



Chapter 4

The Danish Steelworks industry

The information used in this chapter is, when not stated otherwise, from the Danish Steelworks home page on <http://www.dansteel.dk>.

4.1 Presentation of the Danish Steel Works, Ltd.

Danish Steelworks Ltd. has premises located about 60 km north of Copenhagen. The company has about 1,200 employees and a production output of approximately 700,000 tonnes of rolled steel products per year. Moreover, the Danish Steel Works is the only steelworks in Denmark.

The quarto plates (steel plates) count for $\frac{2}{3}$ of the total production and the long products for $\frac{1}{3}$. The products are for use in ships, boilers, heavy-duty steel structures, agricultural machinery, reinforcement steel and other structural elements. All plate material is hot rolled, a number of grades are normalised and others are TM steel (thermo-mechanical rolled).

75 percent of the production output is exported. With Sweden, Norway, Germany, and UK as the largest export markets.

The History of the Steelworks

1937-1940: European countries protect their shipbuilding industry against the competitive Scandinavian shipyards by permitting the European Steel Cartel of that time to sell steel to Scandinavia with a 30% duty imposed. Therefore, plans for a joint Scandinavian steel and rolling mill appear.

On the 12th of August 1940 Danish Steel Works Ltd. is established and located in Frederiksvaerk where there is easy access to large amounts of freshwater. Stipulated production 40,000 tonnes per year of merchant bars, sections and lightweight beams, based on scrap iron.

1949-1951: The works is extended with a heavy plate mill with an estimated capacity of 60,000 tonnes per year.

1958-1961: A new medium plate mill for rolling of plates is put into service. New bloom mill for preliminary rolling of material for the section mill and the heavy plate mill is completed.

1976-1980: A steel plant with two arc-furnaces, which can produce 500,000 tonnes per year of continuously cast slabs per year is installed. The steel plant is extended with an installation for continuous casting of square billets. The capacity of the steelworks is now 1,000,000 tonnes of steel a year.

A total of DKK 50 million is invested in the battle against water, noise and smoke pollution.

1983-1985: Danish Steel Works Ltd. is the first steel producer to introduce eccentric bottom tap in electric-arc-furnace. The plate mill and the bar mill are equipped with a “state-of-the-art automatic process systems” and an investment in a ladle furnace in the steel plant carried out.

1990-1993: The quality control is certified according to ISO 9001 standard and “environmental accounts” are introduced. The steel plant filter is completed and therefore the environmental declaration for steel products is prepared.

1995: The continuous casting plant is modernised.

As recognition of the firm’s effort in “environmental deceleration” of its products the works receives an international and a Danish environmental award for its environmental accounts.

1996: The organisation is split into divisions where Dansteel Engineering A/S is established.

Organisation

Production at the Danish Steelworks Ltd. takes place in three separate divisions, the Steel Division, which melts steel scrap and casts billets and slabs for the Long Product Division and the Plate Division respectively.

Tasks such as purchasing, accounting, marketing, metallurgy and development are common to the three divisions.

The project department, Dansteel Engineering Ltd., manages larger projects for the three divisions.

The Steel Division transforms scrap into new steel. The scrap metal is melted in two 110 tons arc furnaces. In its liquid form the steel is alloyed with e.g. manganese, silicon and boron to achieve the desired properties in the finished steel product. After being alloyed, the liquid steel is cast into billets for long products and slabs for steel plates.

Approximately 800,000 tons per year of raw steel is produced annually in the form of slabs and billets.

The Plate Division reheats the slabs before rolling them into the required dimensions. A significant part of the production is normalised (heat-treated). More than 450,000 tons per year of plates are manufactured annually, and are mainly sold in Denmark, Germany, Norway, Sweden, and UK.

The Long Product Division manufactures long products and reinforcement steel which typically forms part of machinery, load-bearing parts in rolling stock, safety parts, wearing parts, tools and load-bearing structures. Reinforcement steel is processed in a subsidiary, Danstaal Armering A/S.

