



## BRODOGRADNJA

## SHIPBUILDING INDUSTRY

### ● UVOD

Tradicionalno orijentirani na more i pomorstvo, žitelji hrvatske obale Jadrana morali su ovladati tehnikom gradnje brodova. Višestoljetni kontinuitet te gradnje potvrđuje se visokom kvalitetom i tehničkim rješenjima hrvatskih brodograditelja koji u svjetskim razmjerima imaju značajnu ulogu.

Okosnicu razvoja i proizvodnje hrvatske brodograđevne industrije čine stručnjaci obrazovani u visokoškolskim ustanovama i stručnim školama koji jamče visoku razinu kvalitete.

S obzirom na opseg poslovanja, kapacitete i veličinu plovila koja grade, brodogradilišta se mogu podijeliti u tri skupine:

- Velika brodogradilišta
- Srednja brodogradilišta
- Mala brodogradilišta

### ● PROIZVODNI PROGRAM

#### VELIKA BRODOGRADNJA – GRADNJA I POPRAVAK PREKOOCEANSKIH BRODOVA

Brodogradnja je industrijska grana koja posluje na globalnom svjetskom tržištu, ima prepoznatljiv i kvalitetan proizvod i gotovo je u cijelosti orijentirana na izvoz.

Velika brodogradilišta (brodograđevne grupe) ukupno zapošljavaju 12.400 djelatnika. Još otprilike 1.500 tvrtki (kooperanata, proizvođača brodske opreme, davatelja usluga i trgovaca) direktno je vezano za brodogradnju i oni su u 2004. godini ostvarili promet od oko 2.100 milijuna kuna.

Prema svjetskoj knjizi narudžbi od 3. ožujka 2005. (prema kriteriju nosivosti ugovorenih brodova) hrvatska brodogradnja je na 4. mjestu sa 69 ugovorenih brodova nosivosti 3.482.869 tdw (iza Japana, J.Koreje i Kine) i kapacitetima popunjenim gotovo do kraja 2008. godine. U proizvodnji velikih preoceanskih novogradnji zastupljeni su brodovi svih vrsta i namjena nosivosti do 170.000 tdw:

### ● INTRODUCTION

Living as they do by the sea, with the sea and from the sea, the people of the Croatian Adriatic coast have necessarily had to master the technology of shipbuilding. The centuries of shipbuilding continuity are reflected in the high quality of technical solutions designed by Croatia's shipbuilders, who play an important role also internationally.

The backbone of development and production in the Croatian shipbuilding industry are experts trained at institutions of higher education and vocational schools. They are a guarantee of high quality.

When it comes to the scope of business, capacity and size of craft they build, Croatian shipyards can be classified in the following three groups:

- Large shipyards
- Middle-sized shipyards
- Small shipyards

### ● PRODUCTION PROGRAM

#### IMMENSE SHIPBUILDING – BUILDING AND REPAIR OF OCEAN-GOING SHIPS

Shipbuilding is an industrial branch that operates on the global world market, has recognisable and quality products and is entirely oriented on export.

Large shipyards (shipyard groups) employ 12,400.00 employees in total. Another 1,500.00 companies (sub-contractors, ship equipment producers, service renderers and salesmen) are directly involved in shipbuilding and they achieved in 2004 the revenue in amount of 2,100,000.00 HRK.

According to world order book from the 3rd March 2005 (in accordance with the deadweight criteria of the contracted ships) the Croatian shipbuilding ranks fourth with 69 contracted ships of 170,000 tdw deadweight (after Japan, South Korea and China) and all sold capacities almost until the year 2008.

