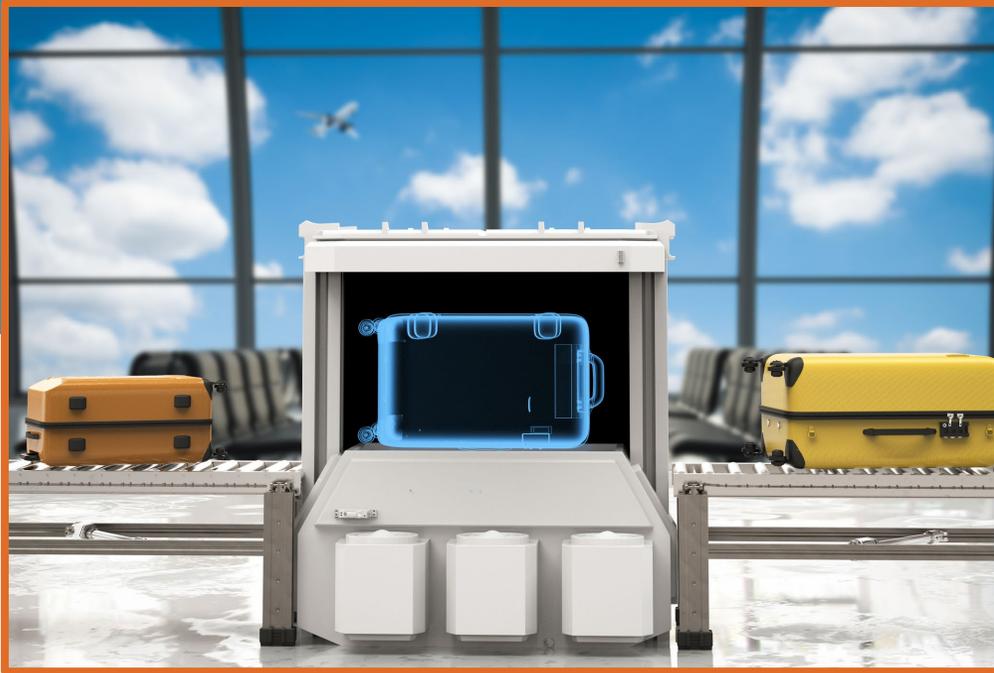


Liquid Cooling for X-ray Scanning Equipment

Introduction



Industrial X-ray scanners generate a large amount of heat that must be quickly dissipated away



Liquid Cooling Systems ensure high performance and long-life operation



Application Overview

Industrial X-ray equipment is commonly used within:



- Manufacturing processes
- Automotive
- Food and beverage processing
- Luggage scanners
- Pipeline inspection stations



Design Objectives



Industrial X-ray require less power and lower image resolution than medical X-ray



Cooling System Design Requirements:

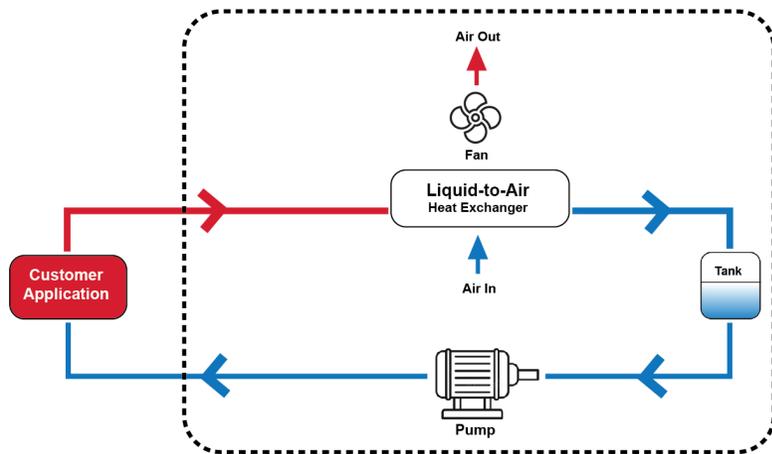
Cost-Effective

Easy To Maintain

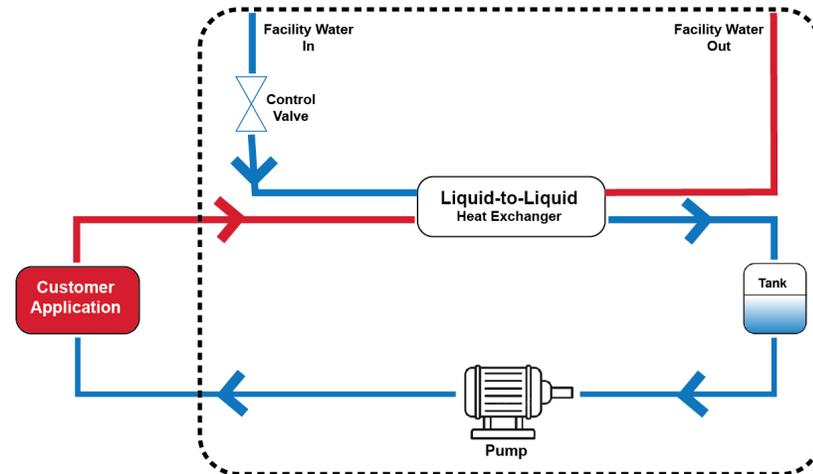
High Reliability

Comparing Technologies

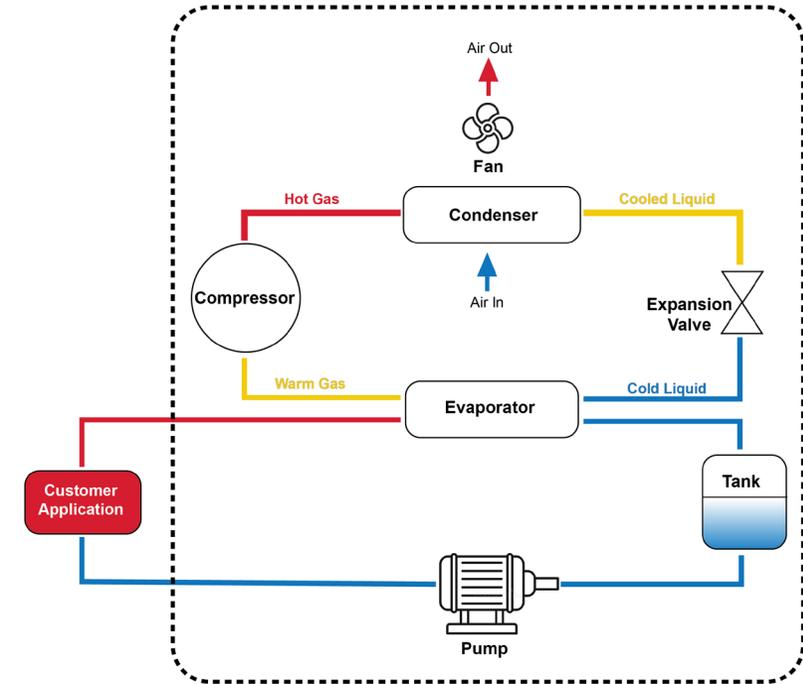
Liquid Cooling offer many advantages over air-based cooling systems