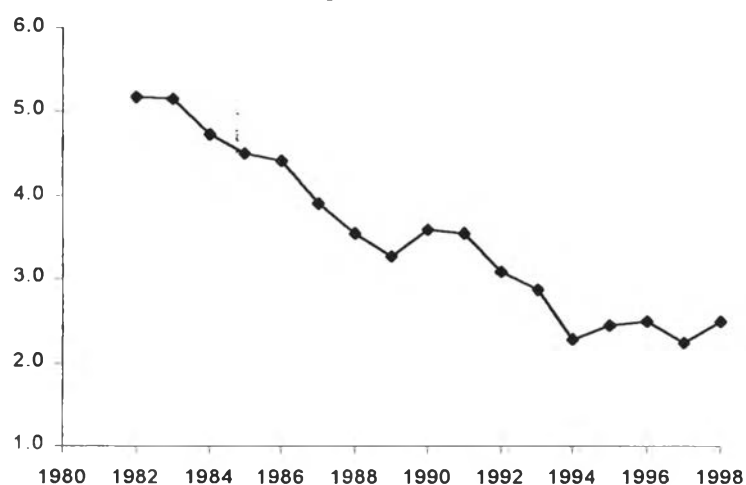
Approximately 250,000 tons per year of steel is produced each year, which is mainly sold to Denmark, Germany, the UK, Sweden and Norway.

The subsidiary Dansteel Engineering A/S was formed in 1996 for commercial exploitation of the expertise gathered at the Danish Steelworks Ltd. regarding environmental improvements and energy optimisation in connection with steel production. Dansteel Engineering manages large projects for the Danish Steelworks Ltd. and it is also in charge of day-to-day computer operation. The work is carried out on commercial terms.

Employment

The Danish Steel Works has gone through a period of strong rationalisation and restructuring since 1975. The company has worked on improving labour hours efficiency through training and reengineering processes. This has paid off in improved labour hours efficiency. *Figure 4.1* shows how the labour hours per ton output has declined from 5.2 in 1982 to 2.2 in 1997¹.

Figure 4.1 Labour-hours per ton finished steel



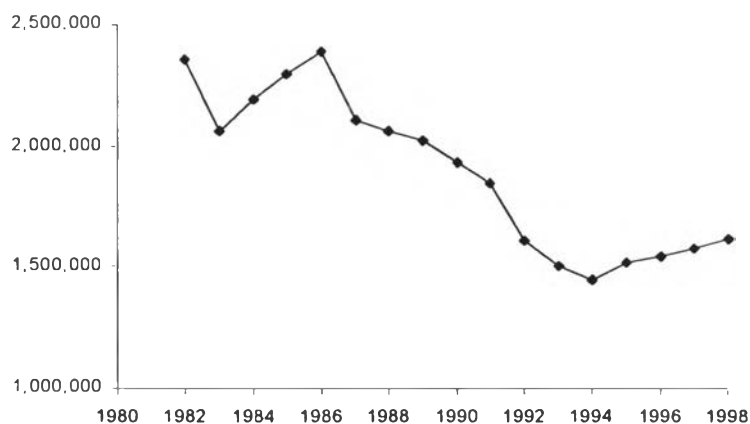
source: The Danish Steel Works financial statements

This productivity improvement has resulted in a decline in employment from 2,357,000 labour hours in 1982 to 1,579,000 in 1997² (please see *figure 4.2*).

