HISTORICAL SURVEY OF SHIPBUILDING AND SHIPPING

Anca Trișcă Ionescu, Daniel Ionescu

PhD. Student, University of Galați; PhD. Student, University of Galați

Abstract: Since a direct relationship exists between shipbuilding and the corresponding terminology, a brief historical survey of shipbuilding in the world, Great Britain and Romania included, is essential at this stage. The present article aims to present the history of shipbuilding in order to understand the shipbuilding industry.

Keywords: shipbuilding, history, survey, naval architecture, industry

Shipbuilding is the construction of ships and other floating vessels. It normally takes place in a specialized facility known as a shipyard. Shipbuilders, also called shipwrights, follow a specialized occupation that traces its roots to before recorded history. Shipbuilding and ship repairs, both commercial and military, are referred to as "naval engineering". The construction of boats is a similar activity called boat building.

Prehistory

Archaeological evidence indicates that humans arrived on Borneo at least 120,000 years ago, probably by sea from the Asian mainland during an ice age period when the sea was lower and distances between islands shorter (See History of Borneo and Papua New Guinea). The ancestors of Australian Aborigines and New Guineans also went across the Lombok Strait to Sahul by boat over 50,000 years ago.

4th millennium BC

Historians are not unanimous in their determination of the birth of ship, but from the evidence it I safe to conclude that man ventured on water before 6000 B.C.

Tomasi (1942:6), in his *History of Navigation*, made the point that “Shipbuilding is the oldest of all arts being born, in fact, before any other artistic undertaking like painting, sculpture, singing, or dancing was born.”

Early man built ships from skins stretched and sewn over a rigid frame, from boundless of reed, and from hollowed-out logs (dugouts). The first boats were probably longboats, rafts and skin boats. Much later came the harnessing of wind and the application of sails. The design of ships has always been determined by the materials available for hull construction, the ships’ particular function, and the character of the surrounding waters. Seagoing craft were constructed in the eastern Mediterranean (Crete) as early as 5,000 B.C. The first sailing ships probably appeared in Egypt or Mesopotamia around 3500 BC. In ancient Egypt ships built of planks were used on the Nile. By about 2,800 B.C. the basic principles of boat building has evolved, with transverse and longitudinal strengths provided by the different parts of the structure. Really large ships were constructed in imperial Rome, capable of loading up to ca 1000 tons. A famous large ship of antiquity was the Syrakosia of Alexandria, a three-masted royal ship, about 70 m long. These crafts were propelled by oars and by a primitive form of rectangular sail. Large ships were also made around 1000 AD in China, also loading up to ca 1000 tons.

Evidence from Ancient Egypt shows that the early Egyptians knew how to assemble planks of wood into a ship hull as early as 3000 BC. The Archaeological Institute of America reports that some of the oldest ships yet unearthed are known as the Abydos boats. These are a group of 14 ships discovered in Abydos that were constructed of wooden planks which were "sewn" together. Discovered by Egyptologist David O'Connor of New York University, woven straps were found to have been used to lash the planks together, and reeds or grass stuffed between the planks helped to seal the seams.[1] Because the ships are all buried together and near a mortuary belonging to Pharaoh Khasekhemwy, originally they were all thought to have belonged to him, but one of the 14 ships dates to 3000 BC, and the associated pottery jars buried with the vessels also suggest earlier dating. The ship dating to 3000 BC was about 25 m, 75 feet long and is now thought to perhaps have belonged to an earlier pharaoh. According to professor O'Connor, the 5,000-year-old ship may have even belonged to Pharaoh Aha.

3rd millennium BC

Early Egyptians also knew how to assemble planks of wood with treenails to fasten them together, using pitch for caulking the seams. The "Khufu ship", a 43.6-meter vessel sealed into a pit in the Giza pyramid complex at the foot of the Great Pyramid of Giza in the Fourth Dynasty around 2500 BC, is a full-size surviving example which may have fulfilled the symbolic function of a solar barque. Early Egyptians also knew how to fasten the planks of this ship together with mortise and tenon joints.

