

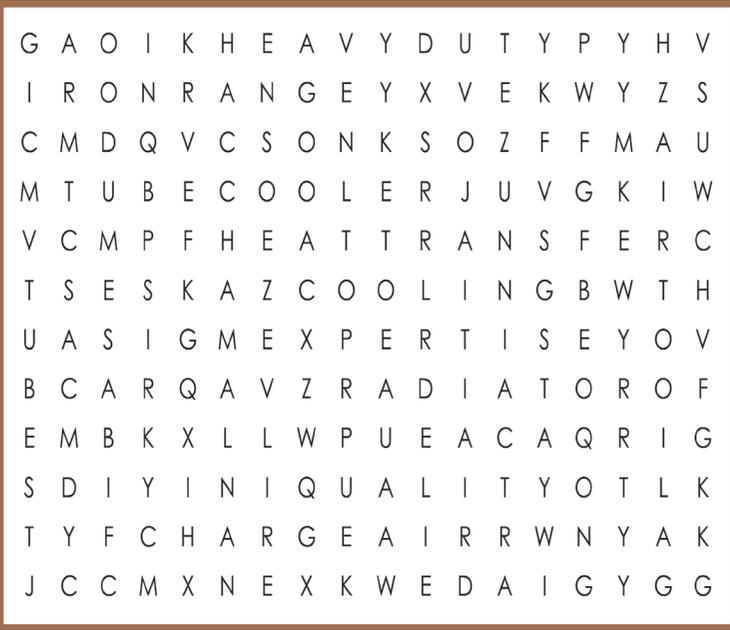
L&M RADIATOR

— Historical Facts

- The British first developed the idea of individually replaceable cooling tubes held in headers with rubber seals during WWII desert tank warfare.
- 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 AND L&M WORD SEARCH

Below is a list of words and terms related to L&M Radiator and the Mesabi® brand. See you if you can find them in the word search box.