¹ The firm's financial accounts and statements

² *ibid.*

Figure 4.2 Development of labour-hours employed



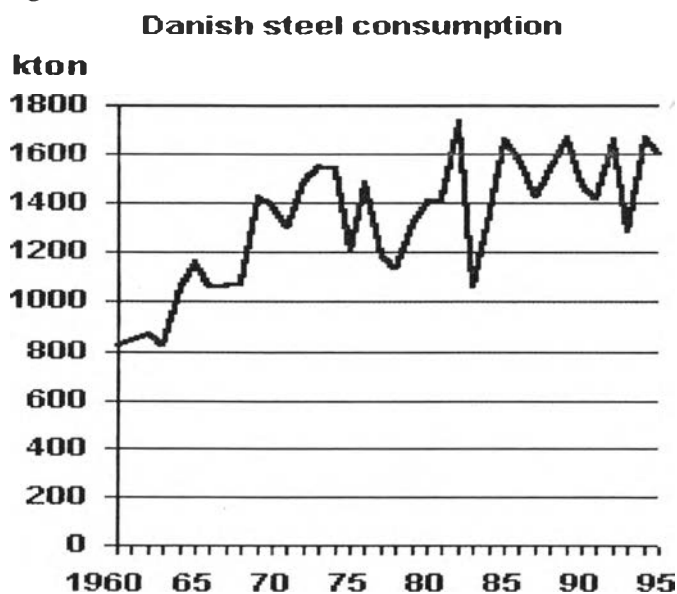
source: *The Danish Steel Works financial statements*

4.2 The Steel Market

The Danish Steel Consumption

Danish steel consumption grew in line with the development of Danish industry from 1960 to 1994. The oil crisis in the mid-70's resulted in a decline, which was not reversed until the beginning of the 80's. Since then the Danish steel consumption has been fluctuating around 1.5 million tonnes per year (please see *figure 4.3*).

Figure 4.3

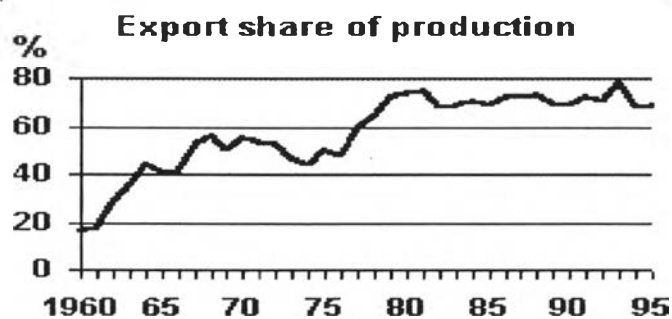


source: *The Danish Steel Works homepage*

Danish Steel Export

Danish steel exports increased on average 12% per year from 1960 to 1980, while The Danish Steelworks' export share rose by approximately 5% on average (please see *figure 4.4*).

Figure 4.4



source: The Danish Steel Works homepage

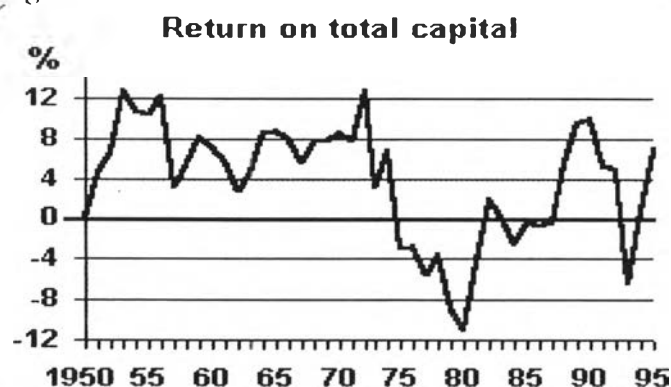
Until the mid-70's, the Danish shipyards were major purchasers of steel. However, the oil crisis resulted in a drastic slowdown in shipbuilding and hence, in the demand for steel.

Profitability

The reconstruction in the 50's (after the Second World War) produced a strong demand with following high prices.

In the 60's, the supply of steel increased and in the mid-70's the world was hit by high oil prices with resulting falling profits (please see *figure 4.5*). The EC Commission intervened and controlled the steel market with quotas, which were not lifted until the 80's.

Figure 4.5



source: *The Danish Steel Works homepage*

The Danish Steelworks' Competitors

The Danish Steelworks does not publish material concerning its competitors. However, this study assumes that their biggest competitors are their European counterparts (as can be assumed with a good reason) since their biggest markets are within Europe. Therefore, the European Commission's published material regarding the production of flat products and long products within Europe is used.

