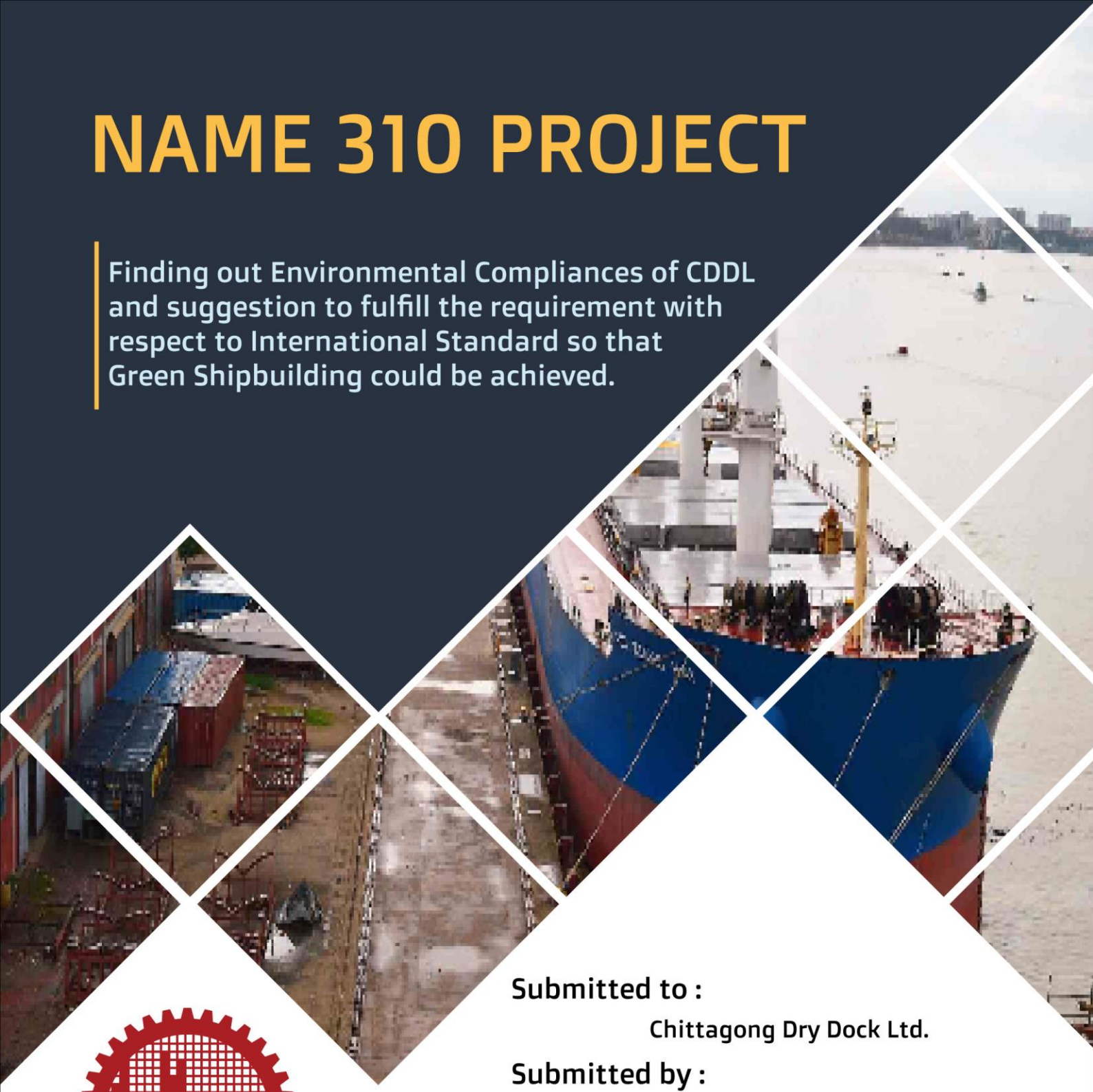
NAME 310 PROJECT

Finding out Environmental Compliances of CDDL and suggestion to fulfill the requirement with respect to International Standard so that Green Shipbuilding could be achieved.



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Chittagong Dry Dock Ltd.

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Date of Submission : 17/11/22

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Introduction

Looking closely at the project title we can emphasize three main phrases. One is **Environmental Compliance**, **International Standardization**, and **Green Shipbuilding**. So, our prime focus will be on these three while working on the project.

Environmental compliances refer to abiding by environmental laws, rules, standards, and other requirements, such as those for operating in a specific location. Environmental issues have significantly increased the number and extent of compliance requirements across all international regulatory settings in recent years. To minimize conflicts, needless overlaps, and gaps, environmental concerns, and compliance efforts are increasingly being integrated to some extent with corporate performance goals. We have tried our best to thoroughly investigate all the sectors of CDDL and tried to find out the compliances and solve them with necessary steps considering the maximization of profit mindset.

The four pillars of IMO are the International Convention for the Safety of Life at Sea (SOLAS), International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), International Convention for the Prevention of Pollution from Ships (MARPOL) and Maritime Labor Convention (MLC). The focus of all the international standards is to increase performance by dealing with challenges related to the human aspect, therefore considerably increasing maritime safety, security, and environmental quality. Like IMO there are ISO and other international organizations that tend to imply different regulations for the safety of people and the environment. So, our focus will be to sort out the compliances and maintain the international standard.

