Carvel building in Norway

1800 – 1990

Hardanger Ships Preservation Centre

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Introduction

While shipbuilding in the mid 1800's was a technological challenge for a new group of professionals who called themselves *engineers*, the construction of wooden boats and ships was considered to be a craft. Nonetheless, wooden ship construction certainly doesn't represent a low level of technology. The depth of knowledge held by the builders of wooden vessels was expressed in other forms than the engineers' drawings and calculations.

The majority of vessels that have the achieved status as having significant historic value in Norway are carvel built wooden vessels. This method of constructing a hull has roots that stretch back to pre-Christian times. The oldest vessels that one can say with certainty were built using the carvel technique are approximately 1000 years old.

The first vessels constructed in Norway using pure carvel construction were ships built for the Danish-Norwegian King, around the year 1600. These were often built by local craftsmen under the supervision of foreign master ship builders. One hundred percent Norwegian built small carvel built ships made their appearance around 1800. The change over the period from clinker building to carvel building fostered some variations, where vessels were typically clinker built from the keel and up to just above the waterline, and carvel built from there on up.

Carvel building techniques were first adopted in Northern Norway for the construction of fishing boats around 1905, a full thousand years after the technique was fully developed in the Mediterranean.

> *Little research has been done into carvel building of large wooden ships and after 1850 of fishing vessels in Norway. The method requires totally different techniques than clinker building, but we know little of the tools and equipment the Norwegian carvel constructors employed. Local variations in hull form and methods of building certainly exist, but are not documented. Fieldwork needs to be done urgently, as steel and plastic become more and more widespread as building materials. Carvel building normally demands a larger work force than clinker building, but we know little about forms of organisation, worker training, the relationship between traditional technical solutions and mandatory regulations etc.*

These words could easily have been uttered today, but they were in fact written in 1977 by Cand. Philol. Arne Emil Christensen, who was at that time a research scholar at the Vikingeskipsmuseet (Viking Ship Museum) at Bygdøy in Oslo, in the ethnological journal *Dugnad*.

Twenty years would pass before Christensen's precise focus on the problems would result in action. In 1998, the Hardanger Fartøyvernsenter *(The Hardanger Ships Preservation Centre)* initiated the so-called *Carvel Project*, which would attempt to systematise experience gained from restoration projects and tasks carried out at the centre since 1984, together with information from the older generation of ship and boat builders. At the same time, the Håndverksregisteret (The Industrial Crafts Register) at De Sandvigske samlinger at Maihaugen had completed a programme of documentation of the construction of a fishing boat at Bremsnes in Møre og Romsdal county. These initiatives had a common goal; to publish a reference work for use in the preservation of cultural monuments and in further education and training, based on material acquired. There is a need for a reference work in connection with boat and ship building & renovation in Norway with regard to the establishment of well planned preservation, administration, future documentation and research work. The target groups are administrative government institutions, museums, people engaged in ship preservation in general, craftsmen engaged in the preservation of cultural monuments and boat building schools. Our hope is that the material will prove to be

a useful tool in renovation and preservation work, training, the distribution of knowledge and advisory under the auspices of the authorities, ships preservation centres and others engaged in the preservation of historic significant vessels.

Carvel building as a technique and a technology

The words technique and technology are often used interchangeably. It is however useful to our purposes to look at these two aspects of carvel building separately and in connection with each other. Technique is from the Greek word ***tekhne,*** and in this connection defined as ”means”. Technique is the use of the means or tools that are implemented in carrying out the work. Technology can be defined as ”knowledge of the means and their use” (Jorde 1999), the Theory of Techniques. Skill is the manner in which a defined activity is carried out. Skills will depend on the circumstances under which they are used or applied, while expertise in the fields of technique and technology will be more independent of the times they are applied in. For our purpose here, *Technology* is knowledge of the principles of ship building, the organisation of the work and the administration and structure of the ship or boatyard. *Technique* is the description of how the vessel is built and the actual physical application of the skills and crafts.

Clinker building was the dominant ship building technique in Norway, until the transfer to carvel technique during the 1800’s. The change to carvel building was not always easy for a ship or boat builder, used to clinker building. It is by no means certain that a ship builder has mastery of both techniques; the reverse is in fact often true. There has been a clear and defined specialisation.

Technically speaking there appears to be little difference between the two techniques. Clinker- built vessels have overlapping cladding boards, while in carvel building the boards are butted. In order to understand the technological difference better, one can say that clinker building is a shell-first building technique and carvel building is a skeleton-first building technique. One of the major differences between shell building and skeleton building is that the shell builder always has full visual control over the form of the vessel. The design of the sub-surface hull is of prime importance in determining the vessel’s sailing characteristics, and by adjusting the lay of the boards the builder can form the hull to the desired shape prior to the ribs being installed. The skeleton builder, however, is bound by the design and form of the vessel in that the ribs have been attached to the keel *before* the boarding is nailed into place. This demands that the building is carefully planned in advance, for example in the form of a lines drawing or a half model.

Carvel – the term

The word “carvel” appears for the first time in a Portuguese manuscript (the so-called Gala-charter, dated 1255) and describes a Mediterranean fishing boat type – *à caravel*. The word is possibly the same as in the Arabian vessel type *carib* or *caravo,* which had two or three lateen-rigged masts. The sources give no indication of the construction method used to build these smaller vessels. Later from around 1440 and on, the name can be found in a number of written sources, for example in connection with stories about the Portuguese explorers. There was of course a difference between the Portuguese, relatively speaking, large fishing vessels and the vessels that were sent out to explore the West-African coast near the end of the 1300’s. (Uldum 1999, after Unger 1987).

