Superior Jetties
Die Cast Cleat Case Study by Duform® Commercialisation

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introduction

Duform® Commercialisation specialise in the development of products and processes to reduce cost and improve quality for its clients.

The case study 'Deco Cleat' is an example of Duform® Commercialisation identifying opportunities to improve the quality of a product, reduce production cost, increase product longevity and enhance product aesthetics.

The case study will explain the process in which product development and advance material research can transform a once basic functional product into a beautiful corrosion resistant product.

background

Superior Jetties is an Australian manufacturer that build and install commercial marinas and domestic pontoons both nationally and internationally.

Superior Jetties endeavored to standardise their marina cleat range with one universal cleat that will be applied to all their marina systems. This will reduce the bill of material and introducing purchasing power with bulk orders from sub contractor manufacturers.

Superior Jetties had two cleats; Standard (see figure 1) and Sliding (see figure 2) for the application to three marina systems. Both cleats were manufactured via investment casting, a labour intensive process that delivers average tolerance and a rough surface finish.

Per unit cost is high for investment casting, thus not delivering a profitable margin when the cleats are sold wholesale.

When configuring cleats for vessel berthing on a marina, the load rating of a marina cleat should not exceed the load rating of the stainless steel bolts that fix it to the pontoon. The stainless steel bolts should also not exceed the strength of the location of the marina that the cleat fixes to. By following this principle, damage containment is achieved by localizing point of failure to the cleat, providing an affordable solution when damage occurs.

background

The Superior Jetties Standard and Sliding Cleats also experience corrosion when installed in the marine environment. The cleats are made from aluminium and when fixed to the concrete surface of a marina, the salt water causes electrolysis, thus causing corrosion. The fixing recess located at the top of the cleat (see figure 1.3) experiences corrosion also due to the contact of dissimilar metals (aluminium cleat, stainless steel fixing bolts). When salt water sits in the fixing recess of the cleat, the assembly bonds together due to corrosion and makes it impossible to remove the cleat from the marina. During maintenance, the cleat assembly will have to be cut from the pontoon, sacrificing the cleat and fixing bolts.

The surface finish of the Standard and Sliding Cleat is a rough cast finish with minimal consideration for aesthetics (see figure 1.4). The product is purely a functional product that is overpriced and under quality.

solution

Duform® Commercialisation has successfully combined both the Standard and Sliding Superior Jetties Cleats into the new Deco Cleat (see figure 1.5).

The Deco Cleat is die cast 356 aluminium with a tolerance of 0.1 mm, polished, chrome plated and protected with a trade secret coat that makes the cleat last forever in the marine environment.

A field trial was conducted with a Deco Cleat placed in the tidal flow of a marina for 2 months. When the Deco Cleat was removed from the tidal flow, the salt had crystalised on the Deco Cleat (see figure 1.6). By simply pouring fresh water over the Deco Cleat, the salt was removed, revealing a high polished finish with no corrosion.

Die casting is a high capital, low unit cost method of production so by combining both previous cleats into one design, capital expenditure is reduced by 50%. A feasibility study was completed to ensure ROIC (Return on Invested Capital) was achieved in the shortest time possible.

For use of the Deco Cleat for Standard application, it is fixed via the bolt recess (see figure 1.7). To overcome the issue of electrolysis between the aluminium cleat and stainless steel fixing bolts when use for Standard application, a polymer coat is bonded to the inside surface of the cleat (see figure 1.7).

solution

The bolt head recess on the Deco Cleat is now protected with the introduction of the Bolt Head Caps (see figure 1.8). The Caps prevent salt water from entering the Deco Cleat and causing corrosion. They also presents a clean seamless design.

For use of the Deco Cleat for Sliding application, the bolt recess is caped and the Deco Cleat is fixed in the sliding track (see figure 1.9). During the die casting process, two recesses are moulded in the die (see figure 2.0). If a Deco Cleat is to be used for Sliding rather then Standard, an 10M thread is drilled and taped at the recess location (see figure 2.0).

The Deco Cleat has been engineered to not exceed the load rating of the fixing bolts, nor the marina where it is located. By load rating the Deco Cleat, the configuration of number of Deco Cleats per vessel has been calculated, eliminating the possibility of damage to a pontoon and ensuring the vessel is safely secured.

conclusion

The Superior Jetties Deco Cleat is an example of material advancement along with innovative design to improve quality, reduce maintenance and cost whilst increasing product performance.

This is an example of Duform® innovation that can be applied to a number of industries for clients that wish to be the leaders in their industry and cost competitive.

Duform® identifies the problem, creates a solution and commercialise opportunities in the market for its clients.