The oldest known tidal dock in the world was built around 2500 BC during the Harappan civilisation at Lothal near the present day Mangrol harbour on the Gujarat coast in India. Other ports were probably at Balakot and Dwarka. However, it is probable that many small-scale ports, and not massive ports, were used for the Harappan maritime trade. Ships from the harbour at these ancient port cities established trade with Mesopotamia. Shipbuilding and boatmaking may have been prosperous industries in ancient India. Native labourers may have manufactured the flotilla of boats used by Alexander the Great to navigate across the Hydaspes and even the Indus, under Nearchos.[5] The Indians also exported teak for shipbuilding to ancient Persia. Other references to Indian timber used for shipbuilding is noted in the works of Ibn Jubayr.

2nd millennium BC

The ships of Ancient Egypt's Eighteenth Dynasty were typically about 25 meters (80 ft) in length, and had a single mast, sometimes consisting of two poles lashed together at the top making an "A" shape. They mounted a single square sail on a yard, with an additional spar along the bottom of the sail. These ships could also be oar propelled. The ocean and sea going ships of Ancient Egypt were constructed with cedar wood, most likely hailing from Lebanon.

The ships of Phoenicia seem to have been of a similar design.

1st millennium BC

The naval history of China stems back to the Spring and Autumn period (722 BC–481 BC) of the ancient Chinese Zhou Dynasty. The Chinese built large rectangular barges known as "castle ships", which were essentially floating fortresses complete with multiple decks with guarded ramparts. There is considerable knowledge regarding shipbuilding and seafaring in the ancient Mediterranean.

Early 1st millennium AD

The ancient Chinese also built ramming vessels as in the Greco-Roman tradition of the trireme, although oar-steered ships in China lost favor very early on since it was in the 1st century China that the stern-mounted rudder was first developed. This was dually met with the introduction of the Han Dynasty junk ship design in the same century.

Archeological investigations done at Portus near Rome have revealed inscriptions indicating the existence of a 'guild of shipbuilders' during the time of Hadrian.

A striking development in Scandinavian waters was the Viking ship, of fine form, but clinker-built, that is, with the plank on the sides overlapping, and propelled mainly by oars and carring a simple rail. A seagoing ship peculiar to Chinese and Japanese waters was the junk, a flat-bottomed boat with square sails of matting. Until the Middle Ages, all Nordic ships were clinker built using the shell-first method. The logs were split radially, and the planks had to be shaped with an axe. Only later, planks were sawed. The changes were driven partly by cog, and by the carvel-built hull which from the 15th century was necessary for warships to support guns. Carvel-built ships were usually built with the skeleton-first method. In the Nordic countries, where wood is abundant, commercial wooden shipbuilding existed until recently. Fishing trawlers were made of wood in Sweden until the 60s, and in Denmark and Finland until the 80s. There are possibly some shipyards in Norway that still build fishing trawlers with wood, using modern laminated wood/glue technology.

Viking long ships were an advancement from the traditional clinker-built hulls of plank boards tied together with leather thongs. Sometime around the 12th century, northern European ships began to be built with a straight sternpost, enabling the mounting of a rudder, which was much more durable than a steering oar held over the side. Development in the Middle Ages favored "round ships", with a broad beam and heavily curved at both ends. Another important ship type was the galley which was constructed with both sails and oars.

An insight into ship building in the North Sea/Baltic areas of the early medieval period was found at Sutton Hoo, England, where a ship was buried with a chieftain. The ship was 26 metres (85 ft) long and, 4.3 metres (14 ft) wide. Upward from the keel, the hull was made by overlapping nine planks on either side with rivets fastening the oaken planks together. It could hold upwards of thirty men.

The first extant treatise on shipbuilding was written c. 1436 by Michael of Rhodes, a man who began his career as an oarsman on a Venetian galley in 1401 and worked his way up into officer positions. He wrote and illustrated a book that contains a treatise on ship building, a treatise on mathematics, much material on astrology, and other materials. His treatise on shipbuilding treats three kinds of galleys and two kinds of round ships.

Outside Medieval Europe, great advances were being made in shipbuilding. The shipbuilding industry in Imperial China reached its height during the Song Dynasty, Yuan Dynasty, and early Ming Dynasty, building commercial vessels that by the end of this period were to reach a size and sophistication far exceeding that of contemporary Europe. The mainstay of China's merchant and naval fleets was the junk, which had existed for centuries, but it was at this time that the large ships based on this design were built. During the Sung period (960–1279 AD), the establishment of China's first official standing navy in 1132 AD and the enormous increase in maritime trade abroad (from Heian Japan to Fatimid Egypt) allowed the shipbuilding industry in provinces like Fujian to thrive as never before. The largest seaports in the world were in China and included Guangzhou, Quanzhou, and Xiamen.