The production of large new ocean-going ships includes

## IZVADAK IZ SVJETSKJE KNJIGE NARUDŽBI (3. 3. 2005.) NEW BUILDINGS WORLD ORDER BOOK (3. 3. 2005.)

	ZEMLJA COUNTRY	BROJ BRODOVA NUMBER	NOSIVOST (u tdw) DEADWEIGHT(in tdw)
1.	Japan Japan	1063	80.707.413,00
2.	Južna Koreja Korea (South)	1038	75.505.799,00
3.	Kina China	706	34.996.822,00
4.	Hrvatska Croatia	69	3.482.869,00
5.	Tajvan Taiwan	45	2.735.495,00
6.	Poljska Poland	78	2.704.811,00
7.	Njemačka Germany	101	2.637.842,00
8.	Danska Denmark	16	1.736.400,00
9.	Filipini Philippines	25	1.324.883,00
10.	Iran Iran	28	1.223.800,00

Izvor: Fairplay Solutions od 3. ožujka 2005

Source: Fairplay Solutions of 3rd March 2005

- Brodovi za prijevoz tekućih i rasutih tereta:
  - tankeri za sirovu naftu, tankeri za naftne derivate, tankeri za kemikalije
  - ore carriers, bulk-carriers, OBO-carriers
- Brodovi za prijevoz suhih tereta:
  - kontejnerski i višenamjenski brodovi, brodovi hladnjače
  - brodovi za prijevoz automobila i kamiona te željezničkih vagona, RO-RO brodovi
- Putnički brodovi, brodovi za prijevoz automobila i putnika
- Brodovi posebne namjene
- Plutajući dokovi
- Odobalni (off-shore) objekti:
  - platforme za istraživanje i eksploataciju naftnih i plinskih nalazišta u podmorju
  - brodovi dizalice za opsluživanje platformi
  - brodovi za polaganje cjevovoda i kabela
  - brodovi za opskrbu
  - lučki i oceanski tegljači i dr.

Mnogim su brodarima danas zanimljive rekonstrukcije i preinake brodova, jer se skromnijim ulaganjem i u kraćem razdoblju može dobiti plovilo željenih karakteristika. I na tom je području hrvatska brodograđevna industrija stekla visoke reference i često je određište svjetskih brodarka.

### GRADNJA I POPRAVAK BRODOVA OBALNE PLOVIDBE

Dvadesetak srednjih brodogradilišta zapošljava oko 1.800 djelatnika (Tehnomont – Pula; Heli – Pula; Lošinjska plovidba Brodogradilište - Mali Lošinj; Punat – Punat, otok Krk; Nauta Lamjana – Kali; Brodogradilište Betina – Murter; Remontno brodogradilište Šibenik – Šibenik; Greben - Vela Luka....)

Smješteni duž obale i na otocima bave se gradnjom i popravkom brodova te brodicama male obalne plovidbe.

To su trajekti koji povezuju otoke i kopno, brodovi za turistička kružna putovanja, ribarski brodovi, brodovi za javne potrebe (policija, carina, protupožarna zaštita, zaštita okoliša i dr.), te brodice za rasonodu.

### GRADNJA I POPRAVAK BRODICA I BRODOVA ZA SPORT I RAZONODU

Nagli razvoj nautičkog turizma pobuđuje veliko zanimanje za gradnju, popravak i održavanje brodicama i brodova za sport i rasonodu ne samo duž jadranske obale nego i u unutrašnjosti. U RH je registrirano približno 200 malih

ships of all types and purposes, with a deadweight up to 170,000 tdw:

- Transport ships for liquid and bulk cargo:
  - tankers for crude oil, tankers for petroleum products, tankers for chemicals
  - ore-carriers, bulk-carriers, OBO-carriers
- Transport ships for dry cargo:
  - container and multi-purpose ships, refrigerator ships
  - car and train transport ships, RO-RO ships
- Passenger ships, ships for car and passenger transport
- Special-purpose ships
- Floating docks
- Off-shore structures:
  - platforms for the research and exploitation of underwater oil and gas fields
  - auxiliary crane ships for platforms
  - cable- and pipe-laying ships
  - supply ships
  - harbour- and ocean towboats etc.

