SEKISUI

ESLON TIMES

Feature article : Achievements

Site Report

SEKISUI CHEMICAL CO.,LTD.

In Use at Imabari Shipbuilding Co., Ltd.!

Eslon Neo Lumber FFU that can withstand the weight of hull blocks

Interview: June 1, 2022 Atsushi Ozawa, Facilities Management Team Leader
Production Management Group, Imabari Shipbuilding Co., Ltd.

Overview

Headquartered in Imabari City, Ehime Prefecture, Imabari Shipbuilding Co., Ltd. is the largest shipbuilding company in Japan. The domestic market share of the group is about 34.6%, and globally it reached 6.2% (2021).

Located in Saijo City, Ehime Prefecture, Saijo Shipyard is a state-of-the-art shipyard with three giant cranes towering over a dock more than 400m in length. FFU synthetic lumber from Sekisui Chemical Co., Ltd. is in use at Saijo Shipyard. It is used as shock absorber known as blocks, used for supporting massive hull blocks. For FFU to be adopted as the block material where timber had commonly been used, repeated cycles of trial-and-error and improvements were required.

We asked Mr. Atsushi Ozawa, Facilities Management Team Leader, about the development.

Atsushi Ozawa,
Facilities Management Team Leader
Production Management Group

Contribution to the environment and improved performance achieved by switching from natural lumber!

- Please tell us about Imabari Shipbuilding.

As the name suggests, we are a shipbuilding company headquartered in Imabari City, Ehime Prefecture. In addition to the Head Office and Imabari Shipyard, the group has fourteen shipyards and manufacturing bases along the coast of the Seto Inland Sea, and we construct various steel vessels such as container carriers, bulk carriers, tankers, and car ferries. The size and purpose of the vessels built at each shipyard vary, but here at Saijo Shipyard, which has the second-largest dock overall, the company mainly builds large ships.

- The ships under construction and the shipyard facilities are astonishingly large.

Anyone would be surprised the first time they see it.

The largest ship ever built at the Saijo Yard can carry up to 20,000 20-foot sea containers, classed among the world's largest container carriers. It has a total length of 399.98 meters. Since the dock is 420 meters in length, there was only about 10 meters of space in the front and back.

Ships are basically custom designed for each customer's requirements and take between 8 and 10 months, and in some cases more than a year to build. The sense of accomplishment when a ship is completed and handed over to the customer is also great.

- What kind of work are you in charge of?

In my Facilities Management Team, the work is broadly divided into three parts.

One is the operation and management of cranes in the shipyard.

We operate and maintain three goliath cranes that span the docks that are the icons of Saijo Shipyard, jib cranes that are even taller, and ceiling cranes inside the warehouse.

Next is the transport operations in the shipyard. We are responsible for the total logistics within the shipyard, from large hull blocks that are parts of a ship to smaller parts.

Then, there is the management of on-site equipment. Electricity, gas, water supply, warehouse maintenance, equipment enhancement, and so on.

While our work is not directly related to the construction of ships, it is important for the stable operation of the shipyard infrastructure to ensure smooth shipbuilding.