The maritime sector is one of the main causes of the greenhouse effect, a phenomenon that has had a significant impact on the natural ecology of the planet. So, many shipyards around the world have begun incorporating special techniques and equipment into their ships, which not only helps to minimize the carbon footprints but also increases the ship's efficiency. This is done to reduce carbon emissions coming from the maritime industry and to support the global movement toward eradicating the greenhouse effect. The term "Green Ships" refers to these eco-friendly vessels. Therefore, while resolving the compliances, we will also try to achieve GREEN SHIPBUILDING. To do so our main throughout will be “GO GREEN”

Present Condition

Chittagong Dry Dock Limited (CDDL) is a state-owned limited company having the only dry dock in Bangladesh. The construction work commenced back in 1967 and came into operation in 1981. Initially, it was run by Bangladesh Steel and Engineering Corporation (BSEC) under the Ministry of Industries. As CDDL was becoming a losing concern day by day, the honorable Prime Minister of Bangladesh handed over the management of CDDL to Bangladesh Navy on 23rd December 2015 with a great vision to make this organization more vibrant, and profitable and contribute to the shipbuilding and ship repair industry. With this vision of an honorable PM, the management of CDDL is relentlessly working to become a glorified international standard shipbuilding and ship repair organization. Being a state-owned company, CDDL is not only focused on making outrageous profits keeping the environment and ethical values apart. CDDL understands and believes that the new era of civilization does not define the prosperity of a company by only how much profit it has been making so far but also new world requires a company to have ZERO environmental compliances and better health and safety for the workers. That's why WHO, ISO, and IMO have delivered some criteria that should be followed by all companies. Furthermore, as the world is on a motive of going GREEN, from the large tech companies to high ended industries in the world all are on a movement of making the greener environment around them. As CDDL has moved forward from its shabby condition to financial solvency to a significant level, it is the right time for CDDL to take more initiatives to integrate itself into the movement. So far, we have seen there are a few environmental compliances that needed to be omitted, and also some steps needed to be taken to achieve greener surroundings also to be called Green Ship Building.

System Flow Chart

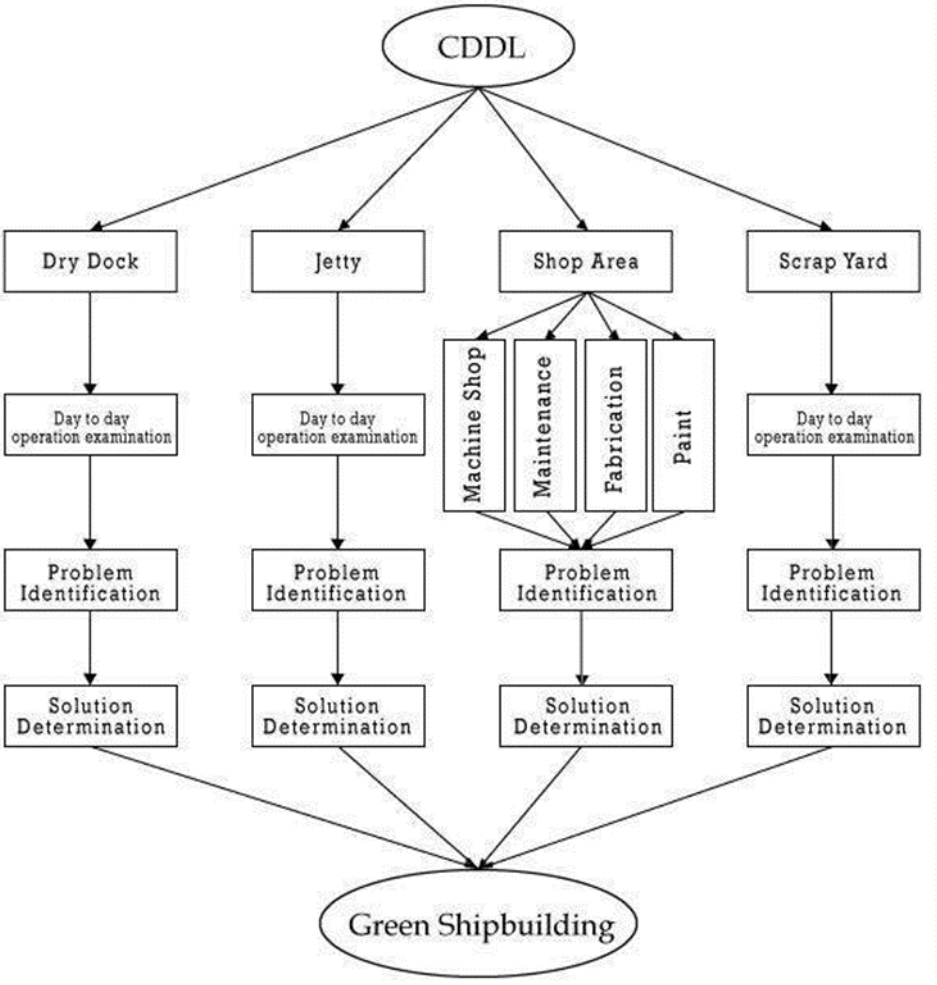


Figure 1: Flowchart of necessary steps

This flow chart will be our solo guiding tool for the overall project. Our focus will be to collect data, analyze it and search for further improvement keeping in concern the profit margin of CDDL.

Working Procedure

Situation analysis, existing problem, and probable solution of some of the key components of CDDL are stipulated below.

a. DRY DOCK

i) Situation Analysis

The procedure used for routine ship, boat, and watercraft maintenance and repairs is known as dry docking. Dry docking has been used for ship repairs for many years. The major purposes of CDDL's dry-dock are for material loading and unloading and repairs.

A significant amount of water is utilized during these tasks to maintain and clean the ship. However, this significant volume of contaminated water is combined with freshwater without adequate filtration.