Today, many shippers are interested in ship reconstruction and remodeling, as this enables them to obtain a craft which has the required features while making only a modest investment and within a short time too. The Croatian shipbuilding industry has earned high references also in this field, and it is therefore a frequent provider of such services for shippers around the world.

### BUILDING AND REPAIR OF COASTING VESSELS

About 20 middle-sized shipyards employ around 1.800 employees. (Tehnomont – Pula; Heli – Pula; Lošinjska plovidba Shipyard - Mali Lošinj; Punat – Punat, Island Krk; Nauta Lamjana – Kali; Betina Shipyard – Murter; Repair Shipyard Šibenik – Šibenik; Greben - Vela Luka....)

Situated along the coast and on the islands, they build and repair ships and boats for coastal navigation.

These include ferries that connect the islands and the coast, cruise ships, fishing ships, ships for public services (police, customs, fire protection, environmental protection etc.) and leisure boats.

### BUILDING AND REPAIR OF SPORTS AND LEISURE BOATS AND SHIPS

Rapid development of nautical tourism has prompted great interest in the building, repair and maintenance of sports and leisure boats and ships, not only along the Adriatic coast but also inland. In Republic of Croatia about 200

**BRODOVI ISPORUČENI U BRODOGRADILIŠTIMA  
ULJANIK, 3. MAJ, KRALJEVICA, BRODOSPLIT, BRODOTROGIR, VIKTOR LENAC**

**SHIPS DELIVERED FROM THE  
ULJANIK, 3. MAJ, KRALJEVICA, BRODOSPLIT, BRODOTROGI, VIKTOR LENAC SHIPYARDS**

Godina Year	Broj brodova Number of Ships	dwt	gt	cgt	USD
1994.	10	403.319	275.047	206.048	400.615.260
1995.	5	252.973	145.552	87.431	142.591.842
1996.	14	571.511	365.006	270.661	405.055.834
1997.	8	190.912	122.224	88.188	148.710.896
1998.	12	462.342	280.433	223.188	336.456.237
1999.	11	319.059	232.772	180.754	276.287.035
2000.	14	324.572	330.700	237.017	373.615.441
2001.	14	411.972	307.645	210.828	284.460.857
2002.	20	525.175	417.165	317.982	424.202.386
2003.	18	725.603	494.592	331.810	433.624.822
2004.	26	956.808	625.620	442.750	596.308.578
<b>UKUPNO TOTAL</b>	<b>152</b>	<b>5.144.246</b>	<b>3.596.756</b>	<b>2.596.657</b>	<b>3.821.929.188</b>

Izvor: Hrvatska brodogradnja-Jadranbrod d.d.,  
Obrada: HGK

Source: Croatian Shipbuilding Corporation  
Compiled by: Croatian Chamber of Economy

**BRODOVI ISPORUČENI U BRODOGRADILIŠTIMA  
ULJANIK, 3. MAJ, KRALJEVICA, BRODOSPLIT, BRODOTROGIR, VIKTOR LENAC 1994.-2004.**

**SHIPS DELIVERED FROM THE  
ULJANIK, 3. MAJ, KRALJEVICA, BRODOSPLIT, BRODOTROGIR, VIKTOR LENAC SHIPYARDS 1994.-2004.**

Brodogradilište Shipyards	Broj brodova Number of Ships	dwt	gt	cgt	USD
Uljanik	41	1.272.444	1.197.448	860.673	1.277.760.765
3. Maj	25	1.049.595	688.768	505.322	705.278.387
Brodosplit	39	2.170.635	1.308.996	884.544	1.303.400.324
Kraljevica	7	12.955	10.862	16.034	30.310.069
Brodotrogir	18	634.165	383.398	312.966	436.144.791
Viktor Lenac	4	2.755	4.591	10.752	27.709.889
<b>UKUPNO TOTAL</b>	<b>152</b>	<b>5.144.246</b>	<b>3.596.756</b>	<b>2.596.657</b>	<b>3.821.929.188</b>