Table 4.1 Flat-product production (for the period 1992-1996):

| | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------------|-------|-------|-------|-------|-------|
| Belgium | 9260 | 8447 | 9565 | 9977 | 9916 |
| Denmark | 378 | 321 | 388 | 409 | 407 |
| Germany | 22823 | 21437 | 23596 | 23617 | 22611 |
| Liechtenstein | 576 | 402 | 444 | 570 | 358 |
| Spain | 4516 | 4882 | 5092 | 5176 | 4150 |
| France | 10375 | 9437 | 10554 | 10529 | 10717 |
| Ireland | - | - | - | - | - |
| Italy | 9386 | 9262 | 10346 | 10833 | 9679 |
| Luxembourg | 262 | 167 | 176 | - | - |
| Netherlands | 3583 | 3538 | 3881 | 4056 | 4151 |
| Austria | - | - | - | 3206 | 2962 |
| Portugal | - | - | - | - | - |
| Finland | - | - | - | 2654 | 2696 |
| Sweden | - | - | - | 3387 | 3480 |
| UK | 7079 | 7272 | 7760 | 8139 | 8587 |
| EUR* | 68239 | 65165 | 71802 | 82553 | 79714 |

source: *EUROSTAT 1997*

* The total production in Europe.

Note: the numbers also include other flat products which the Danish Steelworks does not produce. Therefore, the numbers do not give a true estimate of the market but only give us a picture of the total market.

Table 4.2 Long-products production (for the period 1992-1996):

| | 1992 | 1993 | 1994 | 1995 | 1996 |
|---------------|-------|-------|-------|-------|-------|
| Belgium | 1075 | 1303 | 1415 | 1058 | 1047 |
| Denmark | 163 | 208 | 249 | 222 | 216 |
| Germany | 10219 | 9701 | 10277 | 10699 | 10278 |
| Liechtenstein | 992 | 952 | 852 | 865 | 889 |
| Spain | 6264 | 6681 | 7011 | 7596 | 6822 |
| France | 4829 | 4609 | 4724 | 4581 | 4461 |
| Ireland | 243 | 306 | 242 | 275 | 311 |
| Italy | 13229 | 12498 | 12504 | 13243 | 11566 |
| Luxembourg | 230 | 2440 | 2469 | 2414 | 2315 |
| Netherlands | 601 | 581 | 674 | 646 | 605 |
| Austria | - | - | - | 1006 | 876 |
| Portugal | 678 | 718 | 701 | 704 | 661 |
| Finland | - | - | - | 648 | 597 |
| Sweden | - | - | - | 1073 | 888 |
| UK | 6253 | 6486 | 6678 | 7123 | 7031 |
| EUR* | 46847 | 46483 | 47797 | 52152 | 48562 |

source: EUROSTAT

As can be estimated from *table 4.1* and *4.2*, the production output from The Danish Steelworks only counts for approximately 0.5 percent of the total European production of flat and long products.

Pricing in the output Market

Since the biggest market for The Danish Steelworks is the European market an examination of the prices in that market can give us a picture of how the firm respond to prices.

The price indices for steel and wholesale are depicted in *figure 4.6*. The steel price index fluctuates around the wholesale price index (the vertical axis is the price index).