In the Islamic world, shipbuilding thrived at Basra and Alexandria, the dhow, felucca, baghlah and the sambuk, became symbols of successful maritime trade around the Indian Ocean; from the ports of East Africa to Southeast Asia and the ports of Sindh and Hind (India) during the Abbasid period.

At this time islands spread over vast distances across the Pacific Ocean were being colonised by the Melenesians and Polynesians, who built giant canoes and progressed to great catamarans.

Early modern

With the development of the carrack, the west moved into a new era of ship construction by building the first regular oceangoing vessels. In a relatively short time, these ships grew to an unprecedented size, complexity and cost.

Shipyards became large industrial complexes and the ships built were financed by consortia of investors. These considerations led to the documentation of design and construction practices in what had previously been a secretive trade run by master shipwrights, and ultimately led to the field of naval architecture, where professional designers and draughtsmen played an increasingly important role. Even

so, construction techniques changed only very gradually. The ships of the Napoleonic Wars were still built more or less to the same basic plan as those of the Spanish Armada of two centuries earlier but there had been numerous subtle improvements in ship design and construction throughout this period. For instance, the introduction of tumblehome; adjustments to the shapes of sails and hulls; the introduction of the wheel; the introduction of hardened copper fastenings below the waterline; the introduction of copper sheathing as a deterrent to shipworm and fouling; etc.

Industrial Revolution

The industrial revolution made possible the use of new materials and designs that radically altered shipbuilding. Iron was gradually adopted in ship construction, initially in discrete areas in a wooden hull needing greater strength, (e.g. as deck knees, hanging knees, knee riders and the other sharp joints, ones in which a curved, progressive joint could not be achieved). Then, in the form of plates riveted together and made watertight, it was used to form the hull itself. Initially copying wooden construction traditions with a frame over which the hull was fastened, Isambard Kingdom Brunel's Great Britain of 1843 was the first radical new design, being built entirely of wrought iron. Despite her success, and the great savings in cost and space provided by the iron hull, compared to a copper sheathed counterpart, there remained problems with fouling due to the adherence of weeds and barnacles. As a result, composite construction remained the dominant approach where fast ships were required, with wooden timbers laid over an iron frame (Cutty Sark is a famous example). Later Great Britain's iron hull was sheathed in wood to enable it to carry a copper-based sheathing. Brunel's Great Eastern represented the next great development in shipbuilding. Built in association with John Scott Russell, it used longitudinal stringers for strength, inner and outer hulls, and bulkheads to form multiple watertight compartments. Steel also supplanted wrought iron when it became readily available in the latter half of the 19th century, providing great savings when compared with iron in cost and weight. Wood continued to be favored for the decks.

During World War II, the need for cargo ships was so great that construction time for Liberty ships went from initially eight months or longer, down two weeks or even days. They employed production line and prefabrication techniques such as those used in shipyards today. The total number of dry-cargo ships built in the United States in a 15-year period just before the war was a grand total of two. During the war, thousands of Liberty ships and Victory ships were built, many of them in shipyards that didn't exist before the war. And, they were built by a workforce consisting largely of women and other inexperienced workers who had never seen a ship before (or even the ocean).

Worldwide shipbuilding industry.

MS Oasis of the Seas, the second largest passenger ship in the world, under construction at the Turku shipyard that was taken over by STX Europe, a subsidiary of STX Offshore & Shipbuilding of South Korea.

A TI-class supertanker built by Daewoo Shipbuilding & Marine Engineering in Okpo-dong, South Korea.

After the Second World War, shipbuilding (which encompasses the shipyards, the marine equipment manufacturers, and many related service and knowledge providers) grew as an important and strategic industry in a number of countries around the world.

Historically, the industry has suffered from the absence of global rules and a tendency towards (state-supported) over-investment due to the fact that shipyards offer a wide range of technologies, employ a significant number of workers, and generate income as the shipbuilding market is global. Shipbuilding is therefore an attractive industry for developing nations. Japan used shipbuilding in the 1950s and 1960s to rebuild its industrial structure; South Korea started to make shipbuilding a strategic industry in the 1970s, and China is now in the process of repeating these models with large state-supported investments in this industry. Conversely, Croatia is privatizing its shipbuilding industry.