Izvor: Hrvatska brodogradnja-Jadranbrod d.d.,  
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Source: Croatian Shipbuilding Corporation  
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brodogradilišta i remontnih centara koji zapošljavaju oko 1.700 djelatnika. Tržištu se nudi široka paleta plovila od sandolina i pedalina, obiteljskih motornih brodica i jedrilica pogodnih za nautički turizam do 50 -metarskih jahti koje zadovoljavaju najviše svjetske standarde i dobivaju ugledna priznanja na međunarodnim nautičkim sajmovima.

### BRODOGRAĐEVNI RADOVI

Specifičan su oblik ponude u vezi s brodogradnjom usluge brodogradilištima i brodovlasnicima:

- projektiranje i razrada radioničke dokumentacije
- izrada brodskih sekcija ili obavljanje kooperantskih radova (zavarivačkih, cjevarskih, montažerskih i sličnih radova)
- antikorozivna zaštita.

small shipyards and repair centres are registered that employ approximately 1.700 employees. Different types of vessels are on the market, from canoes and pedal boats to family motor boats and sailboats suitable for nautical tourism, to 50-meter yachts meeting the highest world standards and holding prestigious awards received at international nautical fairs

### SHIPBUILDING JOBS

A specific type of shipbuilding activity are services to shipyards and ship owners:

- design and elaboration of workshop documentation
- manufacture of ship sections or subcontractor work (welding, pipe laying, fitting and similar jobs)
- anticorrosive protection.

## BRODSKA OPREMA

Uz hrvatsku brodogradnju razvija se prateća industrija brodske opreme i usluga s bogatim iskustvom i prestižnim referencama u opremanju najsuvremenijih brodova.

Pri Hrvatskoj gospodarskoj komori djeluje Zajednica proizvođača brodske opreme. Ona okuplja oko 200 proizvođača brodske opreme koji potpuno zadovoljavaju međunarodne norme brodograđevne industrije.

## SHIP EQUIPMENT

Supporting ship equipment and service industries have developed alongside the Croatian shipbuilding industry. They have gained rich experience and earned prestigious references in equipping state-of-the-art ships.

Within the Croatian Chamber of Economy there is the Affiliation of Marine Equipment Manufacturers, bringing together about 200 ship equipment manufacturers that fully meet international shipbuilding standards.

### UKUPNI PRIHOD TVRTKI BRODOGRAĐEVNE DJELATNOSTI TOTAL REVENUE

Godina Year	Ukupni prihod (HRK 000) Total (in HRK 000)	Broj zaposlenih Number employees
1998.	3.238.551	12.900
1999.	4.107.779	13.560
2000.	5.899.061	13.952
2001.	7.060.176	15.127
2002.	8.451.942	14.753
2003.	6.245.992	15.746

Izvor: FINA, DZS, Obrada: HGK Source: FINA CBS, Compiled by: CCE

### NAJVEĆE BRODOGRAĐEVNE TVRTKE PREMA UKUPNOM PRIHODU 2003. THE LARGEST SHIPBUILDING COMPANIES BY TOTAL INCOME IN 2003.

Redni broj Number	Naziv tvrtke Company	Ukupni prihod (u 1000 kn) Total Income (in 1000 HRK)	Broj zaposlenih Number of employees
1.	BRODOSPLIT BRODOGRADILIŠTE d.o.o.	1.763.714	4.361
2.	ULJANIK BRODOGRADILIŠTE d.d.	1.389.882	1.998
3.	3. MAJ BRODOGRADILIŠTE d.d.	1.127.918	2.321
4.	BRODOTROGIR d.d.	568.181	1.307
5.	VIKTOR LENAC d.d. u stečaju	353.247	997