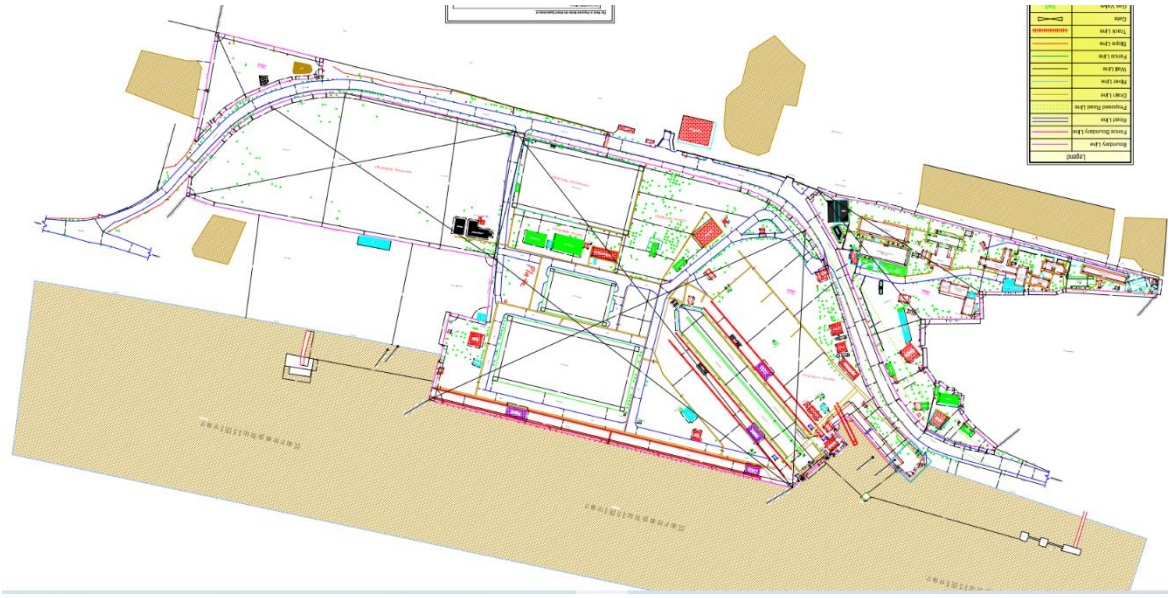
ii) Problem Identification

Karnaphuly water is contaminated with washed water from dry dock Poor biodiversity outcomes from contaminated water.

iii) Solution

An overall drainage system is necessary. After thoroughly analyzing the layout plan of CDDL as far as we have seen there is no eco-friendly drainage system available at the dock.

We would need to improve the central drainage system. So far, we have learned there is a plan for a central drainage system on the layout, but it allows the water to be directly sent to river Karnaphuly. What we propose is we should store the used water and then we can filtrate it properly so that all the harmful chemicals are get rid of properly before let to free the water at Karnaphuly. To purify the water, we propose to set an ETP in our dockyard layout. In general, ETP is of high cost. As our industry does not create a huge amount of waste, we would keep only a minimal number of purifiers. As a result, our cost will be 1-2% of the regular total construction of ETP.



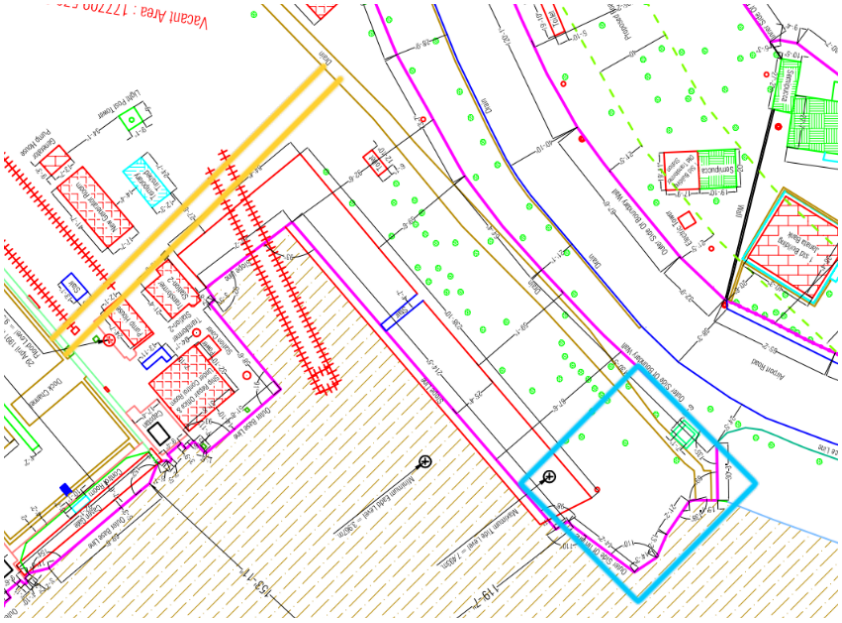


Figure 2: Improvised Layout for better drainage system

b. JETTY

i) Situation Analysis

There is a heavily used jetty section in Chittagong dry dock. It's also a huge source of income as it unloads both wooden and steel industry raw materials. Due to its geographical location and ease of access, it has been highly profitable for the steel industries to unload their raw materials from here and shift to the main factory. But all these create a huge lump of dust and dust of rust and steel particles are seen in every aspect. Also, health issue has always been a hoax in this place as far as we have visited.

ii) Problem Identification

a) As we are a part of the environment. So, any factor driving us to the path of danger can also be termed as environmental compliance too. In CDDL jetty section there is written that everybody should wear solid shoes and protection but most of them didn't follow. During our visit near about 60% of them did not follow the regulations which is very much risky and can cause a major accident as all the scraps are of mild steel, sharp and rust coated.

Figure 3: Jetty Inspection

b) In front of the jetty there is a place not cemented or even not pitched. This causes a huge blow for the dust to gather in the rough soil and then when the truck surpasses it moves along the air all out.

c) Mainly the dust issue has been a point of concern for us. As the dust there affects all over the machine shop, office rooms windows kept closed therefore as a result temperature is high there.

iii) Solution

a) Short term:

- ⇨ In this case, we will first try to pitch the area in front properly and as a result, less dust contamination will occur.
- ⇨ We will try to maintain strict regulations on people about maintaining health safety and regulations.
- ⇨ We will try to apply sprinklers around the road where the vehicles move. While unloading if it is used, it will help us to decrease the adverse effect a bit. Due to this the dust will get wet and will clog the ground. Then the place is washed, and the dirty water is carried toward the main water drainage system.
  We will need a unidirectional sprinkler system where it will only spray along the loading or unloading side. They will cost 54 dollars each and cover 2400 sq. feet.[1]
  We would like to place them along the line shown below.

Figure 4: Sprinkler

Figure 5: Alignment of the sprinkler

b) Long term:

For the long-term proposal, we will suggest CDDL avoid the steel raw material unloading at the jetty. But this can't be done in a day. As its highly linked to the company's profit. So, what we can do is we should give CDDL some time to help themselves out to avoid this scenario. One solution can be the loading and unloading of wooded blocks. This will also cause dust, but that amount won't be at large. And not as harmful as mild steel dust. To encourage the wooden blocks carrying ships to use this jetty we can help them by giving a tariff and side by side increasing the payment and everything for the steel scraps so that those ships tend to avoid this place.

