Forum Weißtanne" (forum Silver fir), could not provide additional information[11]. Secondly, given the fact that almost all spruce deliveries from south-western Germany contain a small percentage of Silver fir mixed into them, it is safe to assume that Silver fir timber is very similar to spruce timber in almost all aspects, rendering all differences miniscule. If spruce fits the requirements of whatever it is, Silver fir is guaranteed to fit them as well, if not better. Thirdly, given the current price policy in Germany, Silver fir is slightly cheaper than spruce.

### 3.3.2 Steel

Steel is the second most commonly used material for sheet pilings. It does not, however, compete with wood directly. Steel sheet pilings are a lot stronger than wooden ones and are used in lengths of up to 12 meters. They are required to withstand the strong forces created by shipping and are thus the only option in large canals[12]. They are, of course, a lot more expensive than wooden sheet pilings, making them uneconomical in rivers and canals without shipping. Due to these properties and their entirely different fields of application, a customer will never have to choose between wood or steel.

### 3.3.3 Concrete

Concrete has a very small market share. None of the interviewees mentioned concrete, thus deeming it rather insignificant in the context of this study. Its importance is unlikely to change.

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10 The fiber saturation point marks the stage of the drying process when the moisture content of the timber falls below 26 to 30%. At this point, the wood will start to shrink and possibly deform.

11 Prof. Dr. rer. nat. Thorsten Beimgraben, teacher for biomass production and logistics

12 Xander Sleurink, Rijkswaterstaat

### 3.4 Prices

This chapter presents several example calculations for sheet pilings.

| Sheet Piling Calculation | Spruce / Fir Mix |
|---|---|
| | |
| **Quality** | **B/C** |
| | |
| **Dimensions [mm]** | |
| **Raw Thickness** | 60 |
| **Raw Width** | 260 |
| **Raw Length** | 5000 |
| | |
| **Thickness after planing** | 60 |
| **Width after planing** | 240 |
| **Length after planing** | 5000 |
| | |
| **Material loss during planing** | 7.69% |
| | |
| | |
| **Costs [€/m$^3$]** | |
| **Raw Material Cost** | 180 |
| **Planing Cost** | 25 |
| **Cost for Lost Material** | 15.77 |
| **Cost for sawing the seeker** | 10 |
| **Total Production Cost** | **230.77** |
| | |
| **Transport to the Netherlands** | 15 |
| | |
| **Prices** | |
| **Raw dimensions, carriage paid, excluding profit** | **230** |
| **After planing dimensions, carriage paid, excluding profit** | **245.77** |

*Table 2: Sheet piling calculation, B/C Quality*

The first calculation assumes a (German) B/C quality of the timber. It is important to distinguish between dimensions before and after planing because the tongue and groove will cause the width to shrink. In this example, the width after planing will be 20 mm less than before, resulting in 7.69% material loss. The second part of the calculation basically just adds together costs in order to find out the total production cost. Notice that the actual profit has not been specified because of its highly confidential nature. For further calcula-

tions, it will be assumed that the profit is 5% of the after planing dimension selling price. This price would then grow to 245.77€/$m^3$ + 12.28€ = 258.05 €/$m^3$. This seems reasonable since, for example, Van der Sijde reported to currently pay 260-275 €/$m^3$.

A second possibility is using timber of lesser quality. This timber must still fulfill the C24 requirement, though.

| Sheet Piling Calculation | Spruce / Fir Mix |
|---|---|
| | |
| **Quality** | **C/D** |
| | |
| **Dimensions [mm]** | |
| **Raw Thickness** | 60 |
| **Raw Width** | 260 |
| **Raw Length** | 5000 |
| | |
| **Thickness after planing** | 60 |
| **Width after planing** | 240 |
| **Length after planing** | 5000 |
| | |
| **Material loss during planing** | 7.69% |
| | |
| | |
| **Costs [€/$m^3$]** | |
| **Raw Material Cost** | 155 |
| **Planing Cost** | 25 |
| **Cost for Lost Material** | 13.85 |
| **Cost for sawing the seeker** | 10 |
| **Total Production Cost** | **203.85** |
| | |
| **Transport to the Netherlands** | 15 |
| | |
| **Prices** | |
| **Raw dimensions, carriage paid, excluding profit** | **205** |
| **After planing dimensions, carriage paid, excluding profit** | **218.85** |

*Table 3: Sheet piling calculation, C/D Quality*

Under these assumptions, the presumed profit is 10.94€, leading to a final price of 229.78 €/$m^3$.