The c*aravela* – Caravel – of the 1400’s is a type of Portuguese vessel built on the basis of techniques that were developed around the Mediterranean. This type of vessel has been highly lauded in connection with Portugal’s success as a sea faring nation, and has given the name to the whole complex of technologies we are discussing here.

Typologically, today’s historians describe the carvel as a vessel from the 1400’s, a two to three-masted, lateen-rigged carvel built vessel, the Nordic version with square sails rigged on

two of the masts. Carvel building had even then become a standard construction method around the Mediterranean, while clinker building was more or less the sole method used in Northern Europe. The European clinker built vessels of the middle ages were similar all over continental Europe and in England. Coqs and holcs were the dominant merchant vessels.

Italian and Portuguese carracks started to turn up in Northern European ports around the middle of the 1300's. In 1416-17, eight Genoan Carracks were hi-jacked in an English port. However, King Henry V gained little advantage from the ships, as no English shipbuilder could repair them and ship builders from Venice and Catalonia had to be hired to do the work (Friel 1995:174).

The first English carvel was built in Dunwich, Suffolk, in 1463 under the leadership of Portuguese shipbuilders. The vessel was carvel built, which means literally "built like a carvel". Here we find some of the basis for the transfer of the technology — and the name.

As early as the 1540's, a method was developed in England that made it possible to abstract from the hull design and to *construct* the ribs using a compass varying the radius (Probst 1993). It can be said that the basis of modern ship building theory was laid in England. This was not accomplished by master ship builders, but by learned men who were engrossed in the then modern sciences of physics, astronomy, mathematics, geometry and so forth. Later – around 1670 – the dissertation "Doctrine on Naval Architecture", written by perhaps the best ship builder and architect of his time, Anthony Deane, was published. He also formed his ribs using a compass.

Early carvel building in Norway

From the early middle ages the extent to which Norway could trade independently with foreign partners was strictly regulated by the King in Copenhagen. Attempts were made to limit shipbuilding, trade and seafaring outside the towns and cities through a number of royal decrees and rulings. In an edict from around 1260, King Håkon Håkonssøn forbade farmers to travel to buy and sell unless they had a minimum of 3 marks capital. After the Black Death in the 1350's, it was even more important to bind the farmers to their land, and in 1364 it was ruled that only farmers with more than 15 silver marks capital should be allowed to travel to the towns and larger markets. In 1421, King Erik of Pomerania renewed the ban, and this was repeated again in 1490.

The many bans were repeated a number of times up to the 1600's, which indicates that they were in all likelihood ineffective. The authorities attempts to forbid farmers from seafaring must be viewed in relation to the growth of a trading elite amongst the bourgeoisies from the end of the 1400's. This elite felt that their trading privileges were under threat from the farmers. For his part, the King was in need of good oak timbers for his navy, and was therefore interested in preserving the forests. The motives were therefore different (cf. Nerhus 1955 and Thowsen 1968).

The carvel building that was carried out in Norway up to the close of the 1500's was done under the auspices of the King. The construction of warships, which had to be both larger and more solidly built than merchantmen, contributed to improving the level of expertise and skill amongst ship builders. The majority of ships were built in Copenhagen using Norwegian materials, but as time passed a good number were built in Norway as well. Smith (1927:46) says that it was "Dutch and Danish ships' carpenters who were brought her" who taught the Norwegian craftsmen the skills of carvel building and ships' carpentry. There was in fact an edict issued by the Danish authorities that the ships were to be built "in accordance with the *model and technique*, which we, together with our own ship builders will send to Norway (...)" (Smith 1927:52).

Ship building in the coastal villages during the 1600 and 1700's took a number of forms: boats and farmers, or ships for the city bourgeoisie or the King. Shipbuilding for foreigners

could be done by the farmer himself, or under an arrangement where the foreign shipbuilder used the farmer's or landowner's facilities and timber. Most of the work force came from local villages and hamlets, but the master ship builder was often a foreigner, if a carvel built vessel was to be constructed. Labour was often imported in connection with carvel building from, among other countries, Holland, France and England.

Some sources contain references to early carvel building in Norway. The following is a list of these.

Small vessels for export were being built as early as in the 1400's in places such as Hardanger and Sunnhordland on the south west coast of Norway. An edict from 1444 tells indirectly of this, and shows that the Hansa Merchants used straw men to have their ships built in the coastal villages. In the Court Journal's Article 17, a ban was placed on "roaming through the woods in search of timber". They (the Hansa Merchants) were to purchase their requirements from the City Merchants, who made their living from this trade. Then a ban on shipbuilding in the villages was introduced (in other words: this had been going on for a long time) (Nerhus 1955:63).

The ship builder Frederik Banck travelled from Denmark to Amsterdam in 1565 to hire Dutch ship building workers to build a ship in Norway (Mortensøn 1995:49.) In 1558, the King ordered that his two ships were to be exchanged for two ships that had been built in Bergen and Oslo, and that were of good quality. The ship from Bergen came to be known as the *Carvel from Bergen* (Mortensøn 1995:204).

In 1576, the King, by request of the Norwegian governor, *Paul Huitfeldt*, gave permission that «...there must once more be more ships, but no ship over 10 or 16 Lasts, unless these be carvel built, which thee (Huitfeldt) believe will serve the Kingdom best..." (Thowsen 1968:25).