As a result, the world shipbuilding market suffers from over-capacities, depressed prices (although the industry experienced a price increase in the period 2003–2005 due to strong demand for new ships which was in excess of actual cost increases), low profit margins, trade distortions and

widespread subsidization. All efforts to address the problems in the OECD have so far failed, with the 1994 international shipbuilding agreement never entering into force and the 2003–2005 round of negotiations being paused in September 2005 after no agreement was possible. After numerous efforts to restart the negotiations these were formally terminated in December 2010. The OECD's Council Working Party on Shipbuilding (WP6) will continue its efforts to identify and progressively reduce factors that distort the shipbuilding market.

Where state subsidies have been removed and domestic industrial policies do not provide support in high labor cost countries, shipbuilding has gone into decline. The British shipbuilding industry is a prime example of this with its industries suffering badly from the 1960s. In the early 1970s British yards still had the capacity to build all types and sizes of merchant ships but today they have been reduced to a small number specializing in defense contracts, luxury yachts and repair work. Decline has also occurred in other European countries, although to some extent this has reduced by protective measures and industrial support policies. In the U.S.A, the Jones Act (which places restrictions on the ships that can be used for moving domestic cargoes) has meant that merchant shipbuilding has continued, albeit at a reduced rate, but such protection has failed to penalise shipbuilding inefficiencies. The consequence of this is that contract prices are far higher than those of any other country building oceangoing ships.

Wooden construction of small ships was practiced as late as the 1980s in Scotland. Possibly as late as the 1980s (and perhaps still) in Spain, Greece, Maine and Nova Scotia. In Portugal, fishing boats are still, in the 1990s, made of wood in Vilamoura (Algarve) and in Peniche. Wooden shipbuilding is also common in other parts of the world, e.g. Egypt and India.

Present day shipbuilding

China is the world's largest shipbuilder. The country has been an emerging low-cost, high-volume shipbuilder that overtook South Korea during the 2008–2010 global financial crisis as they won new orders for medium and small-sized container ships.
South Korea's "big three" shipbuilders, Hyundai Heavy Industries, Samsung Heavy Industries, and Daewoo Shipbuilding & Marine Engineering, dominate the global market for large container ships. As freight rates continue to decline into 2016, production delays, and overcapacity in the industry have led South Korean shipbuilders into financial distress. Consequently, significant market share has been ceded to their Chinese and Japanese rivals.

Japan had been the dominant ship building nation from the 1960s through to the end of 1990s but gradually lost its competitive advantage to China and South Korea which had lower wages, strong government backing and cheaper currencies.

The market share of European ship builders began to decline in the 1960s as they lost work to Japan in the same way Japan most recently lost their work to China and South Korea. Over the four years from 2007, the total number of employees in the European shipbuilding industry declined from 150,000 to 115,000. The output of the United States also underwent a similar change.

Shipbuilding in Romania

Romania’s access to the Black Sea and over 1,000 km of natural border shaped by the Danube river contributed to the development of shipbuilding since the mid nineteenth century. Once the crown jewel of the communist regime, the Romanian naval industry went through a stormy period during the last decade of the twentieth century. Due to the radical changes in the economy after the fall of the iron curtain, the sector had been severely under financed.

As far as the ancient and Middle Ages ship construction on Romanian soil is concerned, not many written evidence is available. More recently, however, research points to the fact that in ancient times an intense navigation and ship construction activity was carried out at the Danube mouthed and Dobrogea sea-shore. This was mainly achieved by the colonies (e.g. Histria, Tomis, Callatis) set up North-West of the Black Sea coast by ancient Greece. This activity continued after the Romans occupied Dobrogea, only to be interrupted towards the middle of the 3rd century A.D. by Goths’ invasion.

Towards the end of the Middle Ages notable commercial relations between the Italian republics of Genoa and Venice and the Romanian Principalities were established. All this led to an increase in shipping and ship construction by all traders, Moldavians included.

The fall of the Constantinople in 1453 and the penetration of the Turks in Balkans, the Romanian port-citadel included, brought about a substantial decrease in shipbuilding and navigation over a period of about four centuries. As a consequence of the weakening of the Turkish Empire and of the considerable growth of the Romanian forces of production, in the second half of the 19th century various industrial enterprises, including shipbuilding yards, were set up all over the country. First, at Turnu-Serverin, later on at Galatz, Braila, Giurgiu, Tulcea, Constanta, and more recently, at Oltenita and Mangalia. All this yards have been engaged in ship repair rather than in ship building proper, many large vessel being, in fact, imported from different countries. However, between 1900-1945 more than 250 vessels were built in Romanian shipyards, of which about 60 tugs of 60-150 HP, 11 passenger ship of about 100-1400 HP, 2 submarines, tankers etc.