A third option is using leftover timber from another product that Dold currently manufactures.

| Sheet Piling Calculation | Spruce / Fir Mix |
|---|---|
| | |
| **Quality** | **B** |
| | (other product) |
| **Dimensions [mm]** | |
| **Raw Thickness** | 60 |
| **Raw Width** | 260 |
| **Raw Length** | 5000 |
| | |
| **Thickness after planing** | 60 |
| **Width after planing** | 240 |
| **Length after planing** | 5000 |
| | |
| **Material loss during planing** | 7.69% |
| | |
| | |
| **Costs [€/m³]** | |
| **Raw Material Cost** | 135 |
| **Planing Cost** | 25 |
| **Cost for Lost Material** | 12.31 |
| **Cost for sawing the seeker** | 10 |
| **Total Production Cost** | **182.31** |
| | |
| **Transport to the Netherlands** | 15 |
| | |
| **Prices** | |
| **Raw dimensions, carriage paid, excluding profit** | **185** |
| **After planing dimensions, carriage paid, excluding profit** | **197.31** |

*Table 4: Sheet piling calculation, B Quality from a different, existing product*

This alternative would generate 9.86€ of profit per $m^3$, adding to a total price of 207.17€/$m^3$.

# 4 Market

## 4.1 Macro Economic Overview

### 4.1.1 The timber market as a whole

It is important to understand the timber market in order to employ a proper strategy. Figure 9 shows what the Dutch timber market looks like according to Woodguide.

