Running Head: MINERAL OIL SUBMERSION

Green Cooling: Mineral Oil Submersion

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Alternative cooling for Data Centers can take many forms, from using external air to supplement internal temperatures, to geothermal cooling technology where temperature differences between the Earth’s surface and its soil are exploited for temperature control in a data center (Alger, Grow a Greener Data Center, 2010). Intel recently implemented an old method of cooling in a relatively new fashion; they submerged their server motherboards in a mineral oil type coolant thereby causing all heat transfers to directly occur within the oil itself (Miller, 2012). This method of cooling data center hardware can reduce electricity consumption “by~30%” (Green Revolution Cooling, NA).

The greatest risk with this type of cooling is in non-compliant hardware cooling. That is, while this method will definitely cool data center hardware (to the point that overclocking can even be considered), those pieces of hardware which cannot go in the oil tanks must be air cooled in the traditional fashion. This means that there will still be a need for conventional HVAC, although at a much reduced cost per operation. Additional risks fall in line with initial installation and support contracts for coolant replacement.

All of this can be offset, however, by the sheer costs in savings from not having to actively cool the data center environment in the same way an open air data center must be done. Combine this with the performance increase that increased cooling from the oil can provide, and the entire structure pays for itself. This is especially relevant for those organizations whose data requirements consist of crunching large amounts of data at extremely high speeds.

The location of the cooling tanks must be in a position where leaks of the coolant will not adversely affect every day operations. That is, if a catastrophic failure of a tank wall occurred, a sudden spill of mineral oil will not result in damage of organizational property or someone slipping and falling. This being said, a traditional data center environment is still capable of implementing a mineral oil bath. E.g. the entire support infrastructure needed to access, monitor, and maintain a conventional HVAC data center is used in this liquid tank environment. In essence, cooling efficiency is not affected in this instance.

The primary down side to this type of cooling and the primary reason to use this cooling is the mineral oil itself. The oil used for cooling is non-conductive so it will not damage any electrical system it gets into/on, however, it is a slippery mess to clean up in the case of a spill. Although, there are company’s such as Green Revolution Cooling who are able to replace oil under contract, as required (Green Revolution Cooling, 2012).

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