Liquid-to-Air



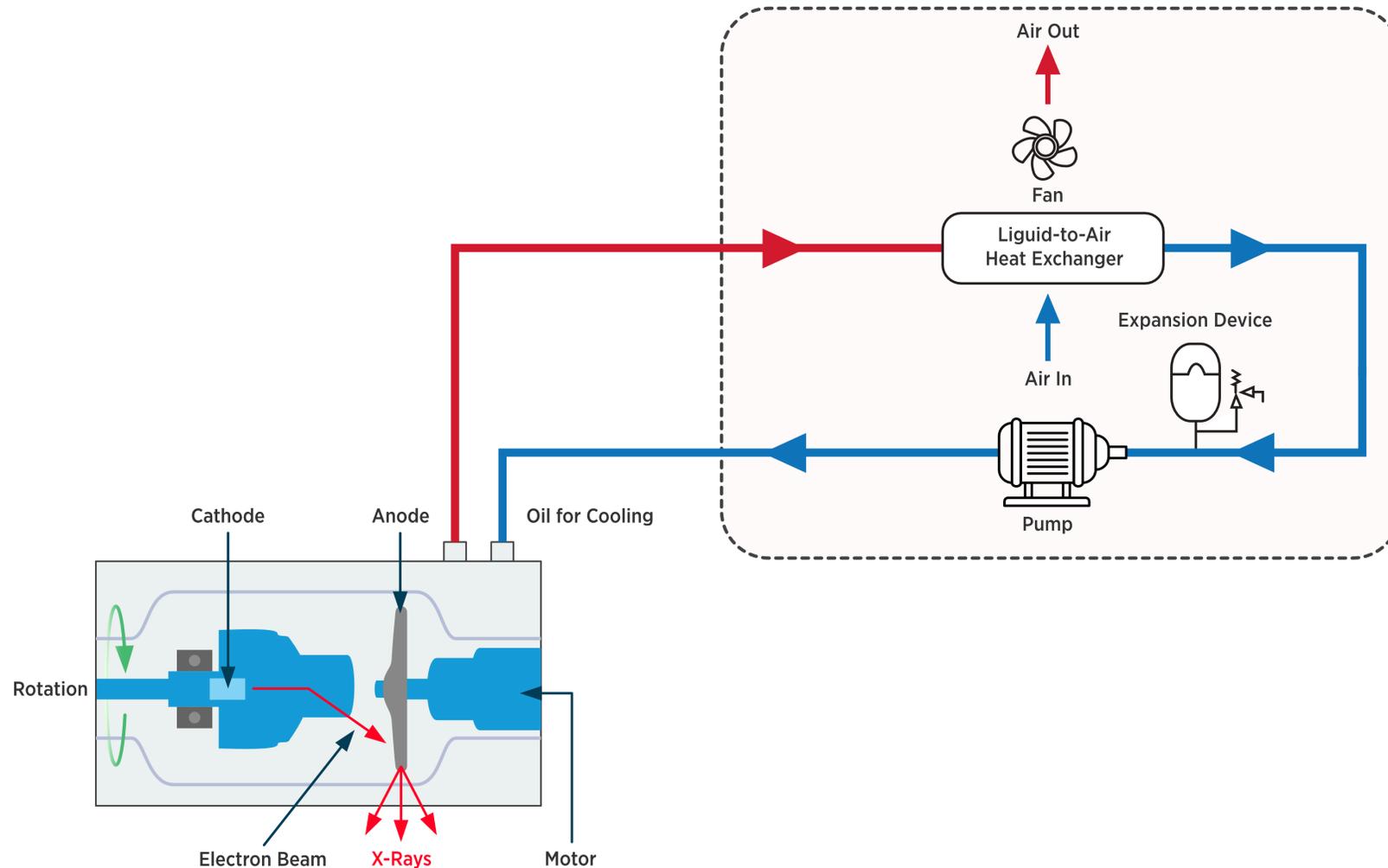
Liquid-to-Liquid



Recirculating Chiller

Liquid Cooling of X-ray Systems

Liquid-to-air heat exchanger systems are the most cost-effective cooling solution for industrial X-ray



LA5000 Liquid-to-Air Heat Exchanger



- High Reliability
- Low Maintenance Features
- Low noise operation
- Operates above ambient temperatures
- Cost-effective cooling solution
- Meets laboratory standards

5000
Watts of
Cooling Capacity



Conclusion



Industrial X-ray Equipment **requires a cooling solution to dissipate a large amount of heat** to the surrounding environment

Liquid cooling systems offer several advantages over air-based heat transfer mechanisms

Liquid-to-Air Heat exchangers are the most economical option for **operation above ambient temperatures**

The LA5000 features improved fan and heat exchanger technology **providing high reliability and long-life** operation with **low maintenance**

LA5000
MFG Part Number 387005598

VL Series Liquid Cooling System

The LA5000 is a recirculating liquid-to-air heat exchanger that offers dependable, compact performance by removing large amounts of heat from a liquid circuit. The coolant is recirculated using a high-pressure pump to ensure maximum flow rate. Heat from coolant is absorbed by a radiant heat exchanger and dissipated into the ambient environment using brand name fan. Manual adjustments can be made to control flow switch. Customized features are available, however, MOQ applies.