King *Christian IV* (the King of Denmark-Norway 1588 - 1648) had imposed a ban of the building Jekts larger than 20 Lasts in Bergenhus fiefdom, but the Scot, Archibaldus Douglas of Wingen (Wittingen), received permission in 1590, through the Scottish King James VI, to build a Jekt of 80 Lasts in the Fiefdom of Bergenhus, with the support of the Danish King. (Nerhus 1955:64) The ban on shipbuilding was reinstated in the same year.

The *St. Franciscus* carrying 34 canons, built in either Hardanger or Sunnhordland in 1670, fought with honour together with the reserve fleet ship *Gyldenlevs Vaaben* in the battle with the pirates off the coast of Algiers in May 1672. (Nerhus 1955:67, Wiesener 1931:14.) We have no knowledge of either the shipyard or shipbuilder, but a picture of the ship (*copperplate print by J. Maschius in the Bergen Maritime Museum)* shows that the vessel was carvel built. The design, rigging and embellishments were as good as any other of its time.

"by their own inventiveness"

We have some knowledge of how shipbuilding was developing in the villages from around 1800. By this time, most of the technological challenges had been more or less conquered, and the carvel technique had become somewhat more standardised and accepted. Ship and boat builders, who had until then constructed only clinker built vessels, had started to use the carvel method.

During the second half of the 1700's, surveys were carried out to determine the status of the shipbuilding industry in Denmark and Norway. We know the results through records that have been preserved in magistrates' archives, customs' archives and so on. The best known is probably the survey that was carried out in 1803. It was then that the Commerce Collegiate in Copenhagen issued a question to the County Administrators asking "(...) to what degree

are the inland shipbuilders capable of supplying the Kingdom's need for vessels in connection with the very high level of sailings."

According to the reports, during the five-year period 1799-1803, 26 master ship builders built 152 ships in Norway. The average size of the reported Norwegian built ships was just below 55 Lasts (approximately 110 gwt.).

The reply from the County Administrator in Bergenhus stated that (...)"the ships were built by farmers, for whom this work was quite new, assisted by carpenters from Bergen, who knew how to build according to drawings. The ships were both carvel and clinker built, the exterior cladding was fixed to the stems first and then clinkered, after which the inner timbers were fixed into place". It was merchants in Bergen who had ordered the ships, and the wood used was for the most part local pine. Constructed up to the point when the master shipbuilder could and had issued his certificate, they were sent to Bergen where they were finished and clad. We see the same pattern in Kristiansund, where the town's merchants had "large 'jakts' shaped like ships" built in the area, which were clad in the town, had decks fitted and were outfitted "as ships" (Smith 1927:91f). Terms that are often repeated are: "Experience and a good eye guide them well", "work for the most part relying on a good eye, apart from some measurements that are calculated according to the length of the keel", "not by following drawings but by their own inventiveness" (Nielsen 2000:18).

Building according to one's own inventiveness, or using one's own ideas or invention is also known as clamp building in Denmark (Nielsen 2000). This describes a method where no drawings are used, but where the shipbuilder uses a different method for designing the ribs. Clinker building is also sometimes called 'invention building'. Clamp building and invention building appear in the records as the opposite of "the use of construction drawings" and one notes that clamp building is rated as the poorest alternative (Nielsen 2000:15).

The old method of designing the frames was to draw them out in full size using a compass. By erecting a few, designed frames along the keel, the ship builder had a sufficient number of "positions" to work with. Ribbands (boards used to aid in forming the shape of the hull) were placed between the frames. More frames could then be formed against the ribbands, thereby filling in the spaces between the main timbers.

As late as in 1901-02, a carvel built vessel was constructed using this method: According to the newspaper Nordland March 9th 1902 issue, Jahn Andreassen, from Sundby, had constructed the first carvel built decked boat in Saltdal, in the northern part of Norway. This was a 35-foot smack, "built without drawings using just the human eye, using a method in which moulds are erected. Timbers are then nailed to these to which the frames are then attached."

At around 1800 we find at least two main methods of shipbuilding that produce much the same result:

- Carvel building using drawings (first and foremost in the towns)
- Carvel building by "own invention" (first and foremost in the villages)

Which or what techniques that were used in invention building cannot be determined with certainty from the available sources. Erik Møller Nielsen (2000) more or less equivalates invention and clamp building to constructed frames. As we read the sources, building after their "own invention" only tells that the shipbuilder designs and builds the vessel without the use of drawings. He has the design "in his head". Therefore, it is also possible that clinker building of the hull in the villages with cladding finished in the larger towns was also referred to as invention building. Half-carvel, where the bottom of the hull is clinker built and the sides carvel built is first mentioned somewhat later (cf. Kolle 1995). It is however unclear whether this method is also described as invention building around 1800.

When did shipbuilders first start to employ design models or half models? We don't know for certain. As far as we can tell from Norwegian sources, no models have been found that were used for construction that pre-date the 1840's.

The Norwegian historic boat researcher Gøthe Gøthesen has scrutinised all the 43 models housed in the Norwegian Maritime Museum. None of these seem to pre-date 1860. Based on these findings, he concludes that the use of half models prior to 1860 was very rare, and that we therefore have a long tradition in ships drawings that pre-dates the model tradition. But if the 1776 decrees had little success due to the demand for drawings, then drawings cannot have been in common use at that time. We can provisionally draw the conclusion that those who built according to their "own invention" up to the mid 1840's used neither models nor drawings, but designed the frames in full scale. Perhaps models have some function, wich we do not yet know.