The 2nd World War cut the production capacity of our naval industry to about 45%. In order to have a clear picture over the growth of our shipbuilding industry in 1951-1975 we shall examine the table below:

Type of ship	1951-1955	1956-1960	1961-1965	1966-1970	1971-1975	Total
Bulk-carriers	-	2	31	53	99	187
Smaller sea-vessels	208	141	6	6	27	388
Self-propelled/powered/river-ships	13	156	197	399	112	876
No propulsion river-vessel	290	450	694	730	218	2382
Technical ships	15	43	32	30	52	172
Total	525	792	960	1218	508	4003

Table 1. Number of ships built between 1951-1975

It is to be noticed that a great number of sea-going and river-ships of various types have been exported to different countries of the world, such as: the URSS, China, Vietnam, Bulgaria, Poland, India, Greece, Egypt, Israel, Iran.

As of 2009 the Romanian shipbuilding industry ranked tenth in the world in terms of gross tonnage production. While in 1989 over 80% of the output was for the domestic market, currently 70-80% is exported mainly to EU, China, South Africa, and Norway.

At present time, there are nine major shipyards in Romania and some seven smaller scale workshops. Constanța, Mangalia and Midia shipyards are situated on the coast of the Black Sea. Tulcea, Galați and Brăila shipyards are located close to where the Danube flows in the Black Sea. Orșova, Drobeta-Turnu Severin and Giurgiu are fluvial shipyards in the south-western part of the country, bordering Serbia and Bulgaria respectively. The long tradition of shipbuilding led to the development of educational programs that deliver highly skilled specialists, a strong research and design data bank.

Romanian shipyards are generally specialized in building ships for freight transport. The main types of ships build here are bulk carries, tankers, cargo ships, fishing vessels, towboats, pushers and barges. Mangalia shipyard specializes in containers of at least 5,500 TEU capacity and 80,000 to 180,000 DWT bulk carriers. Constanţa shipyard builds 40 to 55,000 DWT tankers, while Damen Galaţi builds military ships and tugboats. Tulcea and Brăila shipyards specialize in supply vessels and tugboats, whereas Severnav Drobeta-Turnu Severin and Orşova focus mostly on river ships and coastal ships.

Constanţa Shipyard (Romanian: Şantierul Naval Constanţa) is the largest shipyard in Romania and one of the largest in Europe having a market share of 20% in the Black Sea basin. The shipyard has two drydocks, one used for the construction of ships up to 150,000 tonnes deadweight (DWT), and the second one used for the construction of ships up to 250,000 DWT, and two floating docks with a capacity of 8,000 tonnes and 15,000 tonnes.

The Constanţa Shipyard was first mentioned as the Craft Repair Shop within the Constanţa Harbour area in 1892 by the Ministry for Public Works. In July 1905, the shipyard housed the Russian battleship Potemkin and refloated her after she was half scuttled by her mutinous crew. The first ship ever constructed by the shipyard and launched to sea on May 31, 1936 was a 12 metres (39 ft) long yacht named Crai Nou, designed and built by Alexandru Theodoru a student at the Naval School in Constanţa and graduate of the French Naval School.During World War II, the shipyard provided repair and maintenance to the Italian flotilla of midget submarines operating in the Black Sea. Together with the Galați shipyard, it also rebuilt, maintained and repaired numerous German R-boats during the War. 1950 the shipyard began to construct ships, pontoons, tugboats and towboats. In 1975 the shipyard constructed one bulk carrier of 54,200 DWT which was the first large ship ever constructed in Romania.

After the construction of a large bulk carrier Giuseppe Lembo in 1994, the shipyard reprofiled its activity to construct only small ships. Only after the privatisation in 2002 the shipyard restarted to construct large scale ships. In the 114 years of existence the Constanţa Shipyard constructed 432 ships, 365 for Romanian shipping companies and 67 for shipping companies from Egypt, Russia, Greece, Japan, Hong Kong, Liechtenstein, Czech Republic, South Africa, Belgium, Germany, Italy, Norway, France, Panama and Netherlands, which have a total of 4,128,143 DWT.