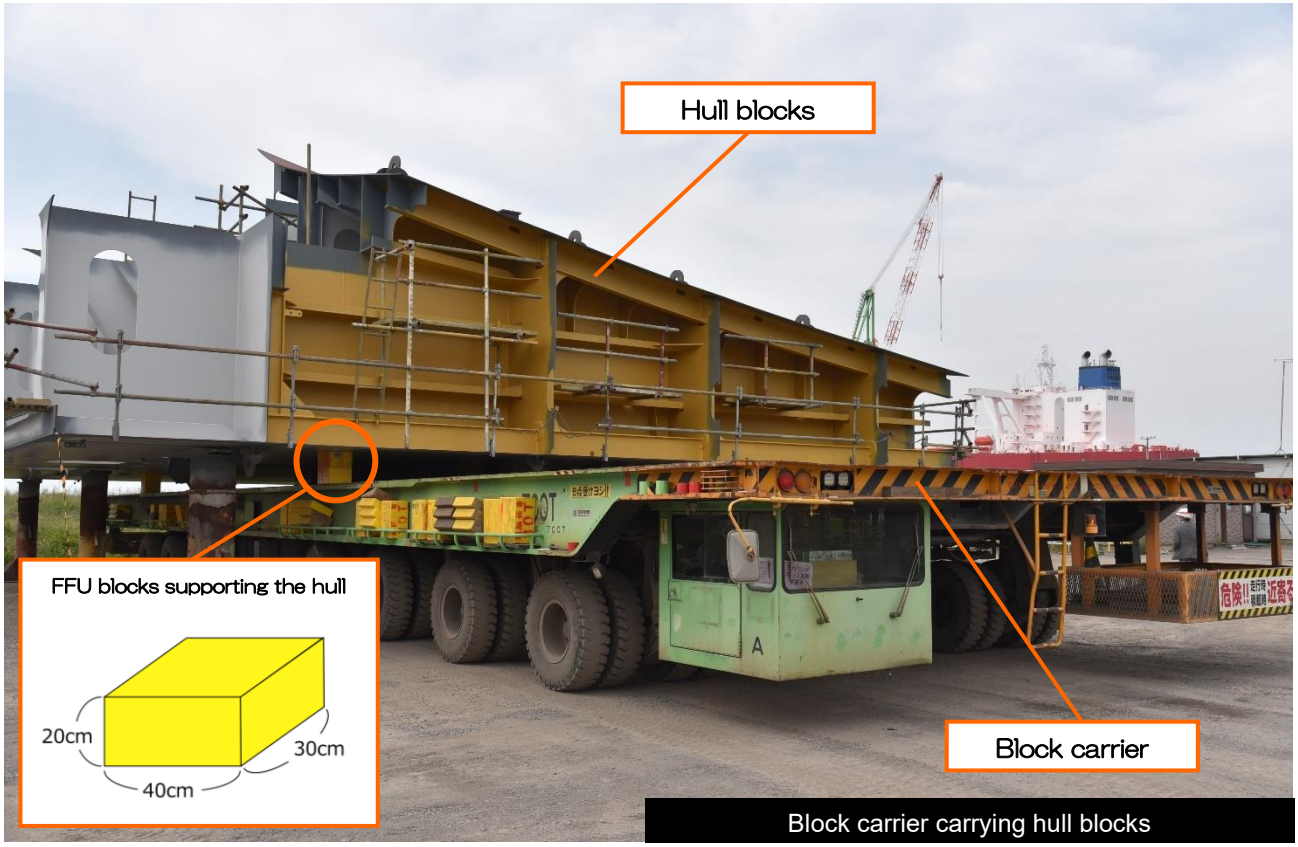
Keeping the electricity, gas, and water going aside is a must, and if the cranes do not work, process delays will occur.

- In what ways are you using Sekisui Chemical's synthetic FFU lumber?

The FFU is involved in the transport of the hull blocks I mentioned earlier.

First, allow me to explain how ships are built. When a steel ship is constructed, the hull is divided into dozens of blocks, which is known as the block method. Then they are welded together at the dock to complete the ship. Hull blocks weigh hundreds of tons each and cannot be carried by ordinary trucks. They are transported to the dock in special vehicles called block carriers, but when the blocks are loaded, wedge materials called blocks are placed between the cargo bed and the hull block to act as a cushioning material. The FFU is used for these blocks.

Hull blocks are made of iron plates and frames. If a hull block is placed directly on the cargo bed, its lower-strength iron plates will be subjected to force and get bent.



Block carrier carrying hull blocks

To prevent this, it is necessary to support the load at several points of high strength where the frames intersect each other. The FFU blocks are placed there. They are rectangular, only 20cm x 30cm x 40cm in size, butcan support a weight of up to 30 tons each.

FFU blocks supporting the hull on the cargo bed

- How did you come to the decision to use FFU?

Before the adoption of FFU, natural lumber had been used as the blocks. It was Selangan Batu, a lumber produced in the tropical forests of Southeast Asia. However, in recent years, due to the impact of drought and other factors, the forest resources were decreasing, which led to frequent delivery delays and degrading quality.

It was difficult to continue to use Selangan Batu lumber without a stable supply, as well as from an environmental perspective, so we had been looking for an alternative material.

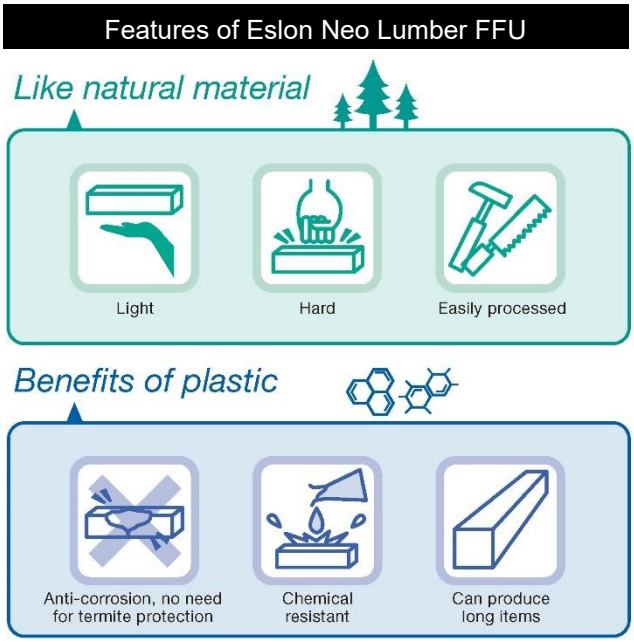
The first thing we tried after considering a change of materials was resin blocks made of recycled plastic. We did several tests, but they didn't meet the standards we had for use.

