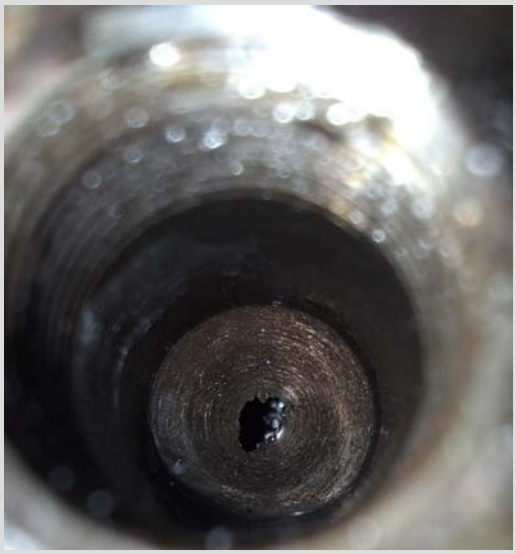
mechanicalservicecorporation

TECH TALK

MSC - THE ONLY TRUE HVAC SERVICE COMPANY - WE FIX IT

NEWSLETTER - APRIL 2017

973-884-5000



Shown here is a small hole in the oil filter housing where the port should have been bored completely through. The resulting restriction in oil flow led to multiple screw compressor failures.

SERVICE CALLS

MSC was called in to troubleshoot a low exhaust airflow condition. With usually-reliable constant-volume Venturi valves in place, CFM readings weren't making sense. After some investigative work, techs found and extracted several hairnets stuck in an air valve. Problem solved.

Screw Compressor Problem Finally Solved

MSC recently made a true believer of a new client by going far "above and beyond" to finally solve a costly long-term compressor problem plaguing their 200-ton screw chiller. For several years MSC's sales team had pursued the business of this client, who spoke of his growing frustration with having to repeatedly replace failed screw compressors to the tune of $40,000 a pop, but he was hesitant to release the service arm of the chiller manufacturer as their service provider. But when a fifth compressor failed, the client finally took a leap of faith and contacted MSC to find the root of the problem and stop the bleeding.

MSC tapped a seasoned service technician with over thirty-five years' experience to spearhead the investigation into the string of compressor failures. Following installation of a new compressor, our tech did an in-depth analysis of the chiller during operation. He soon narrowed his focus on the oil lubrication systems when he noted multiple irregular drops in oil pressure. When investigations into the usual causes of oil pressure issues didn't pan out, he removed, disassembled and examined the entire oil filter housing, where he finally discovered the problem. One side of the filter housing had been only partially drilled during manufacturing, severely constricting the oil lubrication system and causing multiple compressors to fail. (see photo, upper left)

INSIDE...

The solution was simple, effective, and quick. Eager to get his chiller up and running, the client had his onsite machine shop properly drill out the port. The repaired oil filter housing was promptly reinstalled and oil pressure readings returned to normal – problem solved. The client was relieved and thankful, and more than a little irritated with the chiller manufacturer. He asked our service technician why, after twenty years and $200,000, had the previous service team been unable to find the problem in equipment manufactured by their own company? Simply put, the knowledge, experience and persistence of the MSC sales team and service technician didn't allow them to give up until we solved our customer's problem.

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CHILLER SURGE CAUSE AND EFFECT

Chiller surge is a condition in which refrigerant flows in reverse from the condenser back to the compressor, which can lead to severe damage.

What is surge?

Each chiller system has a maximum lift (head pressure), which is the difference between condenser refrigerant pressure and evaporator refrigerant pressure. Lift can also be measured by the difference between the leaving chilled water temperature (LCHWT) and the entering condenser water temperature (ECWT). If this differential increases to where it exceeds the system's pumping capacity, refrigerant will flow backward through the compressor wheel every few seconds. Pressure builds up in the compressor, causing the refrigerant to surge forward again, and the cycle repeats. This reverse-load can damage the thrust assembly, bearings and gearbox, and can cause a rupture in the safety disc or blow the relief valve. Surge is identifiable by its loud, distinctive sound, sometimes likened to an elephant's squeal or a surging jet engine, as well as a fluctuation in compressor amperage.

What causes surge?

Chillers are designed to meet specific system requirements and operating conditions. With proper maintenance and operation within design intent, a properly selected chiller will not surge. Changes in operating conditions, however, can cause surge to occur, particularly under low load conditions. Surge can be attributed to maintenance issues including fouled tubes, low refrigerant charge, or non-condensables in the refrigerant. It can also be caused by poor control of water flow rates and condenser water temperatures. Low load issues surge issues can be avoided or corrected with hot gas bypass or VFDs.

HVAC IN SUBMARINES

Two things that can be counted on in a submarine is the continuous production of moisture and heat. Engines, storage batteries, electronics, lights, galley stoves, and human occupants, and other devices give off considerable heat, and moisture produced by storage batteries, cooking, bilges, and human occupants can average about 1,000 lbs. a day. When a submarine is submerged, air temperature and moisture is controlled in several ways.

Submarines are made mostly of metal, an excellent conductor of heat, and significant transfer of heat occurs between the ocean and the submarine due to its large surface area. If the vessel is warmer than ocean temperatures, heat is transferred to the surrounding water, causing the air temperature to fall. If cooled air temperatures reach the dewpoint, water vapor will condense on compartment surfaces. Therefore, it is important to lower the dewpoint by drawing air through ducts to an air conditioning evaporator to condense and remove moisture before blowing the drier air back into the vessel. (continued on page 3)

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DEFERRED MAINTENANCE IS RISKY BUSINESS

There are no two ways about it. HVAC preventive maintenance is imperative when it comes to energy-efficient system operation and maximum equipment longevity and requires a proactive, rather than reactive, approach. Unfortunately, however, many building owners and managers delay preventive maintenance (or postpone it indefinitely) when faced with budget constraints. The truth is, a neglected HVAC system will always cost far more in the long run than a system that has been properly maintained, and expenses grow exponentially the longer maintenance is put off. Deferred maintenance means a system cannot run at its peak efficiency, causing energy consumption to increase. Small problems cascade into costly repairs or equipment failure.

Facts and figures

Building owners and managers should takes steps to understand their ROI on preventive maintenance vs deferred maintenance and safeguard their PM program budget – which, according to experts, should be 2-6% of a facility's annual operating budget – by educating decision makers with concrete facts and figures. It is tempting to focus on immediate cost savings, so the more specific and accurate the calculations, the better.

To start with, HVAC systems with preventive programs in place use, on average, 15 to 20 percent less energy than systems that are allowed to deteriorate, and system downtime and operational interruptions are far less frequent. Maximizing equipment longevity can save into the tens, or even hundreds, of thousands of dollars when calculated over time. Properly-maintained chillers, for example, can be expected to last 20-25 years, and sometimes as long as 30 years, while neglected systems commonly fail after 15. Regular PM is proven to improve indoor air quality, leading to better productivity, tenant retention, and employee morale.

HVAC In Submarines (continued from page 2)

In hot weather and tropical and subtropical climates, where ocean temperatures are much higher, submarine air conditioning systems must be operated at maximum capacity to keep air temperatures at a comfortable level while removing as much water vapor from the air as possible to protect equipment from moisture. During winter weather and in Arctic regions, prevention of condensation is a large concern. Because wet-bulb, dry-bulb and dewpoint temperatures are much closer together at cooler temperatures than they are at warmer temperatures, a small drop of just a few degrees can result in condensation on the interior shell, so temperatures must be very closely monitored. If moisture does condense, the air-conditioning system is operated at low speed to dry it out.