Daewoo-Mangalia Heavy Industries or DMHI is a large shipyard located 45 kilometres (28 mi) south of the Port of Constanţa, in Mangalia, Romania. It was formed in 1997 as a joint venture between South Korean company Daewoo Shipbuilding & Marine Engineering and the 2 Mai Shipyard in Mangalia. Since it was founded the company built over 127 new ships and repaired around 300 ships.

The shipyard is spread over an area of 980,000 square metres (10,500,000 sq ft), has three dry docks with a total length of 982 metres (3,222 ft) and 1.6 kilometres (0.99 mi) of berths. In 2002 the company delivered two tankers of 42,500 DWT to the Norwegian company Kleven Floro used for the transportation of orange juice. One of the main customers of the shipyard is the German company Hamburg Süd which ordered six container ships of around 6,000 TEU each, and seven ships of 7,100 TEU each as well as four tugboats. The company also signed in 2005 an agreement with Mediterranean Shipping Company S.A., NSB Niederelbe, Gebab and Conti Reederei companies for the construction of 12 container ships of around 5,000 TEU each that will be delivered in stages until 2011 at a total cost of US$1.1 billion.

In 2008 the shipyard bought the largest gantry crane in North America, the Goliath Crane, formerly located in Quincy, Massachusetts from the General Dynamics company. Built in 1975, the crane, nicknamed Goliath, Big Blue, The Dog or Horse, has a height of 100 metres (330 ft), a span of 126 metres (413 ft), a weight of 3,000 tonnes (6,600,000 lb) and a lifting capacity of 1,200 tonnes (2,600,000 lb). The cranes's re-assembly has been under way since March 2009.

The Galați shipyard (Romanian: Șantierul naval Galați), formally Damen Shipyards Galați, is a shipyard located on the Danube in Galați, a city located in the Moldavia region of Romania.

Shipbuilding is a longstanding practice at Galați: by the late 18th century, longboats, canoes, sailboats and kayaks were being built there for both commercial and military use. Due to Moldavia's being a vassal state, most war vessel production was on behalf of the Ottoman Navy through the 1820s. The wood, of high quality, came from forests upstream and was brought by raft. It was not until the late 1830s, following the establishment of a free port at Galați, that the bulk of its ships started being used domestically: seven vessels were built there in 1839, followed by ten in 1840. In 1893, a local resident named Fernic purchased the arsenal of the fleet stationed there and the Naval Mechanical Factory, beginning ship production at what was called Șantierul Naval Fernic Galați ("Fernic Shipyard Galați").

Four river monitors (NMS Ion C. Brătianu, Mihail Kogălniceanu, Alexandru Lahovari and Lascăr Catargiu) were commissioned for the Romanian Navy in 1907. Built in sections in the Austro-Hungarian port of Trieste, they were assembled in Galați. In 1911, under the Premiership of Petre P. Carp, the area suffered some structural collapse, allegedly as a result of bad workmanship and political corruption (investigated by Nicolae Fleva on behalf of the Opposition).

During the interwar period and into World War II, the yard had strategic significance, and two submarines (NMS Rechinul and NMS Marsuinul) and one minelayer (NMS Amiral Murgescu) were built there. Initially commanded by German captains, these later fell to the Soviet Navy. From 1938 to 1944, Galați completed 65 civilian ships and 11 warships: in addition to the submarines and minelayer, these consisted of four speedboats and four minesweepers.The components of the Cernavodă Bridge were also built at Galați. In 1974, the Communist regime made a massive investment into the shipbuilding industry, so that the yard became fully stocked with supplies, including an animal farm. From that time until the 1989 fall of the regime, some 80% of the shipyard's products were exported. Following this event, there were 32 unsold boats at the shipyard, and these were only liquidated in full in 2000. Meanwhile, the Dutch Damen Group had taken over the yard.[3] The group's interest in Galați began in 1994, when it subcontracted several cargo vessel hulls.[3][4] This was the means by which its manager decided whether to invest somewhere. Noticing too that the boats left over from the Communist period were being reinforced, he decided to take control of the shipyard company's stock, which happened in 1999. Although he wished to obtain 100% of the shares, he only managed to acquire 99%, the remainder being in the hands of unidentified individuals who received privatization vouchers in the 1990s.