[1] https://cutt.ly/7MECGAi

c. MACHINE SHOP AND FABRICATION SHOP

i) Situation Analysis

Both machine and fabrication shop are seen facing a huge temperature gradient along with high noise. All these are very discomforting for the workers. And no proper ventilation system is used there. Also, most of the machines there are outdated.

ii) Problem Identification

a) Lack of ventilation system has led the total system to a huge Temperature rise.

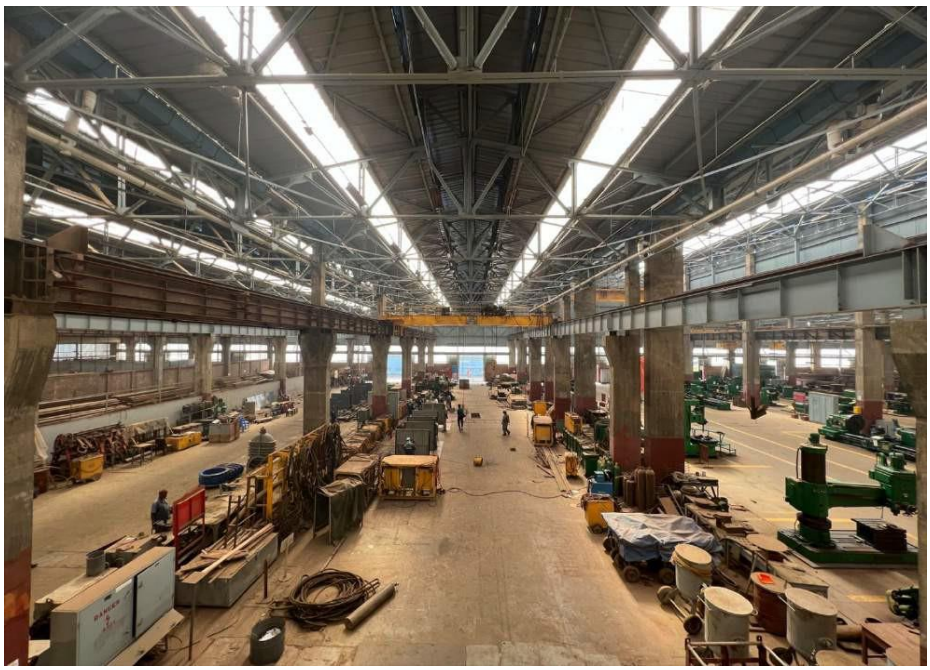


Figure 6: Machine Shop Inspection

b) While welding or using highly chaotic machinery, workers are left working at sounds around 91 dB. Which is beyond the human hearing limit and can be a major cause of health issues in the long run.

Figure 7: Sound intensity investigation at Machine Shop

c) The outdated machinery has lower efficiency and accuracy. So, the job prepared is not of great standard and seldom causes accidental situations.

iii) Solution

a) The last when a ventilation system such as an exhaust fan was introduced in CDDL was in 1983 by Yugoslavia. So, we will try to introduce an exhaust fan ventilation system around the machine and fabrication shop.

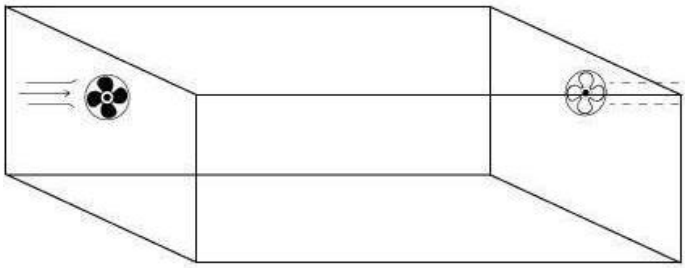


Figure 8: Ventilation along the length

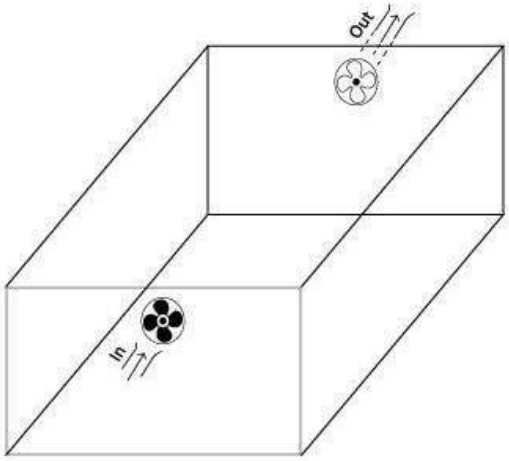


Figure 9: Ventilation from top view

b) As there is a presence of a jetty section behind the machine shop so we will try to avoid placing an exhaust fan there. So, in the case of the machine shop exhaust fan will tend to be placed along the transverse section. But in the case of a fabrication shop exhaust fan can be placed longitudinally. This will keep the place cool and help us achieve crossflow of wind and keep the place calm.

c) The final one is for workers in the welding section, we will provide them with the necessary safety precautions for ears. Like an ear protector that will help them reduce the adverse effect of 91dB sound. The estimated cost is 50 dollars per gear.[2]

Figure 10: Protection Gear for ears

d) The outdated machines are needed to be noted down. The worse ones are needed to be changed as early as possible.

[2] https://cutt.ly/8ME86hO

d. MAINTENANCE SHOP

i) Situation Analysis

In the maintenance shop as we have seen there, all the transports of CDDL are being repaired and other machineries like overhead cranes and forklift cranes are also repaired.