Model from the Sunnhordland Folkemuseum, dated 1844. One of the oldest known models in Norway.

Training books and regulations

How and to what degree did the boat and shipbuilders of the villages acquire knowledge of carvel building? Towards the end of the 1700's it was possible for Norwegian shipbuilders to acquire knowledge in a number of different ways. The most obvious was to try and get work at a shipbuilding yard under a recognised master ship builder. Another possibility was to travel to the larger towns and cities and get work at the temporary yards or one of the few permanent shipyards. A third possibility was to seek work abroad in Sweden, Denmark or England. No records were kept of the number of Norwegian shipbuilders who left home to learn shipbuilding or where they came from.

Of early training manuals the best known is probably *Åche Rålambs* "Skeps Byggerii eller Adelig Øfnings tionde Tom" (1691, 10 volumes, of these one on shipbuilding). We have no idea of the degree of influence the book had on shipbuilding along the coast and fjords, but it certainly had some. The illustrations show that the techniques and tools were exactly the same as those used by ship and boat builders 100 and 200 years later.

In Copenhagen, the *Konstruktionsskolen* (Ship Design School) was established by Royal Decree on September 8 1757. The school focussed solely on the design of naval vessels. No information is available as to whether Norwegian students attended the school, but the archives of the Handels og Søfartsmuseet at Kronborg, Helsingør, contains some practice drawings of local Norwegian boats, which clearly indicate a good knowledge of Norwegian shipping. The school was closed/converted around 1813 (Klem 1985 and Bjerg & Erichsen 1980).

Even though ship design and architecture was an independent theoretical field from around 1750, ships drawings appear to have played only a marginal role in shipbuilding at the close of the 1700's. According to Hasslöf (1970:70) drawings were quite simply not accepted in the shipyards.

A school for shipbuilders was established in England in 1811, but was closed 20 years later. The reason was in part that the school did not attract enough students and in part the shipyards did not accept them. Hasslöf claims that the results of research into technical ship design, which form the basis for drawings of carvel built vessels, do not appear to have fostered any interest until the iron and steel ship era. Gøthesen opposes this point of view,

and claims that one must differentiate between those that built smaller fishing and coastal trading vessels and those that built the large trading and warships. This differentiation is based on the fact that even today the smaller boat and shipbuilding yards have based their constructions on half models and not on theoretically based design. ”But the old ship builders that constructed the large sailing ships knew how to draw and calculate, even though they may have had a minimum of education” (Gøthesen 1990:76).

Fredrik Henrik af Chapman's many dissertations, among these the *Tractat om Skepps-Byggeriet (The Shipbuilding Tractate),* (1775) were translated into several languages, among these English, German and Russian.

The first training manual published in Norway was prepared for the Naval Academy's Technical School by H.A. Sommerfeldt, published in 1856. The effect the manual had on Norwegian shipbuilders is unknown.

Some Norwegian master ship builders used *N. C. Kierkegaard's* ”Praktisk Skeppsbyggnads-konst”, *(The Art of Practical Shipbuilding),* published in Gothenburg in 1864 as a ship building reference manual (Gøthesen 1990). The work is a book of plates that provides the dimensions of 18 designs of small and large vessels. Kierkegaard was Danish, but worked in Sweden. The ship builder John Hauge took his master ship builders certificate with Annanias Dekke in Bergen from 1867 to 1869. Dekke educated him in ship building theory using German and English language training manuals (Smith 1927:223).

In 1859, "Fællesregler for Bygning av Norwegian Skibe" *(Common Standards for the Construction of Norwegian Ships),* which described and defined material dimensions for all major sections of the hull in relation to the size of the vessel, was published (Smith 1927:142). This means that standards for materials, scantlings, strength and joints, have been in existence since the mid 1800's. One of the prime motives for establishing a common building method has been the establishment of a classification system for insurance companies. Det Norske Veritas was established in 1864.

As late as in 1980, an ordnance was introduced that requires sheer draught, constructional drawings and layout plans for approval to the Maritime Directorate and the Norwegian Shipping Control for vessels under 25 gross register tons. Prior to this, it had not been necessary in principal for shipyards to produce or use drawings for vessels under this size. The vessel's strength is then approved on the basis of the constructional drawings, which are monitored by The Norwegian Maritime Directorate during building. Stability is calculated after the vessel is launched. However, one can claim that there are still no formal standards for ship design. This means that there are still some elements of personal preference, theory and local tastes and traditions in carvel building.

Shipbuilding after 1850

On the basis of the analysis of the builder's certificate from Hardanger and Sunnhordland, the historian Nils Kolle describes a course of development that he splits into three phases. An understanding of the course of development will probably be transferable to other districts. In the first phase (up to the end of the 1830's), a number of vessels were built at farms in Sunnhordland, for the most part under the supervision of ambulating master ship builders. The vessels in question were mainly wide, clinker built, gaff rigged sloops between 40-45 feet. They were probably used to carry fresh herring to the curing plants. Their size may have been dictated by regulations governing maximum cargo volume (60,000 herring per vessel equal to approximately 160 export barrels).

