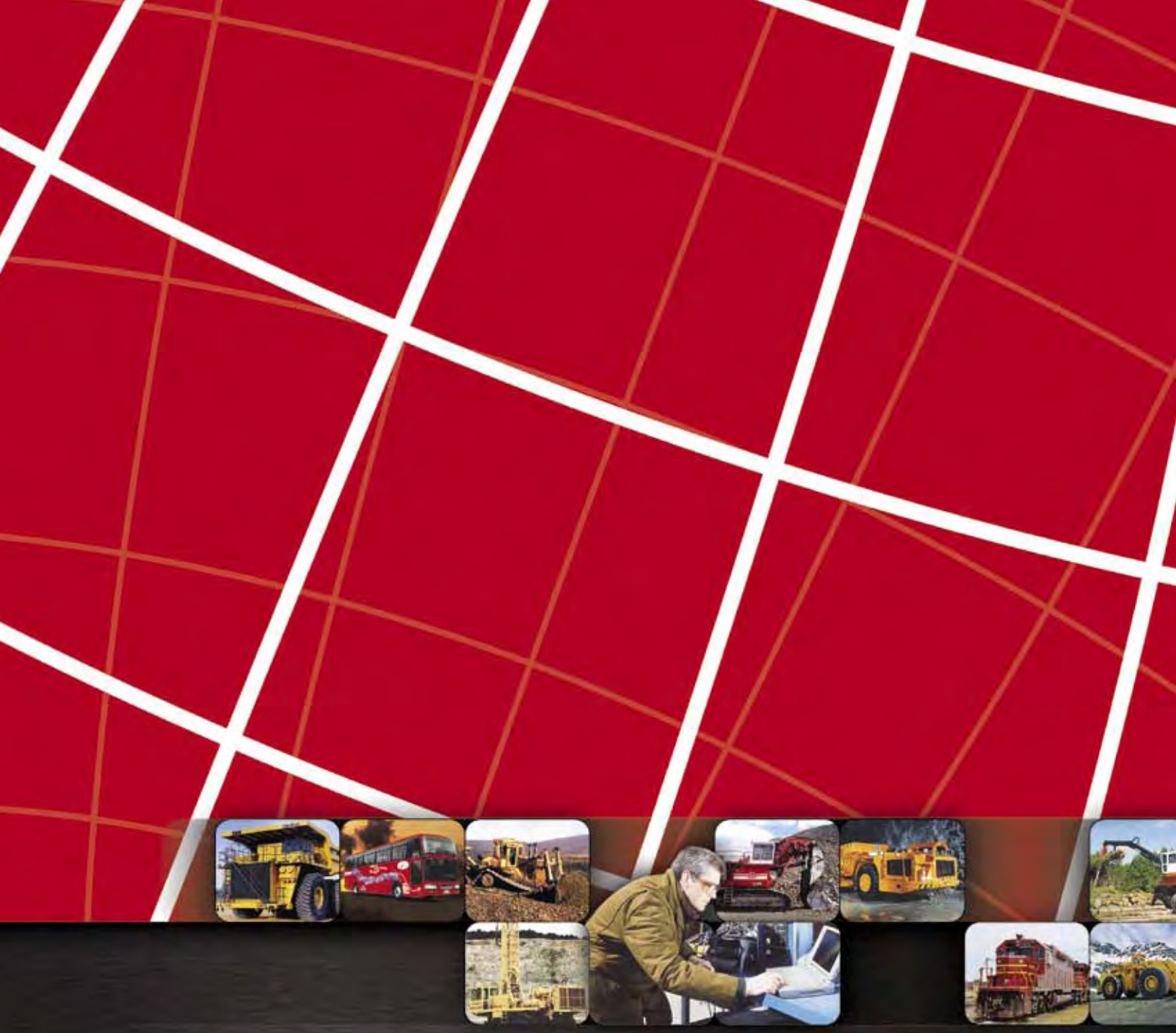


FLEXIBLE CORE HEAT EXCHANGERS

MESABI®

L AND M

Manufactured and Distributed Worldwide by L&M Radiator

KING OF THE CHILL.

Complete Engine Cooling Packages

From the simple to the complex, including remote power units with fans and drives.

ENGINE RADIATORS

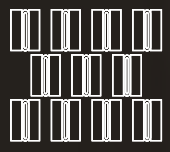
Complete radiators — tanks, core and framework — can be specified on OEM applications for all heavy-duty diesel engine cooling. If only the core is desired, MESABI® cores interchange with virtually all conventional bolt-on cores. Designs available to meet all current and past emission requirements and standards.