Standard Features | **Check Stock** | **Request a Quote** | **Contact Tech Support**

Features

- Cooling to ambient
- High heat pumping capacity
- Compact form factor
- Long life operation

Applications

- Cooling Particle Accelerators, Linear Accelerators and Cyclotrons
- Semiconductor Fabrication Equipment Cooling
- Active Cooling in Industrial Settings

FLUID OPERATING POINTS

100% Water
Cooling Power (Qc) = 5000 Watts
Thermal Conductance = 274.5 W/°C
 ΔT (Ambient-Coolant) = 10.5 °C
 ΔT (Outlet-Inlet) @ 8.3 L/min = 9.6 °C

70/30 Water-Glycol
Cooling Power (Qc) = 5000 Watts
Thermal Conductance = 441.5 W/°C
 ΔT (Ambient-Coolant) = 11.3 °C
 ΔT (Outlet-Inlet) @ 8.3 L/min = 10.1 °C

60/40 Water-Glycol
Cooling Power (Qc) = 5000 Watts
Thermal Conductance = 400.4 W/°C
 ΔT (Ambient-Coolant) = 12.5 °C
 ΔT (Outlet-Inlet) @ 8.3 L/min = 10.5 °C

50/50 Water-Glycol
Cooling Power (Qc) = 5000 Watts
Thermal Conductance = 388.4 W/°C
 ΔT (Ambient-Coolant) = 12.9 °C
 ΔT (Outlet-Inlet) @ 8.3 L/min = 11.1 °C

LA5000 Heat Dissipation 5000 Watt Requirement

SELECT ORIGIN
Qc vs ΔT (Ambient/Inlet)
 ΔT (Inlet/Outlet) vs Qc
Pump Curves (Pressure vs Flow)

Thermal Wizard Liquid Cooling Calculator

Wizard Home | Device Cooling Calculator | PCR Calculator | Enclosure Cooling Calculator | Air Cooling Calculator | Liquid Cooling Calculator

CHOOSE AN EXAMPLE OR COMPLETE THE REQUIREMENTS...

View video for help using: [Liquid Cooling Calculator](#)

Contact Tech Support

LIQUID FLOW RATE
Fluid Flow Rate: 9.5 L/min

FLUID DEFINITION
Water
Density: 997.3 kg/m³
Specific Heat: 4180.3 J/kg·K

TEMPERATURE
Inlet: 25 °C
Outlet: 21 °C

LIQUID INLET
COOLED LIQUID OUTLET

CALCULATION RESULTS...
Fluid Type: Water
Fluid Density: 997.3 kg/m³
Fluid Specific Heat: 4180.3 J/kg·K
Qc Specification: 2840.4 Watts

SEARCH

Liquid Cooling for X-Ray Scanning Equipment

Laird Thermal Systems Application Note

Laird Thermal Systems

[Datasheet](#)

[Liquid Cooling Calculator](#)

[Application Note](#)

About Laird Thermal Systems

Laird Thermal Systems develops thermal management solutions for demanding applications



Medical



Analytical



Industrial



Transportation



Telecom

● **DIVERSE PRODUCT PORTFOLIO**
Thermoelectric Coolers, Thermoelectric Cooler Assemblies, Temperature controllers and Liquid Cooling Systems

● **SOLVING COMPLEX ISSUES**
Our engineers use advanced thermal modeling and management techniques to solve complex heat and temperature control problems

● **ACCELERATING TIME-TO-MARKET**
We partner closely with our customers across the entire product development lifecycle.

● **MAXIMIZING PERFORMANCE**
Our global manufacturing and support resources help customers maximize productivity, uptime, performance and product quality

Laird Thermal Systems is the optimum choice for standard or custom thermal solutions

Learn more by visiting
www.lairdthermal.com





Have a question or need more information about
Laird Thermal Systems? Please contact us via the website at www.lairdthermal.com



Trademarks