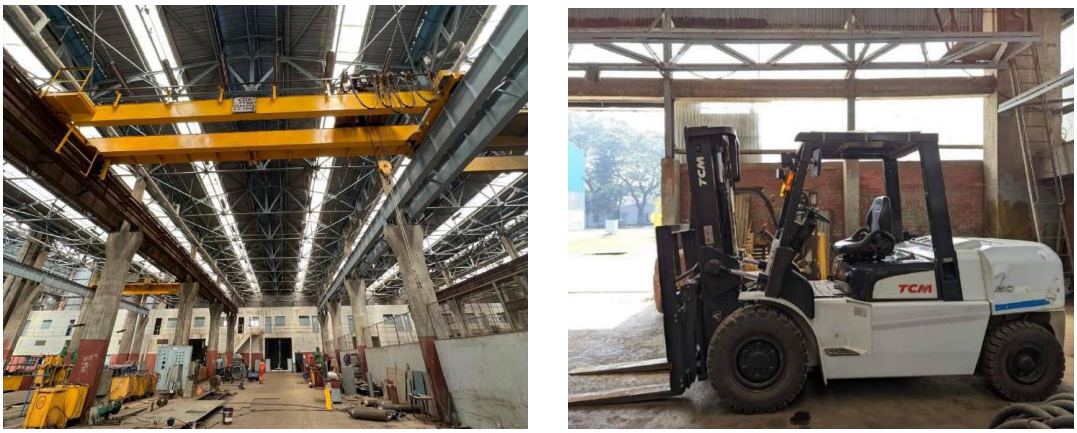


Figure 11: Over Head and Forklift crane at Maintenance Shop

ii) Problem Identification

As we have consulted with maintenance shop specialists, we have learned all the machinery is out of its life span. The life span of an overhead crane is around 25 years, and the forklift crane on average use is 7-8 years. But most of them are way out of their expiry date. So, the amount of carbon emission and carbon droplets from them are not under the safety standards. Which is a case of concern. Also, again when some parts are needed to be repaired the washed grease and oil are directly going to Karnaphuly which is a case of concern.

iii) Solution

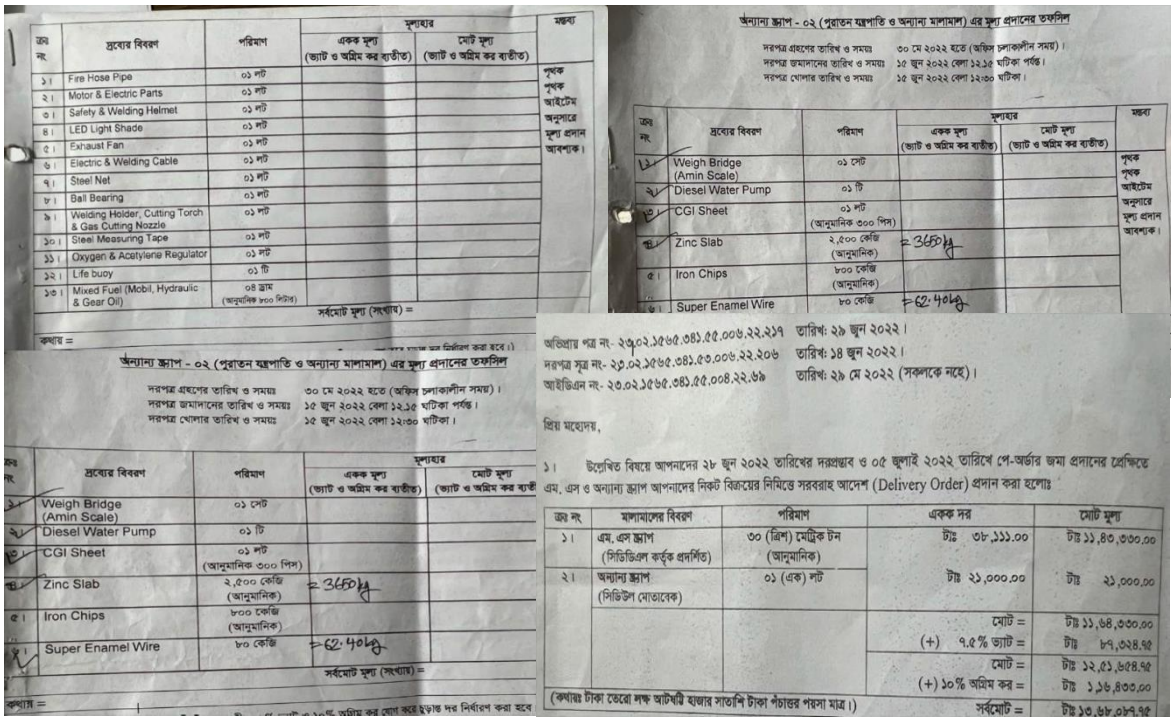
a) The heavy-duty vehicles or machinery that we are using is needed to be replaced after a certain time.

b) “Oil and grease separator” is recently introduced in CDDL. Its application should be done properly. As a result, oil and grease will be separated and the wastewater is needed to be stored somewhere or sent under the water drainage system.

e. SCRAP

i) Situation Analysis

As far as we have seen there is a separate section for storing scrap in Chittagong dry dock. The scrap stays there for a while and gets dispatched after proper negotiation of vendors.



অন্যান্য স্ক্রাপ - ০২ (পুরাতন যন্ত্রপাতি ও অন্যান্য মালামাল) এর মূল্য প্রদানের তফসিল

ক্রম নং	দ্রব্যের বিবরণ	পরিমাণ	মূল্যহার: একক মূল্য (ভ্যাট ও অগ্রিম কর ব্যতীত)	মূল্যহার: মোট মূল্য (ভ্যাট ও অগ্রিম কর ব্যতীত)	মন্তব্য
১।	Fire Hose Pipe	০১ লট			পৃথক পৃথক আইটেম অনুসারে মূল্য প্রদান আবশ্যক।
২।	Motor & Electric Parts	০১ লট			
৩।	Safety & Welding Helmet	০১ লট			
৪।	LED Light Shade	০১ লট			
৫।	Exhaust Fan	০১ লট			
৬।	Electric & Welding Cable	০১ লট			
৭।	Steel Net	০১ লট			
৮।	Ball Bearing	০১ লট			
৯।	Welding Holder, Cutting Torch & Gas Cutting Nozzle	০১ লট			
১০।	Steel Measuring Tape	০১ লট			
১১।	Oxygen & Acetylene Regulator	০১ লট			
১২।	Life buoy	০১ টি			
১৩।	Mixed Fuel (Mobil, Hydraulic & Gear Oil)	০৪ ড্রাম (আনুমানিক ৮০০ লিটার)			
			সর্বমোট মূল্য (সংখ্যায়) =		
			কথায় =		