Boss Radiators™

The BOSS™ "Brass OffShore Service" is designed for equipment working in corrosive environments. It features brass finning brazed to brass tubes. Mild steel framework is coated for offshore service; stainless steel framework optional.

V-Tube Core™

The V-Tube Core™ is designed for work sites where cores may be subject to external clogging due to dirt and debris. Tubes are configured to create open passages. Finning is V-shaped to resist material hang-up. Debris slides past tubes and through passages. Debris too large for passages is easily removed with high-pressure water or air.



STANDARD CORE
STAGGERED SPACING

V-TUBE CORE™
CLOG-RESISTANT PASSAGES

MESABI® Retrofit Replacement Radiators for Caterpillar® Cores

(Sized to meet Cat® engine specifications)

Build MESABI® radiator dependability into your Cat® equipment:

* Purchase a complete MESABI® retrofit replacement radiator.
* Let L&M Radiator convert your Cat® frame into a new MESABI® Core Radiator – and save.

L&M Radiator can replace Cat® folded cores, AMOCS, air-to-oil and air-to-air coolers, after-coolers, and tube and shell coolers. Special programs available for fleet conversions. Contact L&M Radiator for complete details.

For detailed information on MESABI® products, visit our website: mesabi.com

WHY MESABI®
FLEXIBLE CORE HEAT EXCHANGERS
LAST FOREVER.

FIELD REPAIRABLE TO 100% COOLING CAPACITY
Individual cooling tubes are held in headers with flexible rubber seals. The seals allow tubes that may incur damage to be removed and replaced in the field, and often without removing the radiator from the equipment. Because MESABI® heat exchangers can be returned to 100% cooling capacity over and over again, they will out last the equipment in which they are installed.

NO LEAKY SOLDERED SEAMS
Seals absorb vibration, stresses and thermal shock that can cause rigid soldered seams to crack and leak.

EASY TO CLEAN
With optional V-Tube Core™ *(shown)*, tubes are arranged to create open passages so dirt and debris can blow through core.

MESABI® cores, tanks and frameworks are available in materials and with coatings to withstand the most harsh operating environments.

L&M RADIATOR WARRANTY

The L&M Radiator Warranty consists of the L&M Radiator General Warranty and L&M Product Specific Warranties. See individual service manuals for warranty specific to the product in which you are interested.

GENERAL WARRANTY

Consult L&M before proceeding with warranty claims or repairs. Failure to do so may void this limited warranty. This limited warranty allocates the risk of failure of the product(s) between the buyer and L&M and is reflected in the purchase price.

L&M warrants that MESABI® products will conform to L&M's written quotation specifications and drawings. MESABI® framework components are warranted for 18 months from the date of invoice against defects in materials and workmanship during normal usage. L&M warranty against seal leakage during normal operation is stated in individual product literature.

L&M's liability is limited to the rework or replacement (at L&M's sole option) of products or parts manufactured by L&M that are determined by L&M to be defective in workmanship or material or do not meet L&M's quoted specifications.

L&M product warranty does not apply if the product has been subjected to abnormal use or conditions, unauthorized modifications or repair, corrosion, misuse, neglect, abuse, accident, improper installation, or other acts which are not the fault of L&M, including damage caused by shipping.

L&M does not warranty products incorporated into L&M products that are not manufactured by L&M. Buyer's sole recourse with respect to such products will be subject to the warranty of the individual manufacturer.

OTHER THAN AS STATED HEREIN, L&M MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED, AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTERS WITH RESPECT TO THE SALE OF L&M PRODUCT(S) AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. IN NO EVENT WILL L&M'S LIABILITY INCLUDE ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES, EVEN IF L&M KNEW OF THE LIKELIHOOD OF SUCH DAMAGES.

Any action or lawsuit for breach of the limited warranty in these L&M terms and conditions must be commenced in Minnesota. This warranty supersedes all previously published warranties.

RETURNABLE TO 100% COOLING CAPACITY OVER AND OVER AGAIN.

EASY FIELD REPAIRS

Steps to remove and replace tubes shown are for engine radiators. Other MESABI® products dismantle and reassemble in similar fashion. Entire procedure for replacing or cleaning tubes can be done by regular maintenance personnel without special skills, using only a simple hand tool and often without removing the radiator or heat exchanger from the equipment.

Hand tool lifts tube from seal.

Tube is removed from header plate.

New tube is inserted into new seal. If no new tubes are available, tube holes can be plugged for tube replacement at a later date.