During the second phase (the end of the 1830's to the early 1850's), larger vessels were built. Several of the ships were carvel built or a clinker/carvel built. The period also saw a liberalisation of legislation governing crafts and trade. Anyone was allowed to carry herring

on small vessels (14 Lasts) both in Norwegian and foreign waters, for example to Gothenburg. From 1836 the limit was raised to 25 Lasts and at the same time all vessels were given the right to sail between the fishing banks, the production facility and the port of discharge.

In the third phase (from the 1850's), shipbuilding became more professional, with a new generation of shipbuilders who had mastered the carvel technique. Several of these founded shipyards in the 1850's (Kolle 1995:220f). As the decade wore on, the herring carriers and buyers ventured farther afield, to Trøndelag, Nordland Troms and Finnmark.

The development of the sloop design changed from that of a wide-bodied vessel with a rounded bow to a longer, slimmer vessel with a sharper bow in the 1850's (Kolle 1994:202). This development can be understood by looking at the development of shipbuilding in Bergen. After shipbuilders such as Annanias Dekke and Jens Gran returned home from their studies in Baltimore in the USA, where the fast-sailing clippers had been developed and built in large numbers, it didn't take long before the two shipyards, with Dekke as the prime exponent, introduced a local version of the clipper. It was later known as the "Bergen Clipper", "of the Bergen type", or "of the Dekke type" etc.

There must have been a highly active shipbuilding environment in Hardanger and Sunnhordland. Several master ship builders moved out and established shipyards in other areas. Two of them moved to Møre & Romsdal county; Lars Jensen Hammeraas and John Børve. Børve is best known for his trading yachts (jakts) and ketches. He built using a half model and worked as master ship builder at several shipyards. Hammeraas worked permanently at a shipyard in Romsdal and was very active. He built six jekts, two smacks, eight sloops, two schooners one ketch 'a trading yacht, two schooners and a barque during the first 10-11 years (Vike 1994:45).

Ship and boat building for the fisheries

The Norwegian fishing fleet was totally dominated by open boats until the second half of the 19th Century. But in 1861 two Swedish fishing smacks arrived off the coast of Sunnmøre. They employed local fishermen as pilots, and enjoyed good catches using long lines at Storegga, fishing grounds far out from the shore of Sunnmøre. A merchant from Ålesund immediately converted two of his trading vessels into long line fishing boats. This was the start of the era of Norwegian sea fishing with semi-decked craft. Ålesund's master shipbuilder, Carl Joachim Haasted, built the first Norwegian semi-decked fishing smack in the autumn of 1861. Between 1862 and 1866 Haasted built a total of 14 bank smacks (Maaseide 1991:18).

Haastad's fishing bank smacks were further developed by Lars Jensen Hammeraas of Vestnes in Romsdalen (Maaseide 1991:40). Hammeraas' son-in-law, Kristen Salthammer, was trained by Hammeraas in the 1860's. He remembers the first fishing smack that Hammeraas built (in Vike 1994:51):

"During the summer of 1876, Hammeraas built his first fishing smack "Haabet" for a partnership at Haramsøen. (…) The above-named smack "Haabet", which was of a totally different design than the Swedish smacks, proved to be ideal for the purpose for which it was designed. (…) At approximately the same time, fishing boat designs were also changed, so these are also entirely different from the Swedish fishing boats previously employed.

Ship and boat builders at other locations in Norway had also received orders from fishermen that worked the banks and the North Sea. Small boats remained the favourite vessels for coastal fisheries however, mainly due to poor harbours and the fact that it took too long to travel to and from the banks with larger vessels.

Courses in carvel building

Following a request issued by the Director of Fisheries, courses on carvel building were held for the first time in the winter of 1902-03, under the leadership of the ambulating instructor Johannes Selsvik. Selsvik was born in Jondal in Hardanger in 1854. He died in 1935. His grandparents on both sides of his family were well-known boat builders. He had helped his father in the boatyard from the age of eight.

At fifteen he went to sea, serving on the Nordland trade, which he continued to do for the next five years until he started his apprenticeship as a ship builder with the master shipbuilder Jens Gran in Bergen. He finished his apprenticeship at the age of 23. His first commission was for Ole Vik of Vikør, for whom he built the sloop *Vidar* in 1877.

In 1880 Selsvik was taken on as master ship builder at Bodø Shipyard. In 1893 Selsvik received a public grant and travelled to the Chicago Exhibition. He wrote a detailed report of all he saw there, which was published and read with great interest by Norwegian shipbuilders.

After 16 years at Bodø Shipyard, Selsvik moved to Trondheim where he established his own shipyard. Here he built sailing boats and ships, ferries and open and decked net fishing boats. He was given a commission by the Trondheim Fiskeriselskap to build a ”non-capsizing and unsinkable” fjord fishing boat. In 1899, he built his first carvel built fishing boat. It weighed in at 20 tons, and was the first of many carvel built fishing vessels.

Proposal for a motorized and galley rigged fishing vessel, 70 feet, designed by Selsvik in 1893.

The first motorised boat built by Selsvik was the 54 feet smack *Sunderø* in the year 1900. The petrol engine was now becoming more popular but was still not all that common. The introduction of an engine demanded sturdier designs as the engines became larger and more powerful, and the boats longer. This was a contributing factor to that the government established an ambulating instructor post in carvel building methods.