দরপত্র গ্রহণের তারিখ ও সময়: ৩০ মে ২০২২ হতে (অফিস চলাকালীন সময়)।
দরপত্র জমাদানের তারিখ ও সময়: ১৫ জুন ২০২২ বেলা ১২.১৫ ঘটিকা পর্যন্ত।
দরপত্র খোলার তারিখ ও সময়: ১৫ জুন ২০২২ বেলা ১২:৩০ ঘটিকা।

ক্রম নং	দ্রব্যের বিবরণ	পরিমাণ	মূল্যহার: একক মূল্য (ভ্যাট ও অগ্রিম কর ব্যতীত)	মূল্যহার: মোট মূল্য (ভ্যাট ও অগ্রিম কর ব্যতীত)	মন্তব্য
১।	Weigh Bridge (Amin Scale)	০১ সেট			পৃথক পৃথক আইটেম অনুসারে মূল্য প্রদান আবশ্যক।
২।	Diesel Water Pump	০১ টি			
৩।	CGI Sheet	০১ লট (আনুমানিক ৩০০ পিস)			
৪।	Zinc Slab	২,৫০০ কেজি (আনুমানিক)	=3650kg		
৫।	Iron Chips	৮০০ কেজি (আনুমানিক)			
৬।	Super Enamel Wire	৮০ কেজি	=62.40kg		
			সর্বমোট মূল্য (সংখ্যায়) =		
			কথায় =		

অভিপ্রায় পত্র নং- ২৩.০২.১৫৬৫.৩৪১.৫৫.০০৬.২২.২১৭ তারিখ: ২৯ জুন ২০২২।
দরপত্র সূত্র নং- ২৩.০২.১৫৬৫.৩৪১.৫৩.০০৬.২২.২০৬ তারিখ: ১৪ জুন ২০২২।
আইডিএন নং- ২৩.০২.১৫৬৫.৩৪১.৫৫.০০৪.২২.৬৯ তারিখ: ২৯ মে ২০২২ (সকলকে নহে)।

প্রিয় মহোদয়,

১। উল্লেখিত বিষয়ে আপনাদের ২৮ জুন ২০২২ তারিখের দরপ্রস্তাব ও ০৫ জুলাই ২০২২ তারিখে পে-অর্ডার জমা প্রদানের প্রেক্ষিতে এম. এস ও অন্যান্য স্ক্রাপ আপনাদের নিকট বিক্রয়ের নিমিত্তে সরবরাহ আদেশ (Delivery Order) প্রদান করা হলোঃ

ক্রম নং	মালামালের বিবরণ	পরিমাণ	একক দর	মোট মূল্য
১।	এম. এস স্ক্রাপ (সিডিডিএল কর্তৃক প্রদর্শিত)	৩০ (ত্রিশ) মেট্রিক টন (আনুমানিক)	টাঃ ৩৮,১১১.০০	টাঃ ১১,৪৩,৩৩০.০০
২।	অন্যান্য স্ক্রাপ (সিডিডিএল মোতাবেক)	০১ (এক) লট	টাঃ ২১,০০০.০০	টাঃ ২১,০০০.০০
			মোট =	টাঃ ১১,৬৪,৩৩০.০০
			(+) ৭.৫% ভ্যাট =	টাঃ ৮৭,৩২৪.৭৫
			মোট =	টাঃ ১২,৫১,৬৫৪.৭৫
			(+) ১০% অগ্রিম কর =	টাঃ ১,১৬,৪৩৩.০০
(কথায়ঃ টাকা তেরো লক্ষ আটষট্টি হাজার সাতশি টাকা পঁচাত্তর পয়সা মাত্র।)			সর্বমোট =	টাঃ ১৩,৬৮,০৮৭.৭৫

Figure 12: List of Scrap

So, as we can see there are both plastic and metallic scraps present here. The mild steel scraps that are seen are full of rust.

ii) Problem Identification

a) The rust-filled mild steel scraps are left without any shield or proper barricade. So, it is spreading here and there which can be a cause of environmental disturbance and also a safety issue for the worker. If the widespread mild steel equipment comes in contact with people, this can cause them serious harm. Also, the rust is getting mixed with air from time to time and as a result, the surrounding place is getting contaminated. Also, the rust is getting mixed with water while rainfall and directly going to Karnaphuly and getting the water polluted.

Figure 13: Scrap Area Investigation 1

b) The plastic scarps are light in weight, so they get shifted from the main scrap to a wider area and making the surroundings polluted and hazardous.

Figure 14: Scrap Area Investigation 2

iii) Solution

The solution that we are proposing is will store all the waste inside an enclosed space. There will be separate sections for plastic, MS, and other scraps. And this will not mix them and will stop the spreading of the lightweight stuff. Then again water will not get contaminated by the rust and will stop the pollution of river Karnaphuly. Then again it will not get mixed with the soil and help us keep the soil from soil pollution.

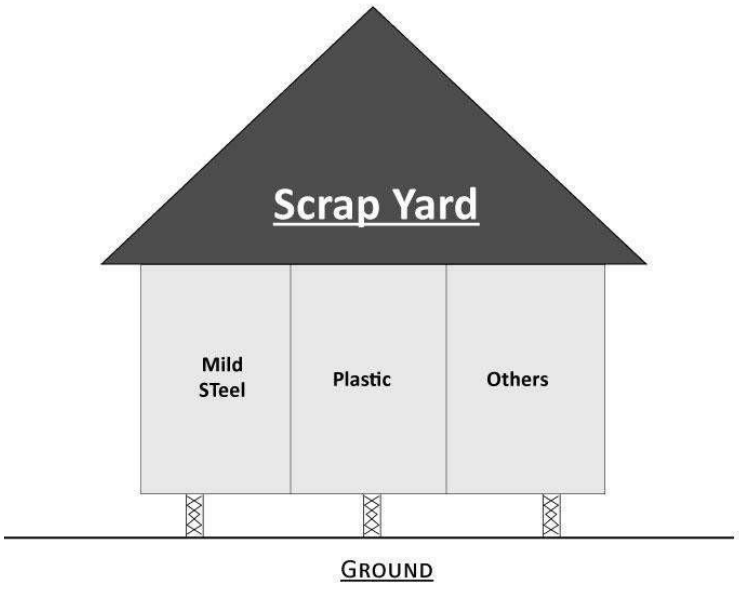


Figure 15: New Solution for Scrap Yard

f. PAINTING

i) Situation Analysis

Painting is one of the main tasks in the ship repair process. As paints are chemical compounds, they are harmful to the human body and environment. To achieve green shipbuilding and repair facilities, this process needs to be environmentally friendly. Also, the painters must be equipped with good quality protective gear to avoid harmful health hazards. Also, one more important factor that is properly maintained is all the coatings and paintings are anti-biocidal. It is highly praiseworthy that CDDL is maintaining this important factor.