Tool seats tube into new lower seal.

COOL UNDER PRESSURE.

AIR-TO-OIL COOLERS & AIR-TO-AIR COOLERS

L&M Radiator offers coolers with either aluminum or copper tubes to meet customers' cooling and space requirements.

Aluminum Tube

For pressures up to 500 psi (3447 kPa)

- **Standard Cooler**
  For pressures up to 175 psi (1207 kPa)

  Cooling tubes feature integral circular finning rolled from the tube wall. Turbulators are placed in tubes to increase heat transfer.

- **High Pressure CSC™ Cooler**
  For pressures up to 500 psi (3447 kPa)

  CSC™ "Captured Seal Coolers™" feature tube-to-header seals held captive in the header plate. Once a tube is in place, the seal is compressed to make a tube-to-header seal capable of withstanding tested pressures.

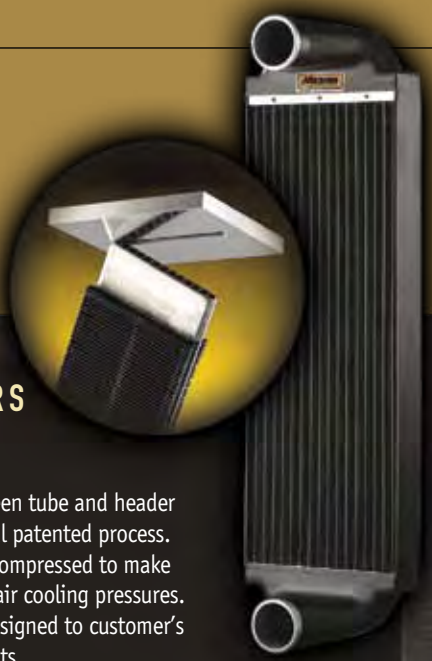
Copper Tube

For pressures up to 150 psi (1034 kPa)

Cooling tubes are similar in design to MESABI® engine radiators, but have internal turbulators. Designed for those applications where high efficiency is required and space available is limited.

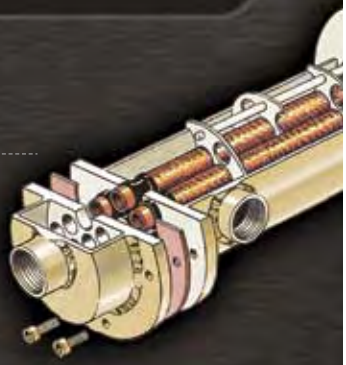
CHARGE AIR COOLERS

Core is comprised of a single row of multi-ported high efficiency aluminum cooling tubes. Seal between tube and header is held captive in header by a special patented process. Once a tube is in place, the seal is compressed to make a seal capable of exceeding charge air cooling pressures. For all charge air cooling. Can be designed to customer's specifications and space requirements.



Left: Optional copper tube charge air cooler (top section) in combination with a water radiator. The package includes cooling for a fuel cooler mounted in front of the radiator, and a detached MESABI® RTTS® tube and shell cooler used for transmission cooling.

TUBE & SHELL COOLERS



RTTS®

For both in-plant and mobile equipment heat exchange: liquid-to-liquid, liquid-to-air and air-to-air. Maximum pressure shell side: 150 psi (1000 KPa); tube side: 50 psi (350 KPa). Maximum temperature: water 230°F (110°C); oil 275°F (135°C). Can be made to almost any configuration of length and diameter.

System Protector™

Provides an added safeguard for systems under continuous operation.

- Protects expensive equipment from downtime caused by cross-contaminated fluids.
- Alerts operator to leaking by sight gauge or electronic sensor.
- Protects the environment.

For detailed information on MESABI® products, visit our website: mesabi.com

The wind tunnel tests designs for air and water restriction, heat dissipation, and configuration of tubes for maximum efficiency.

L&M engineers work directly with OEMs in their plants and in the field to verify performance requirements.

HAVE A HEAT TRANSFER PROBLEM?
WE HAVE A SOLUTION.

L&M ENGINEERS WORK DIRECTLY WITH CUSTOMERS, OEMS, ENGINE MANUFACTURERS AND FAN SUPPLIERS TO BUILD IN MESABI® RELIABILITY

CHALLENGE: Limited space for engine and oil cooling
SOLUTION: "V-Pack" heat exchanger package

This frac truck powered by a 3000 hp 16V4000 Detroit Diesel engine had limited deck space. L&M engineers combined the unit's cooling needs in a single "V"-shaped frame. Included with the "V-Pack" are low and high temp radiators, air-to-oil hydraulic and fuel coolers, and tube and shell coolers for the transmission and frac pump. Two fans pull hot air through the "V" up and away from people and equipment.