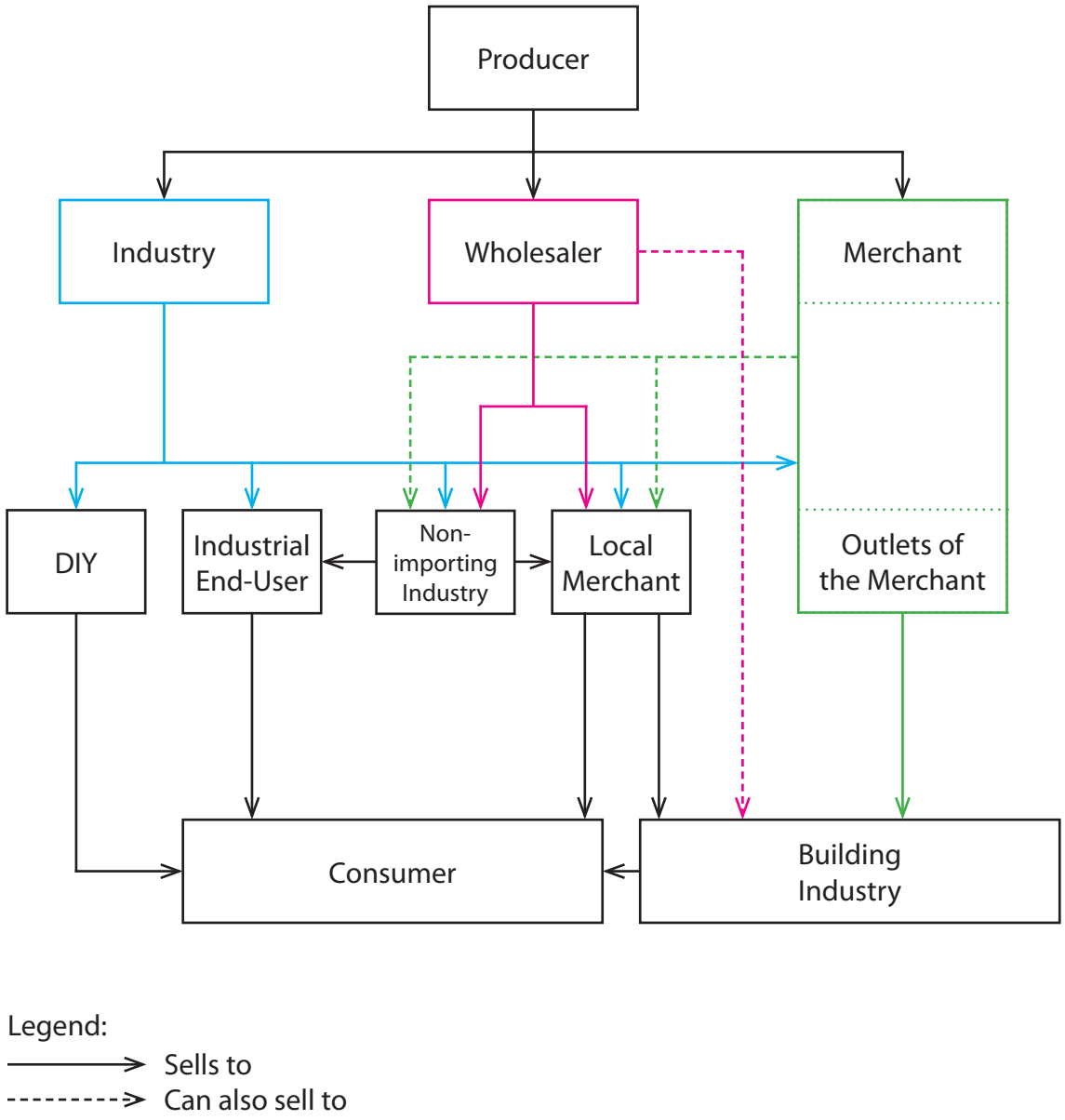


*Figure 9: The timber market seen by Woodguide*

Figure 9 displays the various distribution channels in the timber market, starting with round wood at the producer and leading to different end uses. The “depth” of the market can be easily explained here: The further down the participant in this figure, the deeper he is in the market.

Dold as a producer is at the top of the picture. Woodguide considers itself part of the producer, sharing the same spot in the market. Via Woodguide, Dold sells sawn timber to the following three customer pools: The industry, wholesalers and merchants. Although there are lots of companies that overlap those pools, this is a sensible distribution in order to define customer groups. “Industry” covers all companies that immediately manufacture timber into products like laminated wood, chipboards, components or interior elements. They are big enough to source the timber directly from the producer. “Wholesaler” includes typical grossists that split up large quantities into smaller ones. “Merchant” comprises retailers for professional customers who usually have their own outlets and also sell non-wood products like metal or stone components. The key difference between a wholesaler and a merchant is that the wholesaler does not open the package to remove single items. He will only reduce the amount of packages that his customers have to buy per purchase. The merchant will divide, combine, add and remove items among his goods to provide a wide product range to his customers.

The next level in the market is the last step before the private consumer and consists of mostly retailers. Do-it-yourself stores naturally fall into this category, as do all kinds of industrial end users that e.g. use wrappings or crates made by the manufacturing industry. The non-importing industry is similar to the industry (depicted in cyan) above, it is however too small to buy from sawmills and will make its purchases through wholesalers or other industry companies. Local merchants cover the thousands of small timber trading companies and shops in the Netherlands.

It is important to decide to whom products should be sold. For example, it might be tempting for a producer to skip the wholesaler and sell directly to the building industry. In some cases, this might be possible logistically, and the profit that the wholesaler would have made could be the producer‘s gain. This is, however, a dangerous game because in a rather small business like timber trade, wholesalers will notice after a short period of time if his supplier is trying to sneak deliveries to his customers. This will usually lead to discontinuing the relationship. In addition, the producer‘s logistics usually do not fit customers deep in the market, and the organization of sales to those customers is a lot more difficult. This is due to the fact that there are lot more of them, possibly hundreds more, and they will ask for smaller and more diverse deliveries.

Skipping a merchant is impossible due to delivery sizes. For example, Stiho, a typical merchant, has a minimum delivery size of 1,5 $m^3$. This is a size that can never be offered by a producer. Omitting industry is also not possible, unless the producer has manufacturing industry of his own.