ii) Problem Identification

The quality of the protection gear used in painting is not up to the mark. Also, one of the most noticeable facts of CDDL painting shop is during surface preparation they tend to use Sandblasting as a surface preparation technique. But according to international Standards, it is not accepted for the betterment of the personnel and the health of the workers.

iii) Solution

a) New and better-quality protection gear must be incorporated to ensure personnel safety.
b) Keep using all the anti-biocidal coatings and make people aware of the fact.
c) A session can be arranged to make people aware of BIOFOULING and the effect of painting chemicals in rivers or seas.
d) We have also learned CDDL is trying to improve the situation by introducing hydro lasting. But it's a huge cost-consuming process as the initial setup cost is high. Also, hydro blasting is not suitable for all types of materials. So, analyzing the situation and inspecting the sand storage for sandblasting we propose "Wet Blasting" as a surface preparation tool. Here is wet blasting. Water and sand mixed suspension is sprayed over the surface. It is the best one among all three of the methods we are talking about. It is compatible with all types of materials. And interestingly the price is less than hydro blasting. Whereas major equipment for hydro blasting costs 43,800 dollars approximately[3]. There major equipment for wet blasting requires only 3,650 dollars[4].

[3] https://cutt.ly/DMRiu08
[4] https://cutt.ly/iMRijMt

Figure 16: Wet Blasting Equipment

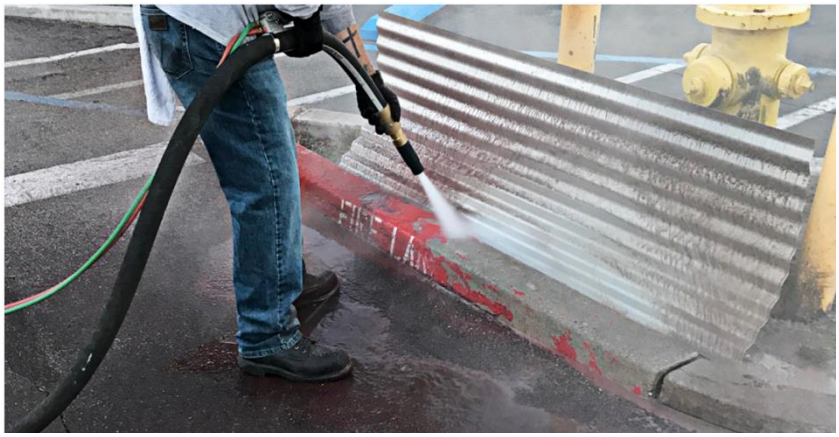


Figure 17: Wet Blasting

There are also other huge advantages of wet blasting. Such as Reduced dust levels: When wet blasting, the water in the slurry suppresses the dust created by the abrasive media, making it a much cleaner process.

It is less wear and tears on the equipment. The water in the slurry cools the abrasive media, reducing the wear and tear on the sandblasting equipment.

It has a multi-purpose capability. Wet blasting can be used for a variety of applications while sandblasting is typically used for more specific tasks.

For CDDL as we have already a good store of sandblasting sand, we can reuse every bit of it just by implementing wet blasting. Rather reuse in a better way as it provides better safety than the traditional one.

Green Shipbuilding

In the modern world of civilization, we must march forward at a modern pace. Already Bangladesh, our motherland has faced a huge loss for not being able to capsize the opportunity of Industrialization 4.0. But this world not only requires gigantic industries but also requires greener ones. So, our motto will be in this condition “GO GREEN”.

1. Western consumers are more worried than ever about the environmental impact of the things they purchase. By reducing the amount of material used in manufacturing and the supply chain, corporations and companies may do more to minimize their carbon footprint and improve resource efficiency. Like this, the global shipping sectors are concentrating on emitting less carbon to advance the maritime industry and meet SDG targets. If CDDL can meet all international requirements, it will be acknowledged for its work on a global scale, open new markets, and can Freelance on new projects.

2. Steel and fuel are currently the two main commodities on which the shipping sector depends. The goal is to have more control over the materials used and eventually build new ships from old ones. The item goes through a certified and secure recycling process. The phrase "reduce, reuse, recycle" has been around for years, encouraging us to use resources wisely and recycle as much as we can. As soon as the staff adopts this maxim into their everyday operations, there will be a decrease in environmental compliance and an increase in sales. Each employee of CDDL will gain their share from a specific profile-sharing system, and the likelihood of landing a contract as a freelancer will rise.

3. The housing system that CDDL now maintains uses numerous pumps to distribute water to various sections. These pumps conduct energy loss and have high energy requirements. One sizable central housing pump may be utilized in place of multiple others. Since only one pump will be used, the energy loss will be reduced. And depending on their needs, different tanks will receive water supplies via gravity. If the central pump malfunctions, the old pumps will still be usable for emergency purposes.