CHALLENGE: Limited space; high ambient temperatures
SOLUTION: Low-profile, multi-cooler package

A blast hole drill rig required multi-functional cooling. Space was limited and with a height restriction. A second challenge was cooling adequate for world-wide ambient temperature extremes. L&M placed all four cooling functions into a single unit. Engine cooling is by standard MESABI® copper tube radiator, charge air by MESABI® aluminum tube cooler, and hydraulic and compressor oil cooling by MESABI® Model CSC™ 350 aluminum coolers. The flexible design feature of MESABI® heat exchangers allowed the number of cooling tubes for each cooler to be optimized to assure cooling at high ambient temperatures.

MESABI® IS THE WORLD STANDARD FOR HEAT EXCHANGER RELIABILITY

Significant L&M Radiator dates:

* 1957 – L&M Radiator founded by George Langer (L) and Clay Murray (M) in Hibbing, Minnesota, U.S.A.
* 1961 – Alex Chisholm joins L&M Radiator
* 1967 – Second plant opens in Hermosillo, Sonora, Mexico
* 1972 – Third plant opens in Western Australia
* 1980 – Fourth plant opens in El Paso, Texas, U.S.A.
* 2005 – Fifth plant opens in Independence, Iowa, U.S.A.
* 2007 – Sixth plant opens in Yankton, South Dakota, U.S.A.
* 2008 – L&M continues in its third generation of family ownership and management

The British first developed the idea of individually replaceable cooling tubes held in headers with rubber seals during WWII desert tank warfare.

The concept had these advantages:

- The flexible seals would allow damaged tubes to be removed and replaced even under combat conditions.
- The seals would absorb vibration, pounding and thermal shock that would cause conventional radiators to leak.

Following WWII, Rolls-Royce motor cars and commercial vehicles were equipped with these radiators. In the early '50s, the radiator core first appeared on haul trucks in Canadian ore mines in Labrador.

In 1957, L&M Radiator acquired the rights to the concept and brought the radiator to the Minnesota Mesabi Iron Range. With rapid acceptance of the "MESABI® Radiator" in the mining industry, the concept grew in popularity worldwide as both an OEM and aftermarket product for all mobile and stationary heavy-duty equipment.

Today, the MESABI® replaceable tube concept, first developed for engine cooling, has been applied by L&M Radiator to all types of heavy-duty equipment heat transfer. MESABI® is the world standard for heat transfer reliability.

L&M RADIATOR FACTORY-DIRECT SALES AND SERVICE

Because so many of our radiators and heat exchangers are a custom design, all sales are on a factory-direct basis. This assures that our customers receive a product that meets their cooling/heating requirements, offered to them at the least possible price.

We ship most parts within 24-hours. On-site technical and engineering assistance is available almost anywhere in the world within a few days notice.

L&M QUALITY POLICY

"The Quality Policy of L&M Radiator is to produce a quality engineered, quality manufactured product through continuous improvement that we deliver to the customer's satisfaction."

Manufactured and distributed by:

L&M Radiator

Toll Free: 800-346-3500 (U.S.A. and Canada)
mesabi.com **Email: cool@mesabi.com**

WORLD HEADQUARTERS

L&M Radiator, Inc.
1414 East 37th Street
Hibbing, Minnesota 55746 U.S.A.
Telephone: (218) 263-8993
Fax: (218) 263-8234

ISO 9001:2000 CERTIFIED

UNITED STATES

L&M Radiator, Inc.
Hibbing, Minnesota U.S.A.

L&M Radiator, Inc.
Independence, Iowa U.S.A.

L&M Radiator, Inc.
El Paso, Texas U.S.A.

L&M Radiator, Inc.
Yankton, South Dakota U.S.A.

MEXICO

L y M de Mexico S.A. de C.V.
Calle De La Plata y Los Nogales
Parque Industrial
Hermosillo, Sonora, Mexico
Telephone: 011-52-662-251-0480
Fax: 011-52-662-251-0638
Email: ventas@lym.com.mx

AUSTRALIA

L&M Radiator Pty. Ltd.
Cnr. Kew & Kathleen Streets
Welshpool, Western Australia 6016
Telephone: +61-8-93616855
Fax: +61-8-94703075
Email: cool@mesabi.com.au

JPG 3.1M 7-08 Printed in U.S.A.