In conclusion, Dold and Woodguide should not try to go deep into the market, but stick to the three customer groups on the next level down in order to maintain their long-term relationships.

### 4.1.2 Sheet piling market size in the hydraulic engineering sector

"The total length of sheet piling constructions in our country [Netherlands] ... measures about 4000 kilometers. Out of those, about 60% are made of wood, about 25% of steel and 15% of concrete. Thus, wood is on top by far. This is of course related to the fact that it is commonly used in waterways, canals etc. of which we have plenty. The total length of alternative shoreline constructions is, compared to the numbers mentioned above, negligible.[1]"

The percentages may be translated into 2400 km of wood, 1000 km of steel and 600 km of concrete shoreline. It is not possible to calculate exactly how many cubic meters that actually is, but an educated estimation can be made. Table 1 showed that some dimensions are widely offered by several companies, others however do not seem to be as popular. Nearly all suppliers sell the following dimensions: 40x3000, 40x4000, 50x4000, 50x5000, 60x4000, 60x5000, 60x6000. It can be assumed that these sizes are used a lot more than the others and make up a significant portion of all sheet pilings used today and in the past. The average of those dimensions is 51x4428 mm:

$$40 + 40 + 50 + 50 + 60 + 60 + 60 = 360; 360 : 7 = 51.42mm;$$

$$3000 + 4000 + 4000 + 5000 + 4000 + 5000 + 6000 = 31000; 31000 : 7 = 4428.5mm$$

Assuming that thickness, it may be concluded how many square meters of sheet pilings there are in a cubic meter:

$$1 : 0,051 = 19.6\frac{m^2}{m^3}$$

It has been established that the average sheet piling is 4,428 m long, and that a cubic meter will contain 19.6 $m^2$. With this information, we can calculate the length of the shoreline per cubic meter:

$$4.428m \cdot x = 19.6m^2;$$

$$x = 4.43m$$

1 Damwandconstructies, 2007

$$2,400,000 : 4.43 = 541,760m^3$$

This is the estimated amount of sheet piling timber that is currently in use in the Netherlands. Now this number may be used to assume the market size, considering that a sheet piling will last about 25 years and will have to be replaced after[2]:

$$541,760m^3 : 25a \simeq 21,670\frac{m^3}{a}$$

Given that this is a very rough estimation, it is not too far away from SKH's estimation of 10,000 to 15,000 $m^3$ per year[3] and thus may be considered valid. Unless the Dutch government changes its policies radically, these numbers will hold true in the future as well due to the rising importance of tropical timber (see chapter 4.3). Notice that this number covers all kinds of timber, including tropical and European hardwood. The share of softwood is therefore only a fraction of it, about 4,000 $m^3$.

### 4.2 Customers and End-Use

As was established in chapter 4.1.1, the three potential customer groups include the industry, wholesalers and merchants. The actual end users are municipalities.

#### 4.2.1 Industry

This includes companies that will manufacture a new product from the raw product delivered by Dold. The two most important companies in this sector are Foreco and Van Swaay. These two companies not only sell sheet pilings from hardwood and softwood, but also an innovative combined product that has a hardwood top and a fingerjointed softwood bottom. Figure 9 shows two pictures.

2 SKH, Jan Dubbelaar: "Tropical timber 20 to 25 years (Azobé 25 years), treated spruce (CCA or creosote) 25 years, untreated less than 10 years [above ground], well CC-treated 15-25 years"

3 SKH, Jan Dubbelaar

*Figure 10: Foreco Twinwood©, Van Swaay H2H®*

The idea behind this is that the softwood will be constantly submerged, avoiding rot and decomposition. This part usually makes up about three quarters to four fifths of the whole sheet piling. The top piece is tropical hardwood whose natural durability will protect it from the same threats as mentioned above. This product ingeniously combines the strengths of both wood types: the comparatively cheap softwood is sufficiently stable under water, and only a small amount of tropical timber is used. Foreco was open for the suggestion of using Silver fir in this product.