Galați is the largest naval shipyard on the Danube, its output ranging from large tankers to small coast guard patrol boats. The company also represents a significant element of the local economy. Since 1990, all of its products have gone to export. Following Damen's takeover, an investment plan focusing on improving efficiency and working conditions was introduced. For example, at the time of the takeover, spoons and coffee cups were listed in the inventory; afterwards, all items worth under $100 were considered disposable goods and no longer placed on the record books. The yard builds offshore vessels, naval vessels, special vessels (such as buoy laying vessels, patrol vessels and research vessels), tugs, workboats and mega yachts, and has also produced oil tankers, container carriers, cargo barges and drilling rig platforms—over 250 vessels since 1999. There were some 1550 employees at the end of 2010, as well as 1150 subcontracted employees handling support functions including electricity, HVAC, carpentry, blasting and painting. This was down from 10,000 total employees in 2006, of whom 3100 worked for Damen. Engineering services are mainly supplied by a Galați firm established in 2004 in which Damen is the major shareholder. Production takes place on four lines: for vessels up to 10,000 dwt, for vessels up to 26,000 dwt, for vessels up to 50,000 dwt and for tugs and workboats. There is also a workshop for piping and galvanizing and a blasting and painting hall.

To better grasp the achievements as well as the complexity of the Romanian shipbuilding industry we still have to get acquainted with the work carrier out by three more institutions: **Registrul Naval Roman**-RNR-(Romanian Register of Shipping), **ICEPRONAV** (the Institute of Research and Design of Ships) and **The Naval Architecture Faculty** at the University of Galatz.

Romanian Register of Shipping is a state organization for technical survey and classification of sea-going ships, inland vessels and containers. The Bucharest Head Office has permanent connections with sixteen offices all over the country and co-operates with other foreign registers. Particulary valuable for the ship terms they include are RRS' publications: *Register of Ships, Rules for the Classification and Construction of Steel Se-Going Ships, Guidelines for Technical Supervision of Containers, Rules for the Construction of Containers, Rules for the Classification and Construction of Inland Vessels* etc.

ICEPRONAV was a central institute for research and design of ships. As its name implies this institution was responsible for the research and design of practically all types of large vessels which were built in Romania. Nowadays it designs ships for companies all over the world as part of the ICEPRONAV UK.

The Naval Architecture Faculty trains most of our highly qualified specialists in the field of naval architecture.

All these hundreds and thousands of people working at or o ship also make use of special terminology which is steadily increasing. The study of this lexis is complex and valuable for any translator working in the field.

BIBLIOGRAPHY

- http://sanco.ro/en/romanian-shipbuilding-overview/
- https://en.wikipedia.org/wiki/Constan%C8%9Ba_Shipyard
- https://en.wikipedia.org/wiki/Daewoo_Mangalia_Heavy_Industries
- https://en.wikipedia.org/wiki/Shipbuilding
- https://www.abc.se/~pa/bld/tradbld.htm
- Higgins, C. (2012) *The Venetian Galley of Flanders: From Medieval (2-Dimensional) Treatises to 21st Century (3-Dimensional) Model*. Master's thesis, Texas A&M University
- McCarthy, M., (2005) Ship's Fastenings: from sewn boat to steamship. Texas A&M Press. College Station
- Possehl, G.. Meluhha. in: J. Reade (ed.) *The Indian Ocean in Antiquity*. London: Kegan Paul Intl. 1996, 133–208
- Robert E. Krebs, Carolyn A. Krebs *(2003). Groundbreaking Scientific Experiments, Inventions, and Discoveries of the Ancient World.* Greenwood PressScience. ISBN 0-313-31342-3.
- Sawyer, L.A. and Mitchell, W. H.(1985) *The Liberty Ships: The History of the "Emergency" Type Cargo Ships Constructed in* the United States During the Second World War, pp. 7–10, 2nd Edition, Lloyd's of London Press Ltd., London, England.
- Ward, C. (2001) *World's Oldest Planked Boats*, in Archaeology (Volume 54, Number 3, May/June 2001). Archaeological Institute of America.

Zumerchik, J., Danver, S.L.*(2010). Seas and Waterways of the World: An Encyclopedia of History, Uses, and Issues*. ABC-CLIO. pp. 428–. ISBN 978-1-85109-711-1