Johannes Selsvik was asked to apply for the post, which he did, albeit somewhat reluctantly. He explained away his lack of enthusiasm with the claim that he would be doing himself out of a job by training a number of new boat builders. Time proved him right. No further orders came from the north once the courses had been held. Nevertheless, he shut down his shipyard in Trondheim in 1902 and started his new career as ambulating instructor. Disagreement between instructor and trainees broke out in the very first course. The students wanted the course to concentrate more on theory as well as demanding access to Selsvik’s own drawings and models. Selsvik strongly opposed this, as he felt that the drawings and models were his private property.

In his time as ambulating instructor, Selsvik travelled around the country holding three-month courses. Among the many venues were Tallvik, Hammerfest, Nordreisa, Rana, Vefsn, Bindal, Saltdal, Strandebarm and Jondal in Hardanger. He held a total of 15 courses. In addition to this, he supervised 13 teams through inspection. A total of 123 students attended the courses. He also held a few courses on theory, which were attended by a total of 67 men and one woman.

Selsvik left his position as ambulating instructor in 1909 and re-opened his shipyard in Trondheim. As he himself had predicted, things did not go well. Selsvik was awarded the Royal Order of Merit in 1926 (Aune 1991).

Laminated materials

A step towards the rationalisation of the industry was the introduction of the use of laminated materials. The situation regarding materials had started to become difficult as early as around 1950:

"It is difficult to obtain both curved raw timber and rootstock for jointing the ground timber. Frames are therefore mostly constructed from straight timber. This is a shameful waste of good timber, and results in a sever reduction in the strength of the construction.

By bending and gluing laminated frames, one achieves much better economical use of the material, and standard sawmill timber can be employed. (…)

These new design methods and construction techniques may well lead to a renaissance in wooden shipbuilding in the ongoing fight to compete successfully with steel. But if this type of construction method is to succeed, its is vital that the potential of the method is judged without bias and that Veritas carries out the necessary revision of its rules and regulations" (Strøm 1949:549).

Westermoens Båtbyggeri & Mek. Verksted in Mandal had been one of the first to laminate wood. As early as in 1949 they had built a number of large pleasure craft (Fortuna) using laminated wood. It is also said that a scholarship holder from the USA by the name of M.L. Selbo was here at that time. He has contributed to NTI's expertise in lamination (Karl Mørkved, in conversation). Westermoen also built motor torpedo boats using laminate.

The pioneer in the use of laminated wood in the construction of fishing vessels was Klaus Ås of Mjosundet Båtbyggeri, a boatyard in Møre og Romsdal county. He developed a new method of construction based on laminates, without the use of adhesives. The first vessel he built using this method was the M/S Klaus Ås, which was commenced in 1954 (Arisholm 1999:17ff).

The introduction of laminated wood in the wooden ship building industry meant that new regulations were required from Veritas. The wooden ship regulations had seen little change since the first regulations were adopted in 1864. The new wooden ship regulations, which included regulations governing laminated wood, were adopted on August 13th 1954. This meant that the regulations were updated to the age of the combustion engine and new building materials.

In connection with this, a course was held for boat and shipbuilders in order to update them on the new regulations. The course leaders were among others Karl Mørkved from Treteknisk institutt *(The Technical Institute for Wood),* boat builder Toralf Westermoen and the third was from The Norwegian Maritime Directorate. A course in laminating was held in Rognan in the winter of 1961. It was the Member of Parliament Erling Engan that took the initiative for the course (Mørkved, in conversation). Laminating gained a foothold with some Norwegian boat builders during the period 1960-1975. There are however those that never used the method and carried on using frames made from straight timber, and perhaps curved on the rare occasions this was available.

The technique of lamination requires equipment for gluing and forming, not to mention a total change in building methods compared to those used when building with solid timber. The work must be carried out under cover, and this was one reason why only a few builders changed to laminate. There were no doubt a number of boat builders who felt that a new era was dawning, but the cost of ”upgrading” the yards with new knowledge and equipment would be too high. Those that made the change and carried on had to modernise and move indoors in order to have the proper facilities for the building of laminated vessels.