### 4.2.2 Wholesalers and Merchants

These two customer pools are important parts of the distribution chain. They are not end users, but crucial suppliers for construction companies. Most probably, wholesalers and merchants will buy most of the sheet pilings because Woodguide already has good relationships with many of them.

### 4.2.3 Municipalities

All hydraulic engineering projects that use sheet pilings are handled in tenders. Municipalities will tender the project, collect submissions from participating construction companies and choose the lowest bidder. This is a standard procedure. As soon as a company has

won the bid, it will contact wholesalers and merchants in order to purchase the required amount of sheet pilings. This is the reason sheet pilings have to be delivered just in time and fairly quickly after receiving the order.

### 4.3 Trend Forecast

The trend forecast consists of two components, one being the expected development of the demand and the other being the predicted composition of the materials.

Some interviewees predict a stable, but also stagnating demand for sheet pilings in the next few years (Waterschap, Foreco). Others expect the demand to rise (SKH, Rijkswaterstaat), while others were unsure because of lack of knowledge of the market (Diderich Houtimport, Stiho). This distribution of statements makes it very difficult to safely predict any future developments. The most reasonable solution is to expect the market to stay as it is with minimal growth. This growth will stem from new municipal projects that will be started because of expanding cities and rising precipitation[1], making more fortifications on waterways necessary.

The development of materials is a very interesting matter because the hydraulic engineering timber market heads into a surprising direction. Historically, creosote-treated softwood was the most common material by far. Before the ban of creosote and CCA (Chromated copper arsenate), it made up 60% of the market, with tropical timber holding 20%[2]. Environmental and health issues led to those bans, and in a year, CC (Chromated copper) will also be prohibited[3], leaving only copper as a preservative. According to SKH, using only copper will yield bad results because the chrome keeps the copper inside the wood. Without it, water will quickly wash it out. It is forbidden to use impregnated wood in hydraulic engineering by now however, so this option is gone anyway.

What happens is that the market is running out of options[4]. Untreated softwood above water will rot in less than 10 years, so this is not an economical solution. Impregnated timber is not allowed anymore. Accoya-treated wood is suitable as a material, but too expensive (800-1200 €/m$^3$). Thermowood is out of the picture because it loses 25% strength and 30% durability during the heat treatment process[5]. Also, experience has shown that sheet pilings made from thermowood will break after two years, suffering severe damage in

1 Waterschap
2 SKH, Jan Dubbelaar
3 Goris van der Sijde
4 This was explicitly mentioned and described by SKH and Van der Sijde
5 SKH, Jan Dubbelaar

their wood structure[6]. This leaves only few viable solutions, the most important of which is tropical timber. For example, Van der Sijde did not trade with tropical timber at all in the year 2000. Since then, its share in the portfolio has grown to 70%. Azobé and Angelim vermelho, the two most commonly used tropical timber species for this purpose, provide the natural durability that is required without the need for treatment. While there are innovations to minimize the use of the controversial tropical timber as mentioned in chapter 4.2, the share of it has constantly increased over the last few years and will probably continue to do so. However, bearing in mind that global deforestation is still a grave matter, increased usage of tropical wood is both alarming and unsustainable. At some point, the Netherlands will have to consider alternatives. It is impossible to predict when that will finally happen, though.

What may be gathered from this information is that Silver fir and spruce will keep their share in Twinwood© or H2H® products as well as in fully submerged constructions. Even though the share of tropical hardwood has risen over the last years, it will never entirely replace softwood solutions. In fact, the reverse is more likely given the controversy around tropical wood species.

# 5 SWOT

**Strengths**

- New asset in portfolio for Dold
- One-time and small investment
- Makes best use of lower Silver fir qualities while meeting all technical requirements

**Weaknesses**

- Only limited number of different dimensions can be offered
- Some investment (planing tool) and new workflow (sawing of the seeker) required

**Opportunities**

- Long-term stable market
- Gain of reputation for Dold, possibly leading to other business opportunities
- Knowledge and experience may be used in other emerging markets

6 Woodguide, Fredrick toe Laer

**Threats**

- Rising share of tropical timber
- The market might reject Silver fir
- Rather unpredictable short-term market

As a first step, the decision of Dold will have to balance strengths and weaknesses of the project. Clearly, having one more product in the portfolio is a good thing as it allows for more flexibility. Also, the actual costs are rather low. The necessary planing tool will amount for about 3000€, and the initiation costs[7] can be estimated at about 2000€. Once that is paid for, there are no more associated costs besides those for maintaining relationships.

