



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<sup>®</sup> IS THE WORLD STANDARD FOR HEAT EXCHANGER 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."*



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<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> is the world standard for heat transfer reliability.



## L&M Radiator

ISO 9001

Manufacturing Facilities:

TOLL FREE: 800-346-3500 (U.S.A. and Canada)



### UNITED STATES

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



L&M Radiator, Inc.  
6966 Market Street  
El Paso, Texas 79915 U.S.A.  
Telephone: (915) 779-3866  
Fax: (915) 779-3195  
Email: cool@mesabi.com



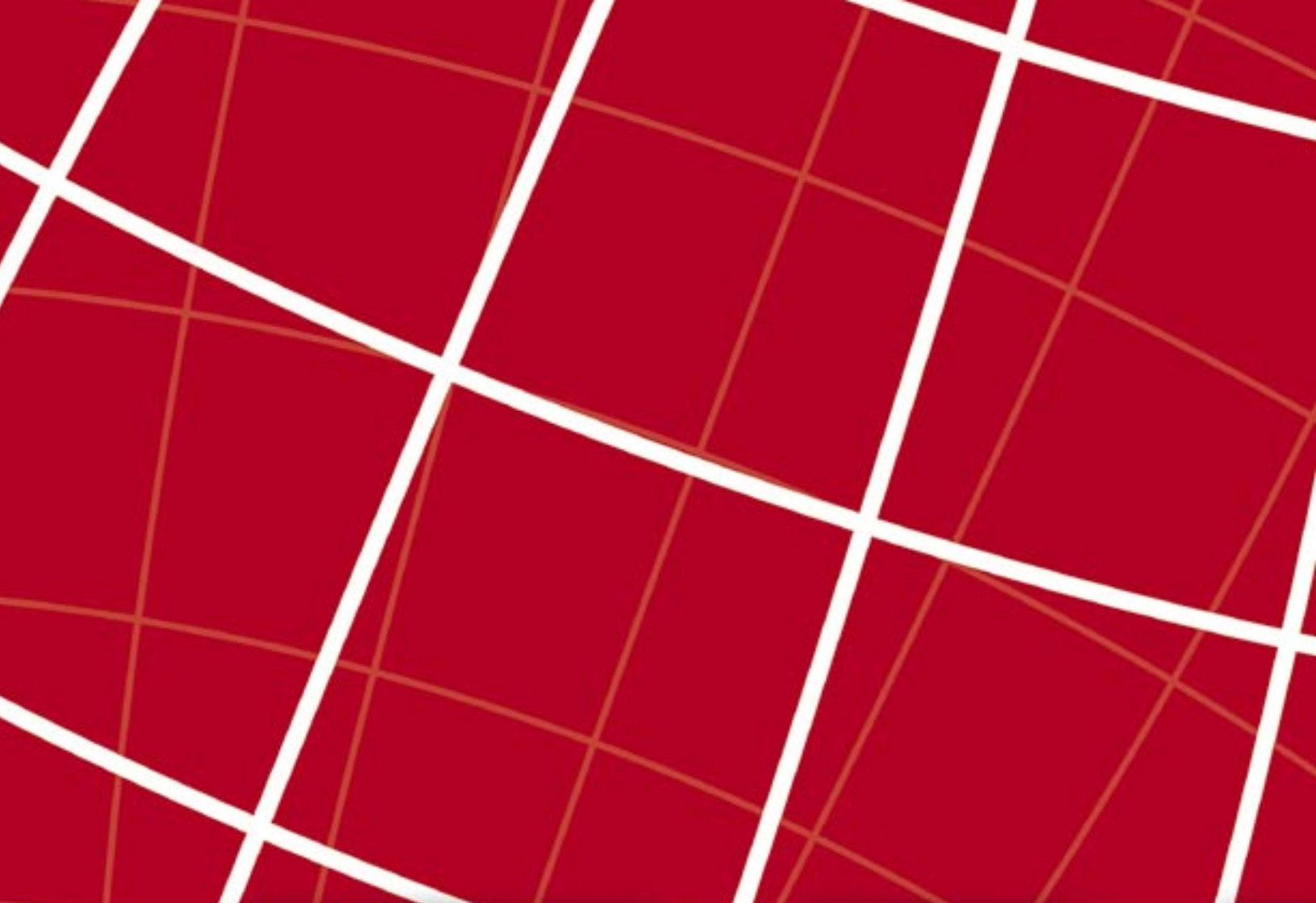
### MEXICO

LyM 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: 011-61-89-36-16855  
Fax: 011-61-89-47-03075  
Email: lmradi@q-net.net.au



FLEXIBLE CORE HEAT EXCHANGERS

**MESABI**



Manufactured and Distributed Worldwide by L&M Radiator

# KING OF THE CHILL.

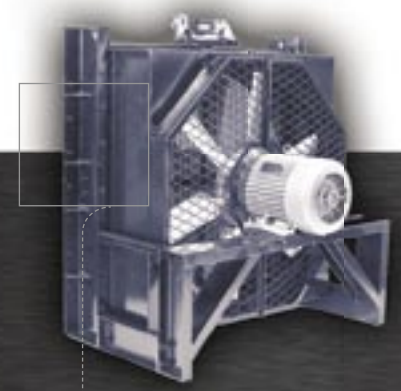


## ENGINE RADIATORS

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. Tier III and Tier II designs available.

### 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.



### Complete Engine Cooling Packages

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



### MESABI® Retrofit Replacement Radiators for Caterpillar® Folded Cores

(Sized to meet Cat® engine specifications)

Three ways to build MESABI® radiator dependability into your Cat® equipment:

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

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

### 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



Caterpillar® and Cat® are registered trademarks of Caterpillar, Inc.

For detailed information on MESABI® products, visit our website: [mesabi.com](http://mesabi.com)

# WHY **MESABI**<sup>®</sup> FLEXIBLE CORE HEAT EXCHANGERS **LAST FOREVER.**

## THREE REPLACEABLE COMPONENTS

1 INDIVIDUAL COOLING TUBES held in 2 HEADER PLATES with 3 RUBBER SEALS that absorb stresses and thermal shock.

## NO LEAKY SOLDERED SEAMS!

## FIELD REPAIRABLE

Seals allow damaged tubes to be removed and replaced in the field, often without removing the radiator or heat exchanger from the equipment.

## 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® cooling tubes may be copper or aluminum depending upon application.



## MESABI™ WARRANTY



L&M Radiator warrants their MESABI® framework components for a period of 18 months from date of invoice. Unless otherwise stated in individual product literature, L&M further warrants MESABI® products against seal leakage during normal use for 48 months from date of invoice.

Under this warranty, our obligation is limited to the repair or replacement (at our option) of products or parts manufactured by L&M that are proven to be defective in workmanship or material. Damage or leakage due to accidents, misuse, or corrosion is not warranted.

L&M is not liable for consequential or incidental damages or costs. Consult factory before proceeding with warranty claims or repairs. Failure to do so may void the warranty.

Warranty on components not manufactured by L&M Radiator shall be that of the individual manufacturers. Individual manufacturers operational and maintenance requirements must be met and their policies regarding shipment of claimed defective parts will apply.

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.



## OIL-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 (1036 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.

