***Tasmanian Science Talent Search - 2020***

Shipping containers and the issues they present

Our group consists of Chloe, Ella and Morgan. Our focus of this research project is about the shipping container and 2 factors. The visibility of the container after it has fallen into the ocean and the buoyancy of the shipping container in the water. The wider focus is about shipping containers after they have fallen into the water and how they can prevent any retrieving issues or ships being damaged.

The visibility also has 2 factors that can be explored. The colour of the shipping container, the issue being that the dark colours used aren’t highly visible in the sea and the toxicity of the zinc used in the current paint. Solutions to those issues included finding eco-friendly paint in replacement of the zinc but also is durable in the weather which is the reason zinc is used; and also linking in the colour of the paint can be changed to a higher visibility colour that stands out in the sea and can be seen. Another idea is to find a reflective tape to stick to the shipping container which would alert any lights searching and avoid any yachts sailing by and crashing into it.

The buoyancy of the shipping container is an issue because once the container is in the water it floats just under the break of the sea meaning that you cannot see it easily and could cause serious damage to any passing boats. Possible solutions to the issue are creating a kind of air bubble or pocket to place in the top of the shipping container, changing the entirety of the shipping container material and implanting a buoyant material in only the top of the container so if it floats it would be upwards and nothing inside should be broken severely.

Research was conducted about these solvable issues. We each had our own point of view and perspective and researched from that. The final report will show the results of our analysing.

That is the extent of our research band on improving shipping containers. Our group has decided our focus points by what intrigues us and what we would like to see improved about shipping containers.

The Final Task Report - findings

Our researching and analysing resulted in the following...

The research considering the visibility once the shipping container is in the water has concluded in the following results. Theorised solutions were determined by practicality and possibilities of what could solve these issues, hypothetically. A list of possibilities was created with the aim of one thing, to aid the visibility of shipping containers in the sea. The concluded possibilities were high visibility paint and reflective tape. Some comments taken from research: Glow in the dark, durable but maybe not entirely, colours can vary from white to yellow, road paint, yellow, durable with weather, non-flammable, maybe not the best to be painted onto metal, reflective tape, durable to weather, yellow or white, decent tape, says it fades quickly in sunlight.

If a large number of containers are lost, a salvage operation might be necessary to retrieve lost cargo and avoid further criminal action due to environmental pollution. Marine salvage of fallen cargo containers is an expensive and lengthy task, and salvage companies charge thousands of dollars and cannot always guarantee that all goods will be recovered.

In most cases, goods are damaged and unfit for use, which is why it is always important to make sure that cargo is insured. In other cases, containers are unable to be located especially in deep sea. Refrigerated containers offer much more buoyancy and drift for much longer, most cargo containers will sink to the sea floor within around 2 months. While they still float, those containers create hazards for smaller boats. Cargo inside lost containers can continue to wash up on shores for years after the incident. In 1997, a vessel carrying containers of Lego was hit by huge waves and to this day, hundreds of Lego bricks are found washed up on the shores of Cornwall, England.

It is illegal to take any goods found washed up on the beach. If cargo is found from shipping containers washed overboard, it must be reported as the contents still belong to the shipper or to the insurer if a claim was lodged and settled.

Sometimes shipping container tracking is done using GPS-enabled sensors, which rely on satellites to deliver accurate placement information. These sensors are attached to the exterior of the containers and periodically get a GPS fix; they then send that location data to the application via satellite.

The best paints for shipping steel containers are acrylic-based paints with an added zinc phosphate and a nonchlorinated plasticized mixture. Rustproof urethane enamel makes another good paint option for steel containers. These provide both an attractive appearance and durability, ensuring the strength and integrity of the metal by keeping it free from rust, an important element due to the damaging elements a shipping container receives. Zinc chromate is primarily used in paints for priming metals to resist corrosion. It is also used in varnishes and automotive paint pigments. Zinc cyanide is used in metal plating, in producing insecticides, electroplating, removing ammonia from producer gas, and gold extraction. It is also used as a chemical reagent, and in medicine and chemical analysis. However, zinc can be incredibly harmful to marine creatures. Scientists have discovered that it takes many years for life to begin to colonise on a sunken object. Scientists fear that when a container reaches the sea floor it will crush any life form that happens to be under it. This is thought to be an issue because the ecosystem around the container is now imbalanced. This theory is based off what happens around artificial reefs.

Some objects do a better job of functioning as healthy artificial reefs than others. The aforementioned pile of tires, for instance, was a popular idea in the 1970s. Later, it turned out that sunken tires were leaching plastic compounds called PCBs into the water. These compounds can cause cancer in animals, so the tire reefs, while attracting wildlife, were also, probably, killing some of that life over time. Other than the potential for contaminates which can work their way up the food chain, artificial reefs can also accidentally alter the local food webs. If the reef helped to boost the numbers of a previously low-population predator, for instance, that animal could have detrimental consequences for other creatures in the ecosystem. Scientists are also concerned about the risk of artificial reefs acting as points of intense biological activity that serve as oases on an otherwise unvegetated deep-sea floor. Given enough steppingstones, animals might be able to cross from their native waters, one step at a time, to become invasive species somewhere else.

In conclusion sunken shipping containers are in some ways beneficial to the ocean, but the pollution and wildlife disruption overpowers the positives. Shipping containers, whilst helpful on land, can not end up in the ocean. Salvage companies have up to 2 months to retrieve a lost container, depending on the conditions. This is plenty of time. There are many possible solutions to this problem; make the paint less toxic, seal the containers tighter to provide more buoyancy or we can trace it back to the stem of the problem the container ships themselves, in particular, the way a container ship is loaded. The containers are stacked up to 31.2 meters high. This alone is concerning, if we can reduce the load then it will reduce the number of containers falling overboard.

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