Izvor: FINA, Obrada HGK

Source: Financial Transactions Bureau. Processing: CCE

## VANJSKOTRGOVINSKO POSLOVANJE

Suvremena hrvatska brodograđevna industrija na svjetskom je tržištu preko pola stoljeća i proizvodi gotovo isključivo za strane brodovlasnike. Orijeantacija na proizvodnju po zahtjevima kupca, koja svaki brod ili seriju čini unikatnim proizvodom, osigurala je hrvatskim brodogradilištima zavidan ugled među brodovlasnicima te brojna priznanja u svjetskim pomorskim krugovima. Sa stajališta vanjskotrgovinske razmjene, kao i gospodarske strategije hrvatske Vlade, brodogradnja je jedna od važnijih grana hrvatske industrije. U robnoj razmjeni s inozemstvom brodograđevna industrija u izvozu sudjeluje oko 12 posto.

Izvoz brodograđevnih radova (ubraja se u nerobni izvoz) također pridonosi vanjskotrgovinskoj bilanci brodograđevnih djelatnosti.

Sljedećih se godina očekuje porast udjela brodogradnje u BDP-u RH jer je knjiga narudžbi danas popunjena u odnosu na prethodno desetogodišnje razdoblje.

Modernizacija proizvodnog procesa provodi se u velikim brodogradilištima, što će pridonijeti porastu njihove konkurentne sposobnosti. Traju i pripreme za snažniji prodor na zahtjevno tržište odobalnih objekata te na tržište megajahti.

## FOREIGN TRADE

The modern Croatian shipbuilding industry has been present in the world market for almost half a century and works almost exclusively for foreign shippers. Customized production methods that make each ship or series unique have secured the Croatian shipbuilding industry an enviable reputation among ship owners as well as numerous awards from nautical circles around the world. In terms of foreign trade and the Croatian Government's economic strategy, shipbuilding is one of the most important sectors of Croatian industry. In overall foreign trade, the shipbuilding industry approximately has a 12% share in total export.

The export of shipbuilding services (classified as non-commodity export) also contributes to the foreign trade balance of the shipbuilding industry.

The shipbuilding industry's share of GDP is expected to grow in the coming years, because the order book is fuller today than in the past decade. Large shipyards are undergoing a modernisation of the production process, which will contribute to their in-creased competitiveness. Preparations for a stronger penetration of demanding markets for offshore structures and mega-yachts are also under way. With appropriate

Uz odgovarajuću razvojnu, financijsku i tržišnu potporu proizvodnje može se očekivati i pojava hrvatskih brodica za sport i razonodu na domaćem i svjetskom tržištu.

## ● PRATEĆE INSTITUCIJE

U brodograđevnu industriju svakako valja ubrojiti i prateće djelatnosti, projektne organizacije, isporučitelje materijala i opreme te svakako i institucije "podrške": Hrvatska brodogradnja - Jadranbrod d.d. Zagreb  
Brodarski institut, Zagreb  
Fakultet strojarstva i brodogradnje, Zagreb  
Fakultet elektrotehnike i računarstva, Zagreb  
Tehnički fakultet Riječkog sveučilišta  
Fakultet elektrotehnike, strojarstva i brodogradnje Splitskog sveučilišta  
Veleučilišta (Zagreb, Rijeka, Split)  
Hrvatski registar brodova, Split  
Značajan doprinos u kreaciji broda imaju Brodarski institut i fakulteti, posebno na definiranju forme, sustava propulzije i upravljivosti broda, rješavanju problema vibracija i buke te konačne verifikacije broda na pokusnoj plovidbi.

Brodarski institut raspolaže velikim brojem visokoškoloranih stručnjaka (doktori znanosti, magistri, dipl. inženjeri), a stručna i znanstvena djelatnost obavlja se u teorijskom i eksperimentalnom radu u više od 20 laboratorija organiziranih u različitim sektorima. Brodarski je institut u rangu vodećih europskih institucija po kadrovskim i laboratorijskim resursima, iskustvu i opremi, od računalnih sustava do eksperimentalnih mjerenja na modelima brodova, kao i u naravi (otpor broda, propulzija, pomorstvenost, upravljivost i porinuća broda).