The strength to withstand the weight of the hull block is important for the performance of the blocks, of course, but the material's flexibility is also a major point. In the case of natural lumber blocks, when the time comes to replace them due to reduced durability, they are gradually crushed and visibly deteriorated. They can be replaced before becoming completely useless. However, in the case of resin blocks, they suddenly reach the limit and break with a burst. Workers may be exposed to danger, and the load may collapse, leading to a serious accident.

While studying various materials, we learned about FFU from Mr. Nakazawa, a sales representative at Sekisui Chemical, and decided to try it out.

Because FFU is strengthened not only by urethane resin but also by glass fiber, its flexibility is closer to natural lumber than regular resin blocks.

In order to be able to officially adopt FFU as the material for our blocks, we would test it and request improvements each time until we had what we needed.



[Mr. Nakazawa, Sales Representative, Sekisui Chemical Co., Ltd.]

At first, I did a cold call and visited the Materials Division, and after having the documents circulating internally, Mr. Ozawa took notice. Fortunately, it was a good timing, as they had been considering new materials.

I was worried how things would go when the FFU block cracked during the test...

[Mr. Osawa]

That's right. It did break once. I didn't think it would be considered, but I thought that embedding metal bolts in the FFU would improve its strength, like reinforced concrete.

Apparently embedding metal bolts was something new, but after our proposal was given the proper attention, the resulting blocks came back having the expected strength.

A hull block once got displaced on contact while being carried on a block carrier using prototype blocks with embedded bolts. At the time, a great amount of force was applied to the blocks, but they held up without breaking. If

they had not had the bolts embedded in them, the blocks might have given out and caused major accident.

Having fully verified their performance, we officially made the decision to use them.

FFU block compression test
(Sekisui Chemical Co., Ltd., Shiga Ritto Plant)

- Please tell us the benefits you felt upon adopting FFU.

The blocks now last longer than the Selangan Batu lumber ones did. The lumber blocks have a service life of 3 to 4 months, but the FFU lasts for 10 to 12 months, more than three times as long.

Their purchase cost is higher than that of lumber, but as they are longer-lasting, the costs are actually lower when comparing the life cycle cost. Moreover, making fewer replacements also reduces the workload associated with disposal and procurement.

Not using natural lumber leads to forest protection and can make a significant contribution to the environment. Saijo Shipyard is ISO14001 (Environmental Management Systems) certified, and when we talked about FFU blocks to the inspectors, it was well-received.

The shipyard workers are also happy. Selangan Batu lumber blocks weight about 27kg each, while the FFU blocks weigh about 18kg. Since the placement of blocks on the block carrier's cargo bed is done by human hands, the weight reduction greatly improves workability and safety. People don't want to go back to the wooden blocks anymore.

Not only in terms of performance, but also in terms of cost, environmental contribution, workability, and just overall, I think FFU is better than Selangan Batu lumber. It's the result of thinking together and continuing to improve without giving up, even when tasting failure.

Weight comparison of Selangan Batu and FFU-made blocks

- We will continue striving to improve our products to meet customers' needs in the future. Thank you for your time today.

<Message from our Sales Representative>

“The lightness and strength (durability) of FFU have been positively evaluated for this application. Although the cost was a concern, I am very happy that the client adopted it, taking into consideration its life cycle cost (LCC).

I was able to once again appreciate the advantages of FFU for its ability to respond to the site's needs. As environmental problems and lumber shortages are being felt everywhere in society, we will continue to develop products that can solve these issues.”

(Mr. Nakazawa, Kinki Infrastructural Materials Systems Sales Office, Nishinihon Sales Headquarters)

The product introduced in this article

Plastic foam material reinforced with long glass fiber **ESLON NEO LUMBER FFU**

Product description

ESLON NEO LUMBER FFU is synthetic lumber made from rigid urethane resin foam reinforced with long glass fibers. It can be used in any field as a replacement material for natural timber. It is attracting attention as a material helping to protect the natural environment.

Features

① Like natural material

Light | Hard | Easily processed

② Benefits of plastic

Anti-corrosion, no need for termite protection | Chemical resistant | Can produce long items

Construction examples

In water treatment plants

As a cover

Excellent durability and enough lightness to float on water, making it easy to retrieve even after a drop. As the product can be reused over a long term, it contributes to life cycle cost reduction.

In railways

As synthetic sleepers

It has the same quality stability and durability as concrete, but can be constructed like wood, and is used by railway companies.

In ports

As floating piers

Excellent water and corrosion resistance, does not require preservative treatment, and does not affect water quality. Environment-aware design is made possible.