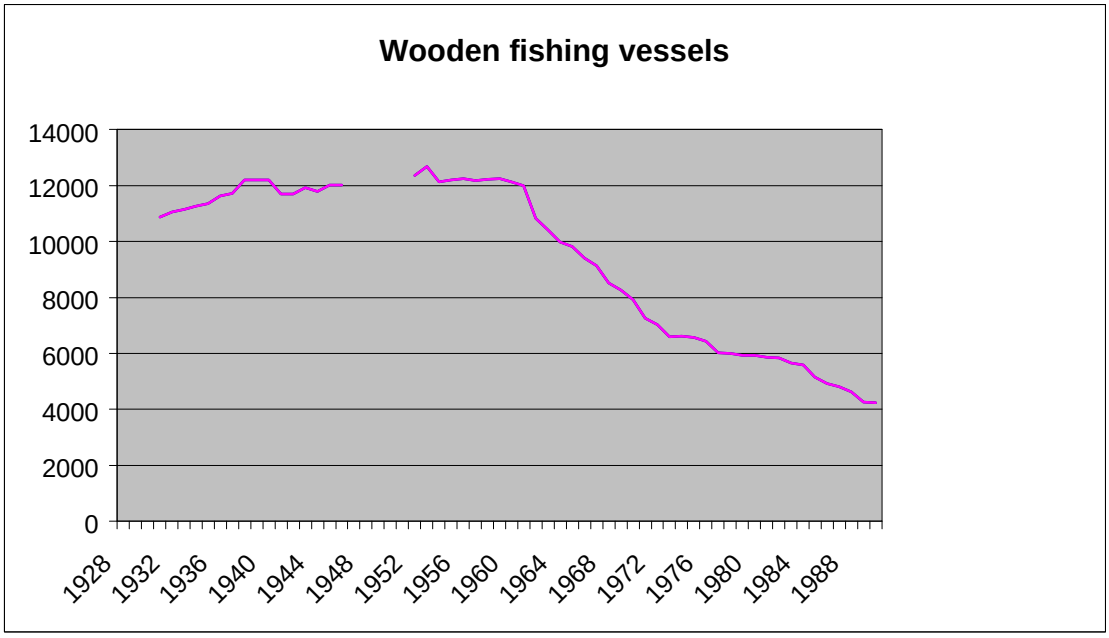
The decline in new buildings

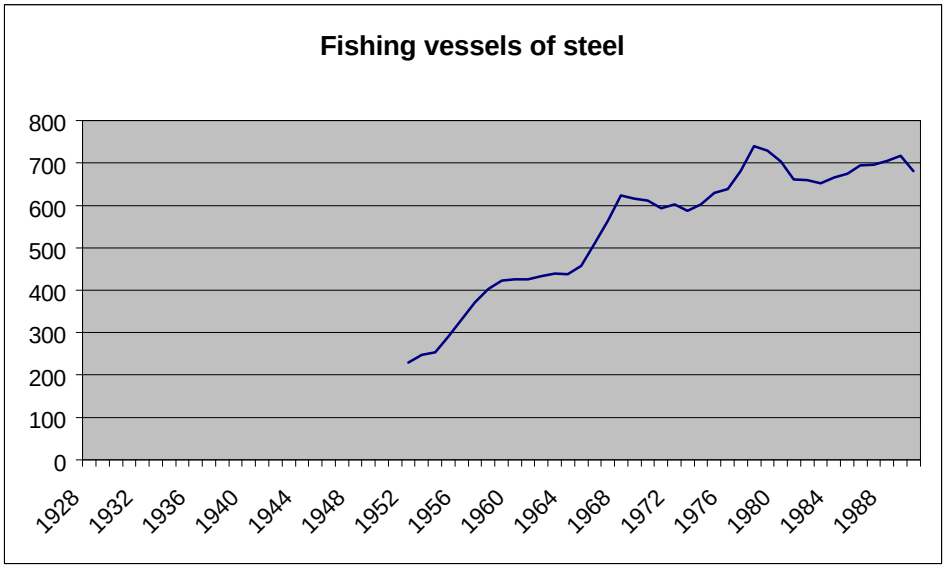
The fishing industry is a ”series dependent system” (Sagdahl 1983). A crisis in one link of the chain will rapidly transplant itself to the other links. This makes it more difficult to identify causes. But there is no doubt that the convolutions in the fishing industry, whether these be caused by failing natural resources or politics, effect the number of fishing vessels built. The fishing industry went through a crisis in the years between the two world wars. This was mainly concerned with trade, and was resolved through the introduction of new organisational forms and increased state controls. There was a crisis in natural resources during the 1970’s that was handled by the imposition of restrictions.

The conventional sector of the fishing industry was considered to be less than effective by fishing authorities during the years immediately following World War II. They planned to restructure and rationalise the industry through a number of policies. In short, the coastal fisher-folk were worse off throughout the 1950’s and 60’s. In the 1970’s however, the realisation dawned that the crisis caused by the lack of available stocks had to be met using other methods and initiatives, and the traditional coastal fisheries were given higher priority in Northern Norway (Sagdahl 1983). This led to increased focus on the smallest (small smacks) and largest vessels. The medium class, where it has still been the rule to use wood, has not seen the same development. Small smacks have increasingly been built in plastic while the larger vessels are constructed from steel.

The number of registered fishing vessels does not appear to have increased to any great degree during the 50’s. There was an increase in the immediate post war years, and during the 50’s this level was just passed. However from 1962 and on, the curve takes a downward turn, and showed just over 4000 vessels around 1990, compared to more than 12000 in the period 1938-61.

We can perhaps say that the coming of the 1960’s signalled changing times, and that choices had to be made. Up until then, the boat yards had built different types and sizes of their own design, and many continued to build under the open sky. Many fishermen disliked the thought of having a new vessel built outdoors, as there were now boatyards that could offer vessels built in the dry. Apart from this, laminating demanded that work be carried out indoors, and there was a general rise in the demand for more comfort and rational production.





Source: Statistics Norway.

In spite of the curve for decked vessels showing a decline, it is not unreasonable to presume that the 60's and 70's were a "golden age" for those that concentrated first and foremost on wooden boats and ships for the fishing fleet. The steep decline downwards was due to among other causes that so many small boats ceased to operate, as was the case with the larger vessels. Many of the smaller boatyards closed their doors, probably because they had no stomach for modernisation. At the same time, the larger yards started to build in steel, and in the West Country this happened as early as in the early 1950's. The number of steel vessels on the graph starts at 229 in 1952 and tops out in 1979 at 740. This means that those who carried on and concentrated on building wooden vessels in the medium class enjoyed better success.

As already stated, the boat building industry is inextricably interwoven in regional and fisheries politics as well as the supply of natural resources. The concentration into more rational units has resulted in a strengthening of Western Norway's position and a weakening of Northern Norway's, where trawling has never really caught on. The traditional coastal fisheries in the north have been reduced and this in turn has dealt the boat building industry a heavy blow. It looks like the industry received a fatal wound during the years 1980-1985.