However, given the nature of the planing tool and the fact that Dold cannot keep dozens of sizes in stock for only one product, only a limited amount of different dimensions can be offered. This will probably not be a big issue because some dimensions are more common than others (see table 1), but is still a limiting factor. Also, the requirement of a seeker forces Dold to modify its workflow. The planery, usually operating with five people, cannot do this extra task with the personnel currently available. The seeker is commonly sawn by a worker with a chainsaw. Both the worker and the saw would have to be arranged for.

Dold‘s opportunities lie in the long-term stability of the market. As will be established in chapter 4.3, the demand for sheet pilings will most likely stay the way it is or even rise a little. Also, by gaining new customers through this product, Dold may develop further positive reputation. This could be useful for other business opportunities. The fact that Dold learns about the hydraulic engineering market falls into the same category, because it then has a kind of experience and knowledge that only few other suppliers have. Dold largely relies on export to sell its products, and if at some point other customers ask for advice and possibilites concering sheet pilings, Dold is prepared for the task.

There are risks though. The biggest one is the unpredictability of the influence of tropical timber. The share of tropical timber in sheet pilings is constantly rising because it is the most care-free and durable type of wood available. In addition, using Silver fir in sheet pilings is largely unheard of despite being perfectly legal and possible. Coupled with the

7 Initiation costs are a general term for all the work necessary to actually start selling. This involves organization and workflow questions and meetings and calls with traders and suppliers.

fact that none of the interviewees preferred one species of softwood over another, this is a rather small risk however. Lastly, all interviewees reported that this market is highly unpredictable in the short term. Sometimes there will be no orders for weeks or even months, but other times, customers will ask for several truckloads of sheet pilings, to be delivered within 2-3 weeks.

# 6 Strategy

Several factors are important to remember when creating a strategy for this project.

• Chapter 3.5 showed that the market entry barrier is rather low. The only costs are caused by the planing tool and some estimated initiation costs. Potential business relationships exist already.
• Quality, sorting, species and certification do not pose problems (see chapter 3.2).
• Silver fir has a small price advantage due to German pricing policies.

The next steps should look like follows:

1. Solve all internal workflow issues. This covers the possibility to saw the seeker with a chainsaw as well as having a worker to do it.
2. Consult potential business partners. Make sure that they are still interested in the product. Name a negotiable price per cubic meter to find out if it is interesting to them.
3. If there is positive feedback, buy the planing tool. Unfortunately, this cannot wait until the first order because the tool itself has a delivery time of 2 to 3 weeks.
4. Maintain business relationships. Relationships is what this business relies on. For this highly interchangeable product, price and quality determine its success in combination with relationships.
5. Keep track of all orders for 2 years. This period of time can be rather generous because after buying the tool, there are no more direct costs. Still, there must be enough orders to amortize the tool as well as to generate more money than what the bank pays in interest (opportunity costs). A rough estimation looks like this: The average profit per cubic meter is about 11,50 € (average of the B/C and C/D models in chapter 3.4). Foreco mentioned that an average quantity per sale is around 50 $m^3$, although they range from 5 to 300 $m^3$. That means that an average delivery will yield 575 €, and it will take 9 such orders to break even, assuming one year‘s interest:

$5000€ + 1\% = 5050€$

$5050 : 575 = 8.78$

The calculation becomes much more lenient of course if a two year‘s time is presumed for amortization.

## 6 Conclusion and final considerations

The purpose of this study was to assess the risks, opportunities and the market for Dold to start selling wooden sheet pilings for hydraulic engineering works in the Netherlands and to subsequently provide a recommendation.

There were a lot of factors to be balanced in this project. On the upside, there are a low market entry barrier, a solid long-term market, reasonable prices, very well-maintained existing relationships, no sorting or certification issues and gain of knowledge and experience. On the downside, there are an unpredictable short-term market, a small diversity of dimensions and a momentarily growing share of tropical timber.