Content in the Case Study: Die Cast Aluminium Deco Cleat is the exclusive property of Superior Jetties.

appendix

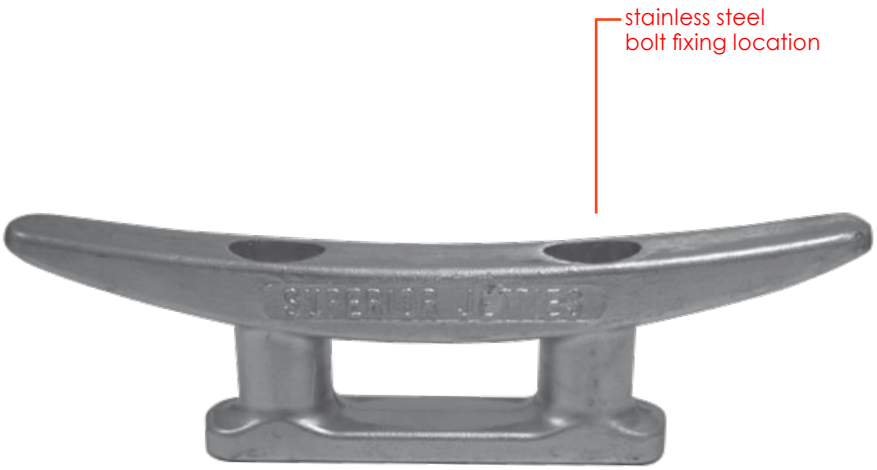

Figure 1.1 ↑

↓ Figure 1.2

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appendix

Figure 1.3 ↑

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Figure 1.5 ↑

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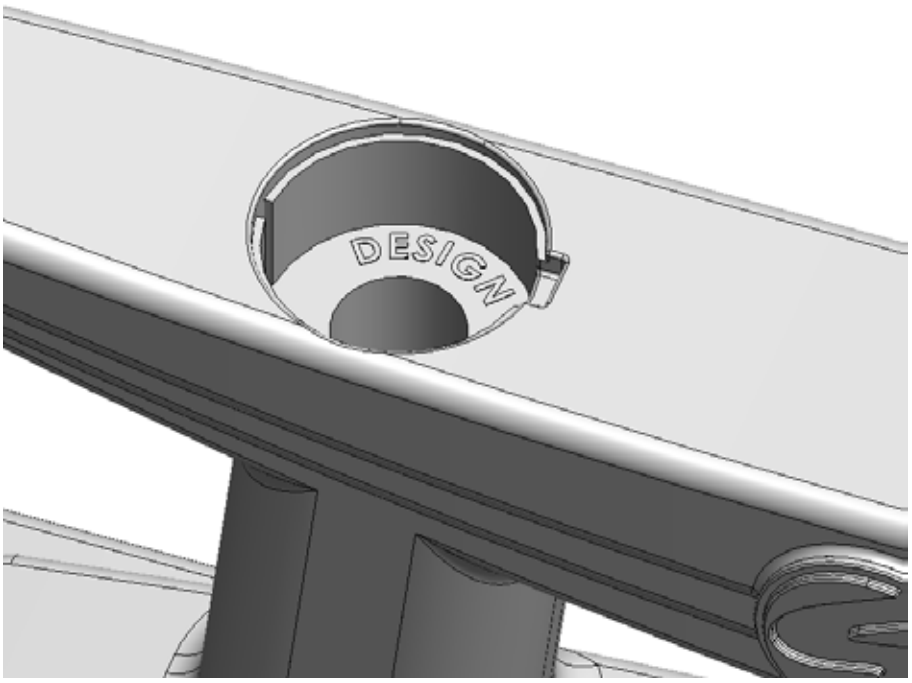

Figure 1.7 ↑

↓ Figure 1.8

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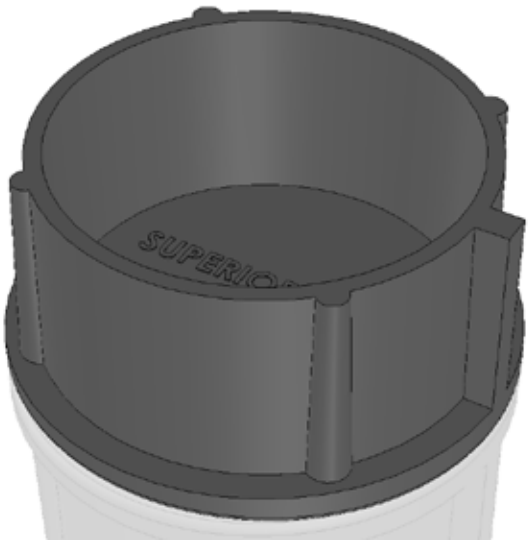

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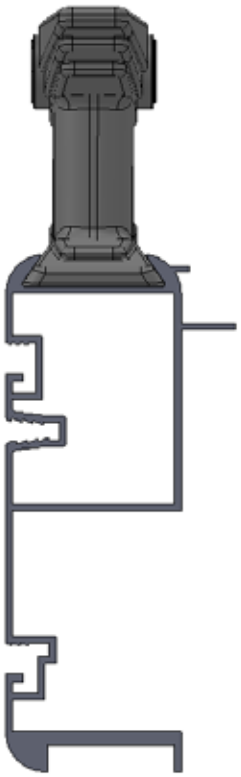