## ● UPRAVLJANJE KVALITETOM

U gradnji brodova hrvatska brodogradilišta pridaju veliku pozornost kvaliteti svojih radova i proizvoda.

Certifikat iz skupine ISO 9000 imaju:

Brodogradilište Uljanik (1994.)

Brodograđevna industrija 3. maj

Brodogradilište Viktor Lenac

Brodosplit – BSO d.o.o.

Certifikat iz skupine ISO 14001 imaju Brodogradilište

Viktor Lenac i Brodogradilište Uljanik.

U postupku su prihvaćanja i ostalih značajnih certifikata u brodograđevnoj industriji (primjerice OSHAS 18001 i dr.).

## ● PROMOCIJA U INOZEMSTVU

U organizaciji Hrvatske brodogradnje Jadranbrod d.o.o. i Hrvatske gospodarske komore velika brodogradilišta redovito nastupaju na međunarodnim sajmovima brodogradnje:

- NOR-SHIPPING u Oslu, Norveška
- POSIDONIA u Pireju, Grčka
- SMM u Hamburgu, Njemačka
- NEVA u St. Petersburgu, Rusija

Mala i srednja brodogradilišta redovito izlažu na specijaliziranim sajmovima nautičke proizvodnje u Genovi, Düsseldorfu, Splitu, Rijeci i Zagrebu.

developmental, financial and market assistance to production, Croatian sports and leisure boats can be expected to appear on both domestic and global markets.

## ● SUPPORTING ESTABLISHMENTS

Supporting activities, design offices, material suppliers and, above all, assistance institutions should also be considered part of the shipbuilding industry:

CROATIAN SHIPBUILDING CORPORATION - JADRAN-BROD, Zagreb

INSTITUTE OF NAVAL ENGINEERING, Zagreb

FACULTY OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE, Zagreb

FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING, Zagreb

FACULTY OF ENGINEERING, Rijeka

FACULTY OF ELECTRICAL AND MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE, Split

Community colleges (Zagreb, Rijeka, Split)

CROATIAN REGISTER OF SHIPPING, Split

The Institute of Naval Engineering and faculties play a significant role in creating a ship, particularly in defining the shape, propulsion and steering system, handling vibration and noise problems, and also in ultimate ship certification after test navigation.

The Institute of Naval Engineering has a large number of highly qualified experts (Ph.D., M.Sc., and graduate engineer level), and professional and scientific activity is pursued on theoretical and experimental levels in over 20 laboratories organised into different departments. The Institute of Naval Engineering ranks among the leading European institutions in terms of its human and laboratory resources, experience and equipment, from computer systems to experimental measurement performed on both model and actual ships (ship's resistance, propulsion, steerability and launching).

## ● QUALITY MANAGEMENT

When building ships, Croatian shipyards pay great attention to the quality of their work and products.

The following shipyards have been certified to ISO 9001:

Uljanik Shipyard (1994)

3. maj Shipyard

Viktor Lenac Shipyard

Brodosplit – BSO d.o.o. (Ltd)

The Viktor Lenac and Uljanik Shipyards have the ISO 14001 Certificate.

They are currently in the process of receiving other significant shipbuilding certificates (e.g. OSHAS 18001 etc).

## ● INTERNATIONAL PROMOTION

Croatian Shipbuilding Corporation - Jadranbrod, Zagreb, and the Croatian Chamber of Economy organise regular attendance of international shipbuilding fairs by large shipyards. The fairs include:

- NOR-SHIPPING, Oslo, Norway
- POSIDONIA, Piraeus, Greece
- SMM, Hamburg, Germany
- NEVA, St. Petersburg, Russia

Small and medium-sized shipyards make regular presentations at specialised nautical fairs in Genova, Düsseldorf, Split, Rijeka and Zagreb.





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