The analysis leads to the clear conclusion that Dold should seize the opportunity and start the business. Even in a worst case scenario in which Dold would not receive any orders, the company would only need to invest into a planing tool and initiation costs, both estimated at about 5000€ combined. This is a minor amount for a company such as Dold.

In a best case scenario, Dold is highly competitive with its offer and has a new profitable product in its portfolio. If the Dutch opinion on tropical timber changes, this product could even have a greater future.

The opportunities and possibilities by far exceed the risks.

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## List of Interview Partners

**Diderich, Tom**
Diderich Houtimport BV. CEO

**Dubbelaar, Jan**
SKH. Timber Specialist

**Foreco**
Son of owner. Sales.

**van der Sijde, Goris**
Houthandel van der Sijde. CEO

**Sleurink, Xander**
Rijkswaterstaat. Engineer

**Staatsen, Roderick**
Stiho. Purchasing

**toe Laer, Fredrick**
Woodguide. CEO

**Waterschap**
Employee with unknown name

## Annexes

### Annex A: Questionnaire

# Questions - Red Thread for Conversations

- Legal requirements? Who's deciding?

- Why is he buying it? Longevity, costs, use, environmental issues? Impregnation?

- Regularity of buying? Prices? Market share and size?

- Logistics and distribution chain? Similar products (e.g. tunnel walls)? Substitute materials (concrete, steel)?

- Must-have requirements? Optional ones? Critical success factors? KOMO, FSC / PEFC Certification?

# Annex B: Excerpt EN 338

**VDS Wiesbaden, März 2006**

**Übersicht - Auszug**

## Zuordnung der Sortierklassen nach DIN 4074 zu den C-Klassen nach EN 338

Zuordnung gem. DIN EN 1912, Ausgabe März 2005

### Tabelle 1 Nadelholz und Pappel

| | **EN 338**<br>**Festigkeitsklassen** | **DIN 4074-1**<br>**Sortierklassen visuell** |
|---|---|---|
| **Nadelholzarten, Pappel** | **C 30** | **S 13** Fichte<br>**S 13** Kiefer<br>**S 13** Tanne<br>**S 13** Lärche<br>**S 13** Douglasie (Herkunft D)<br>beschränkt auf Dicken ≥ 60 mm |
| | **C 24** | **S 10** Fichte<br>**S 10** Kiefer<br>**S 10** Tanne<br>**S 10** Lärche<br>**S 10** Douglasie (Herkunft D)<br>beschränkt auf Dicken ≥ 60 mm |
| | **C 16** | **S 7** Fichte<br>**S 7** Kiefer<br>**S 7** Tanne<br>**S 7** Lärche<br>**S 7** Douglasie (Herkunft D)<br>beschränkt auf Dicken ≥ 60 mm |

Hinweis: Maschinell sortiertes Holz darf direkt in die Festigkeitsklasse eingestuft und entsprechend gekennzeichnet werden und wird in DIN EN 1912 nicht behandelt.

### Tabelle 2 Laubholz

(Zuordnung gem. Tab. F.8 in DIN 1052:2004-08)

| | **EN 338**<br>**Festigkeitsklassen** | **DIN 4074-5**<br>**Sortierklassen visuell** |
|---|---|---|
| **Laubholzarten** | **D 70** | **--** |
| | **D 60** | **LS 10 Ipe (Rohdichte mind. 1.000 kg/m³) (Mittelamerika, Südamerika)**<br>**LS 10 Azobé (Bongossi) (Westafrika, Guyana)** |
| | **D 50** | **--** |
| | **D 40** | **LS 13 Buche**<br>**LS 10 Afzelia, Merbau, Angelique (Baralocus)** |
| | **D 35** | **LS 10 Buche** |
| | **D 30** | **LS 10 Eiche**<br>**LS 10 Teak, Keruing** |

Hinweis: Maschinell sortiertes Holz darf direkt in die Festigkeitsklasse eingestuft und entsprechend gekennzeichnet werden und wird in DIN EN 1912 nicht behandelt.

C_KlassenEN338.doc