During this period there was a serious decline in cod stocks in the Barents Sea, which created a high level of pessimism among the fishermen. It now appears that the decline in cod stocks may well be very long term.

Bibliography

Arisholm, Torstein (1995): Kunnskap mellom håndverk og vitenskap. I: T. Arisholm & H. Laugerud (red.), *Myten om det moderne* (s. 233-251). Oslo: Spartacus.

Arisholm, Torstein (1999): En helstøpt lamellpionér: Klaus Ås og fartøybyggingen i Mjosundet. I: *Fartøyvern* nr. 3, s. 17-27. Hardanger Fartøyvernsenter, Norheimsund.

Aune, Bjørn (1991). *Johannes Selsvik 1854-1935.* Trøndelag Folkemuseum. Trondheim.

Berg, Sverre (1981): *Skipsbyggeren Lars Jensen Hammeraas*. Romsdalsmuseet.

Bjerg, Hans Christian (1977): Træk af skibskonstruktionstegningens historie. I: *Convivium, årsskrift for humaniora, kunst og forskning*, s. 8-23. Lademann. København.

Bjerg, Hans Christian og John Erichsen (1980): *Danske orlogsskibe 1690-1860*. København. Lademann.

Christensen, Arne Emil (1977): Maritim kulturhistorie. Forskningsoppgaver som venter. I: *Dugnad*, Tidsskrift for etnologi 2 - 1977 s. 49-54. Oslo

Friel, Ian (1995): *The good ship : ships, shipbuilding and technology in England 1200-1520.* London: British Museum Press.

Gøthesen, Gøthe (1990): *Norske skipskonstruktører på 1700- og 1800-tallet.* Oslo: Norsk Sjøfartsmuseum.

Hasslöf, Olof (1970): Huvudlinjer i skeppsbyggnadskonstens teknologi. O. Hasslöf, H. Henningsen, & A. E. Christensen (red.), *Sømand, fisker, skib og værft* (s. 28-73). København: Rosenkilde og Bagger.

Jorde, Jens-Herman (1999): Ikke bare teknikk, takk! Kronikk i *Bergens Tidende* 11.04.1999.

Klem, Knud (1941): *De danskes vej*. Høst & Søn. København.

Klem, Knud (1985): *Skibsbyggeriet i Danmark og hertugdømmene i 1700-årene*, bind 1 og 2. Finn Jacobsens forlag. København.

Klem, Knud (1971):*Træk af norsk skibsbyggeris historie*. I: Bergens Sjøfartsmuseums årbok 1970, s. 169 – 211.

Kolle, Nils (1995): Småskipsbygginga i Sunnhordland 1820-1860. A. Thowsen & T. L. Nilsen (red.), *Sjøfartshistorisk årbok 1994* (s. 175-228). Bergen: Foreningen "Bergens Sjøfartsmuseum".

Mortensøn, Ole (1995): *Renæssancens fartøjer – sejlads og søfart i Danmark 1550 – 1650*. Meddelelser fra Langelands museum. Rudkøbing.

Nerhus, Hans (1955): *Frå Vikings tid til vår tid. Eit stykke vestnorsk skipsbyggingssoge*. Gravdal skipsbyggeri og trelastforretning. Sunde.

Nielsen, Erik Møller (2000): *Fra Klamp til Konstruktion. Fra håndværk til ingeniørkunst i Aabenraa's sejlskibsbyggeri ca 1800-1880*. Skrifter for Museumsrådet for Sønderjyllands Amt nr. 8. Aabenraa Museum.

Probst, Niels: Nordeuropæisk spanteopslagning i 1500- og 1600-tallet. *Maritim kontakt*, vol. XVI 1993, s. 7 - 42.

Sagdahl, Bjørn 1983. *Fiskeriene på Helgeland*. NDH rapport 1983: 8. Nordland distriktshøyskole Bodø.

Smith, Sverre Bergh (1927): Skibsbyggeriet fra de ældste tider og indtil vore dager. I: J. S. Worm-Müller (red.), *Den norske sjøfarts historie fra de ældste tider til vore dage* (s. 18-330). Oslo: Steenske forlag.

Sommerfeldt, H.A. (1856): *Lærebog i praktisk Skibsbyggeri utarbeidet for Marinens Haandveærksskole*. Christiania.

Strøm, Jan (red.) (1949). *Norsk Fiskeri- og fangsthåndbok*, bind II.

Thowsen, Atle (1968): En studie i vestnorsk trebåt- og treskipsbygging, Sunnhordland og Hardanger. I: *Sjøfartshistorisk Årbok 1968*, s. 7-71. Bergens Sjøfartsmuseum.

Uldum, Otto Christian (1999): *Kravelbygningsteknologi fra Middelhavet til Østersøen. Teknologispredning og skibsbygning.* Cand. mag.-speciale. Københavns Universitet.

Unger, Richard W.1987: Portuguese Shipbuilding and the Early Voyages to the Guniea Coast. *Vice-Almirante A. Teixera Da Mota In Memoriam 1*. Academia de Marinha & Instituto de Investigacao Cientifica Tropical, Lisboa.

Vike, Henry (1994): *Båt- og skipsbygging i Vestnes.* Vestnes kommune.

Wiesener, A. M. (1931): *De bergenske defensjonsskibs deltagelse i Gyldenløve-feiden 1675-79.* I Bergens Sjøfartsmuseums årshefte 1930, s. 10 – 17.