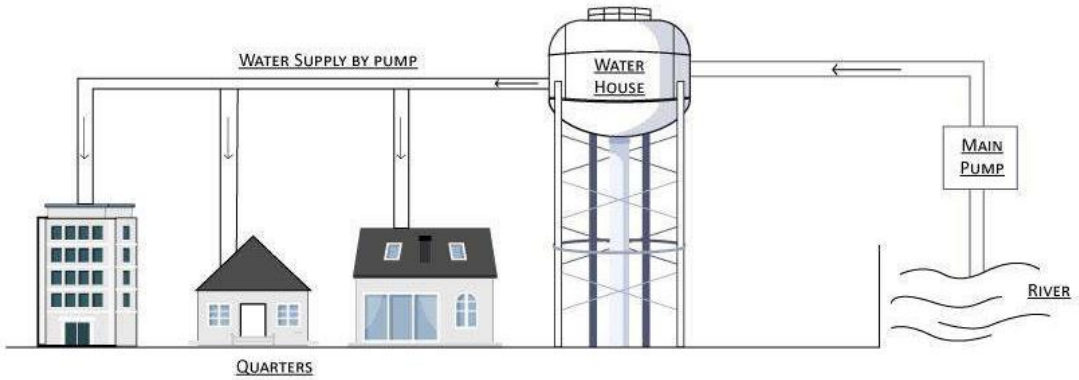


Figure 18: Improved Pumping System

4. There are many different sorts of waste present in the scrapyard and the vicinity of the shops, the majority of which cannot be recycled. Additionally, there is a lake of appropriate waste bins, and the people collecting the waste don't maintain the necessary safety equipment. The

necessity of a safe workplace that is also environmentally friendly must be clear to the employees through effective training.

5. Some small steps add up in the end. For instance, using plastic cups in the canteen will be prohibited. Paper cups or other reusable items can be used in place of plastic cups. also, the volume of plastic used should be diminished by emphasizing different possibilities.

6. Prospect of Green Shipbuilding and our motto “GO GREEN” refers to a greener environment which tends to mean the better use of our resources. So recycling is an important factor which is needed to be considered properly. So far, we have seen the Fabrication Shop and other shops reusing the materials available to them in the very best manner. They should keep the flow and to organize the reusing process we also suggest a flow chart.

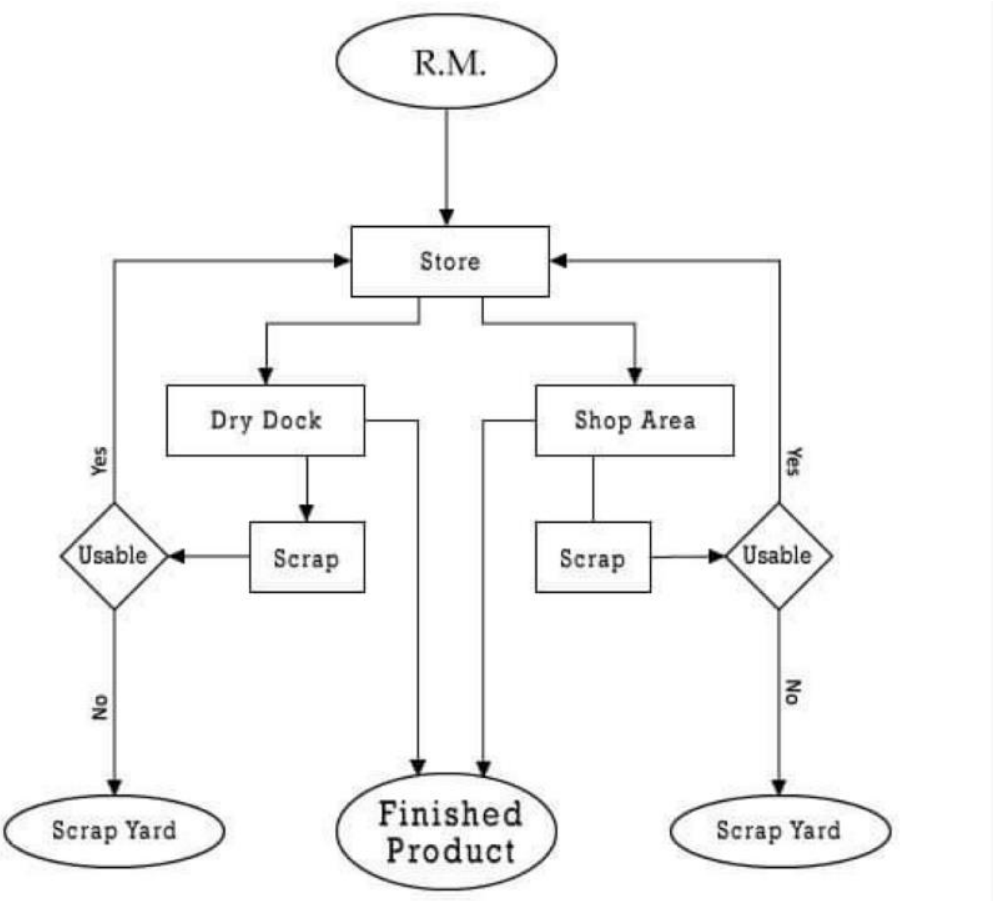


Figure 19: Flow chart of recycling

SWOT ANALYSIS

Strength

Environment friendly workplace

Emerging as a Green Shipbuilding industry

Worker's health issue improvement

Weakness

Long term plans

Won't succeed without making people aware

Opportunity

More international work due to green certification

Effcient scrap management

Better recycling

Threat

Lowering people's trust due to drastic changes

Quite costly at initiation

Conclusion

The world itself is jam-packed with CO_2 emissions and all other natural disasters. We may be living a life worth glorifying due to the facilities we are having and the resources we are available to. But despite the facilities, we are leaving the next generation to an unhealthier world. So, all the industries like CDDL should come out as the leading pioneer of the “GO GREEN” movement we are so focusing on. Industries should focus on their environment, focus on the people, and their safety as they are the key part of the environment. Industries should march towards their success by maintaining international standards. If we can maintain all these then only our endless struggle for a greener environment, safer world, and healthier life will be fulfilled. Keeping this in focus we tried to sort out every problem we are associated with. We tried to find out the best possible solution keeping in mind the profit of the organization. As it's easy for us to recommend anything preferable. But not everything can be accessible by CDDL. So, while solving we tried to keep in mind the feasibility of the solution and its impact on the industry’s overall profit and economy. If all the compliances are mitigated as per our suggestion, hopefully, CDDL will end up being the role model of the GREEN SHIP BUILDING industry of Bangladesh.