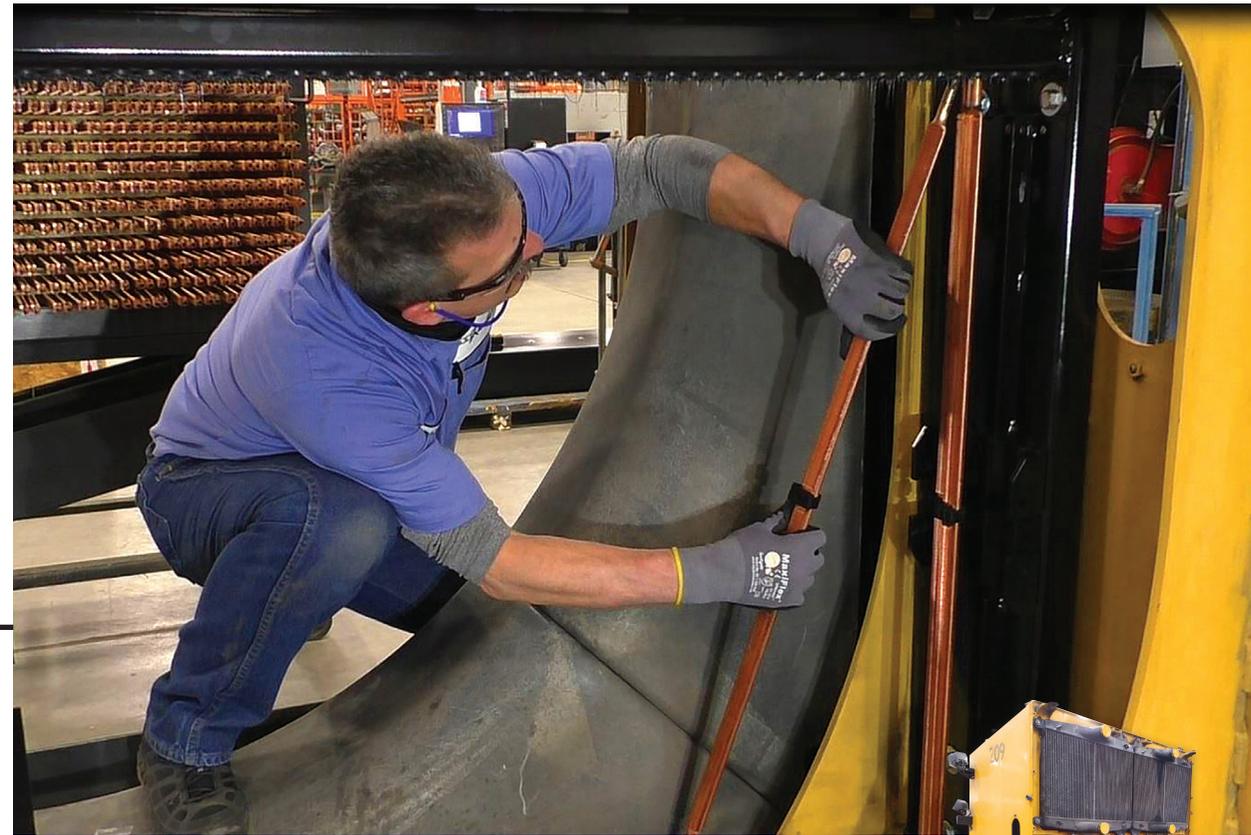


HINT: Words may be hidden in all directions ↑ ↓ → ← ↘

- | | | |
|------------|---------------|-------------|
| AIR TO OIL | HEAT TRANSFER | QUALITY |
| CHARGE AIR | HEAVY-DUTY | RADIATOR |
| COOLING | IRON RANGE | TUBE COOLER |
| EXPERTISE | MESABI® | V-TUBE |

L&M AND L&M *encóres*

DESIGN CHALLENGE OR OPPORTUNITY?



The Caterpillar® 993K Case Study



L&M AND L&M RADIATOR, Inc.

Manufacturers and Distributors of MESABI® Flexible Core Heat Exchangers

1414 East 37th Street • Hibbing, MN 55746 U.S.A.
Phone: 218-263-8993 • Toll Free U.S.A. & Canada: 1-800-346-3500 • Fax: 218-262-6606 • E-mail: cool@MESABI.com

MANUFACTURING FACILITIES:

UNITED STATES

L&M Radiator, Inc. L&M Radiator, Inc.
Hibbing, Minnesota Yankton, South Dakota

AUSTRALIA

L&M Radiator Pty. Ltd.
East Victoria Park, W.A.

MEXICO

L y M de Mexica S.A. de C.V.
Hermosilla, Sonara

CHILE

L&M Industrial Radiator, Sudamerica
Av. Antonio Rendic 6930
Antofagasta, Chile

Past *encóres* online at MESABI.com



Oftentimes, our engineers have to design coolers to fit into many different applications.

Over the years we have designed many loader replacement radiators, so initially we thought the 993K was just another loader radiator. Why would it be any different? Boy, were we wrong!



As we were thinking about the radiator design, we began collecting information from the field and old coolers in an attempt to design ours as an exact replacement for the 993K.

However, we were still missing some information. One of our mining customers, who was taking their machine down for a major refurbishment, said they could send us a bottom tank to measure. But then they asked if we just wanted the whole hardnose section with the radiator. After making sure our forklifts could handle the weight, we decided to have the whole hardnose delivered to our shop. We were sure glad we did!

Once it was in our plant, we realized that the 993K radiator is built and put together inside the hardnose and that due to integral hardnose structure, our one-piece radiator would not fit. We gathered our engineering team, brainstormed ideas, reviewed these ideas with our production assembly team and then got to work!

After much engineering, the completed 993K hardnose, with the new MESABI® radiator and oil coolers installed, was sent back to the mine ready to install into the loader. Note: we can also provide replacement charge air coolers. See the part number cross reference table below for details.

In the end the 993K challenge became an opportunity that turned into two design build options:

- 1. L&M Shop Replacement, Our Preferred Option,** is for the customer to send us their hardnose so we can assemble the radiator inside of it (L&M P/N:122670).
- 2. Field-Build** – L&M can work with the mine maintenance team to assemble and install the radiator into the hardnose on site, or we can work with a qualified radiator shop to assemble the radiator (L&M P/N: 122677). Although we prefer that our experienced assemblers install the cooler into the hard nose, we came up with the field-build option as a way to reduce downtime, as needed. We already have an onsite install scheduled for this Spring.

L&M Radiator 993K Cross Reference Table

ITEM	CATERPILLAR® P/N	L&M REPLACEMENT
Radiator (High/STD Ambient)	252-2476/252-2475/ 343-3299/343-3297	122607 L&M Install or 122677 Onsite Install
Hydraulic Oil Coolers	250-480	122598
Charge Air Coolers	250-8617/488-9086	122699

Please contact your Sales Rep or Customer Service for pricing and lead times for your projects. And remember to always specify MESABI®.



Hardnose preparation for radiator install

We gathered our engineering team, brainstormed ideas, reviewed these ideas with our production assembly team and then got to work!



Installing the radiator top tank



Hardnose with radiator frame installed