Revolutionary keel cooler design more than doubles heat transfer in half the hull space

DuraCooler® SuprStak™ with TurboTunnel Design

Angled TurboTunnel Header Design

Increased convergent header pressure "jets" turbulent sea water between the upper and lower tube decks.

Turbulizer Spacers

Unique shape spacers create vortex effect to "turbulize" the sea water to increase cooling efficiency *(Von Karman effect).*

Flow Diverter Scoops

Diversion of sea water disrupts the laminar flow and allows stagnant high temperature areas to be cooled.

PATENTS PENDING

Duramax Marine® has engineered a unique keel cooler that is the most efficient keel cooler Duramax Marine® has ever built. DuraCooler® SuprStak™ takes keel cooling technology to the next level. It can deliver more than double the cooling efficiency, using half the hull space.

This cooler will be the newest addition to the Duramax Marine® long line of custom engineered heat exchange solutions, and the best answer for the marine industry's ever increasing cooling requirements.

DuraCooler® SuprStak™ with TurboTunnel Design *(patent pending)* is a double-stacked, completely redesigned DuraCooler®.

SuprStak™ is engineered to "jet" turbulent seawater in a tunnel-like configuration between its top tubes and lower tube assemblies. It is the latest in engineered cooler technology that greatly enhances heat transfer in half the hull space. There is nothing else like it on the market.

It has long been understood that turbulent flows allow for great enhancements in heat transfer.

However, little consideration is given to the flows around a marine keel cooler. At low to moderate hull speeds, seawater flowing axially along a 90-10 Cupronickel keel cooler tube is laminar by nature. It is the formation of this laminar boundary layer, which according to classical heat transfer creates a type of insulation, causing reduced heat transfer and restricting heat from properly convecting into the seawater. To circumvent this, advancements have been incorporated into the new DuraCooler® design to both enhance and optimize turbulent flow outside and around the keel cooler, yielding a more compact and efficient DuraCooler® design.

Duramax Marine® is an ISO 9001:2015 Certified Company

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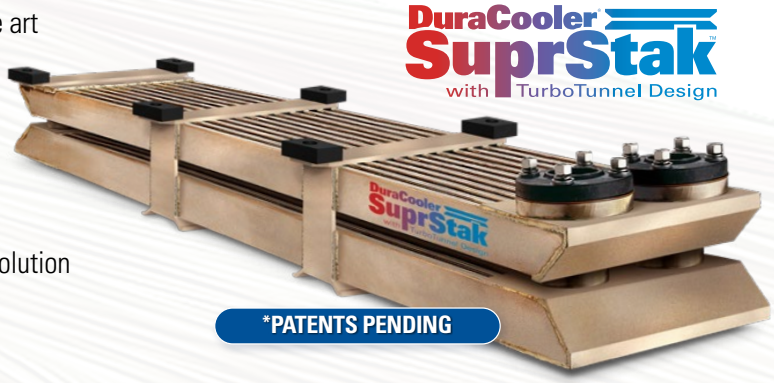
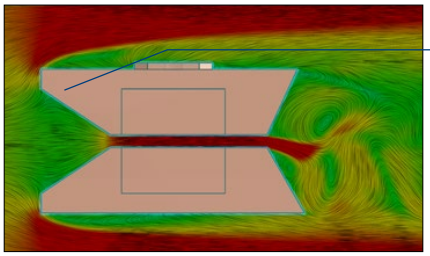
The **DuraCooler® SuprStak™** design advancements – are a breakthrough in keel cooler technology.

These advancements have been developed using state of the art computational fluid dynamic (CFD) modeling techniques and have been tested and validated utilizing a full scale water tunnel. Each innovation has been specifically engineered to properly promote turbulence and modulate flow velocity over the DuraCooler.® Our R&D team has made sure that the SuprStak™ design offers the best, most efficient and robust solution of any DuraCooler® Keel Cooler design.

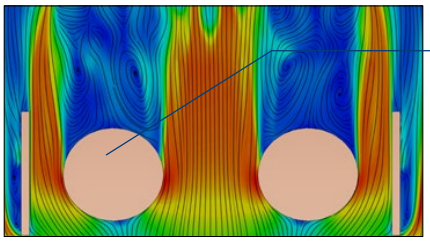




TurboTunnel Header Design.

Taking advantage of our current angled header profile we designed a convergent type profile which allows for the development of stagnation pressure due to fluid inertia.

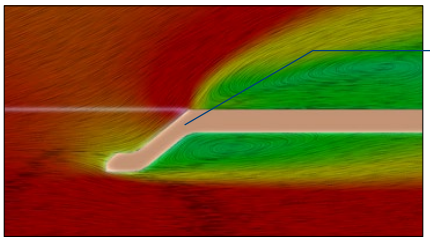
This creates a "jet" like effect accelerating seawater flow between the top and bottom tubes of the double stack increasing heat transfer. The speed of the seawater flowing over the cooler is now significantly faster than the actual speed over the hull. Depending on the application we also adjust the opening size between the stacks to modulate the flow for optimum design and cooling efficiency.



Round Turbulizer Spacers.

Two round spacers on each end of the double stack act as more than spacers separating the upper and lower cooler decks.

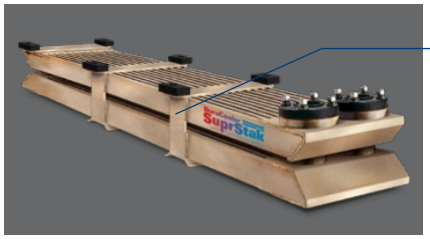
They are designed as turbulence enhancers that naturally develop a swirling type turbulent flow *(Von Karman Vortex Phenomena)* that accelerates the incoming sea water, helping it yield a much better temperature profile than other types of keel coolers.



Flow Diverter Scoops.

Engineered flow diverters run the width of the lower tube assemblies to "flush" the stagnated areas between the tubes with sea water. The diverter is a unique design which must have a specified spacing between the diverter and the tubes.

They are designed to ensure a "scooping" action far enough away from any stagnant regions to allow forced convection between the hot tubes and the lower temperature sea water.



One Piece Brazed or Modular Design.

The DuraCooler® SuprStak™ is engineered to be manufactured in a completely brazed double stack assembly or made in such a way that the 2 cooler decks can be separated.

The modular design is installed in upper then lower sections for easier handling. This will reduce the overall weight of the unit during installation.

Other Custom Engineered Duramax® Heat Exchange Systems.

DURACOOLER® KEEL COOLERS

DURAMAX® DEMOUNTABLE KEEL COOLERS

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