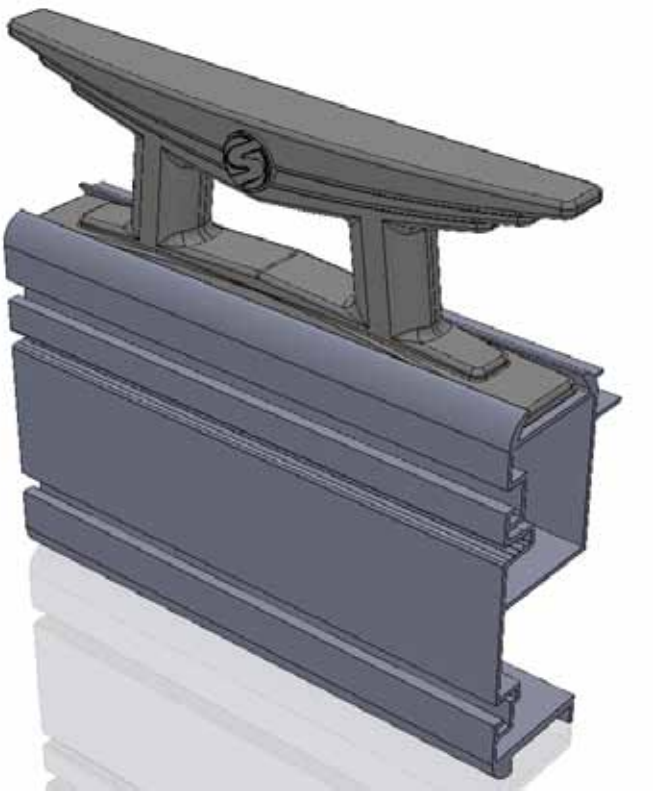

Figure 1.9 ↑

↓ Figure 2.0

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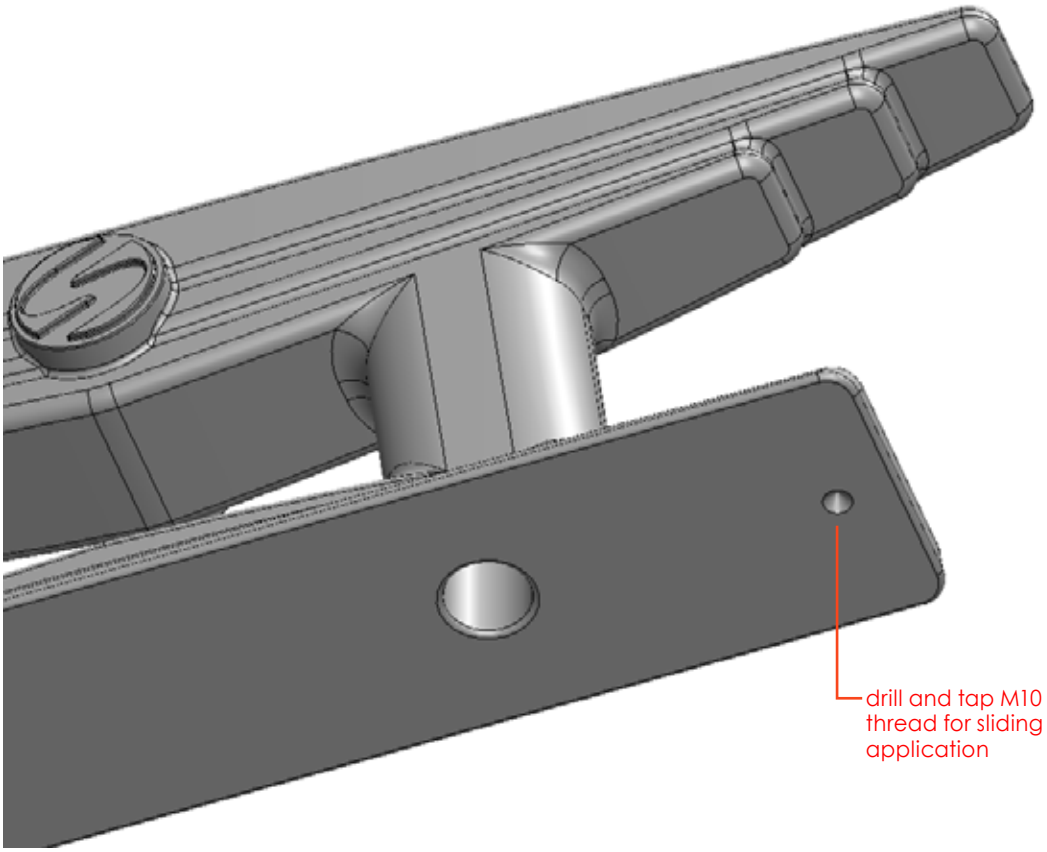

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