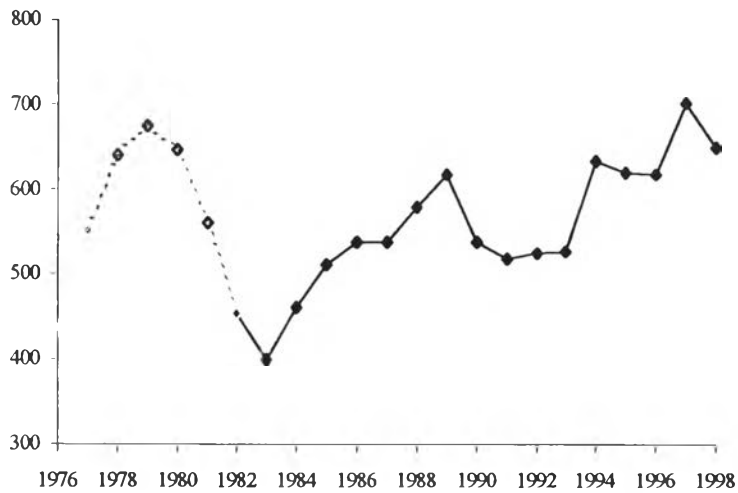
Figure 4.6 Price index for steel and industrial products



source: EUROSTAT 1997

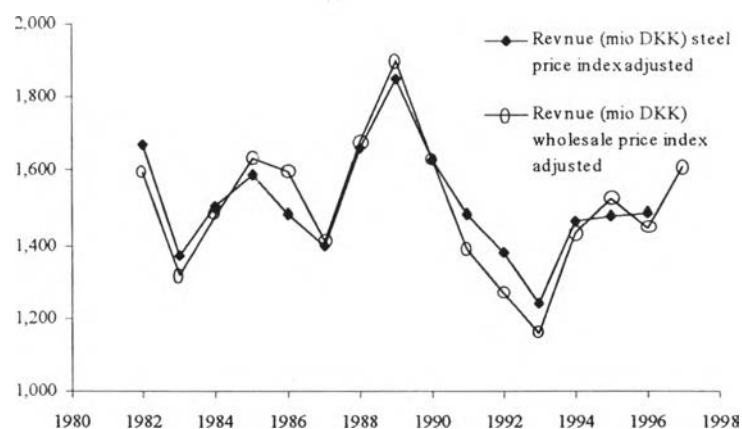
The firm's response to those price fluctuations is shown in *figure 4.7*, suggesting very clearly that the company adjusts its production output to the market prices with fluctuating revenue as a consequence (see *figure 4.8*).

Figure 4.7 Output ton (x1000) 1976 to 1998



source: the Danish Steel Works financial statements

Figure 4.8 Price index adjusted revenue



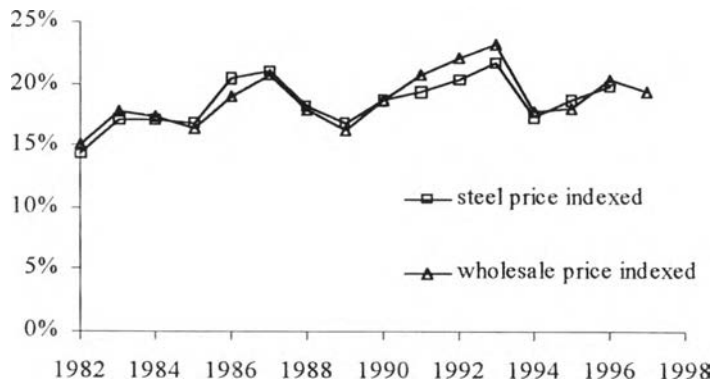
source: the Danish Steel Works financial statements

4.3 Important Notes Regarding the Model Assumptions

- (i) The firm's small market share of 0.5 percent and its fluctuating output and revenue due to price changes, strongly suggest that the firm is a price taker in the output market and that it has no market power.
- (ii) As this chapter clearly shows: there is no significant change in the firm's product range except from changes in quality. Therefore, the simplification of homogeneous output is not unrealistic.
- (iii) The rationale behind the Cobb-Douglas production function in this study was the belief that factor income shares have stayed constant over time. The share of labour-hours income of total income is depicted in *figure 4.9*, where the graph clearly shows that the income share has fluctuated between 15 and 20 percent of total income. Hence, the assumption of constant labour-hour income share is not unrealistic.

Regarding the income share of capital: it has not been possible to get access to those data.

Figure 4.9 Labour-hours' income share of total revenue



source: the Danish Steel Works financial statements