



John Deere Air-Cooled Glycol Supply

Purdue Students: Bernie Chang, Michaela Enerson, Matt Kosten, Carlos Rojas, Ethan Shikany, Kolten Thorson
Purdue Mentor: Ralph Mungia
Purdue Professor: Dr. Fred Berry



Customer Background

John Deere was founded in 1837 in Grand Detour, Illinois. John Deere is a corporation that manufactures agricultural machinery, heavy equipment, and forestry machinery to meet the company motto of "We run so life can leap forward." John Deere is the world's leading manufacturer of agricultural and turf equipment.

Problem Statement / Scope of Work

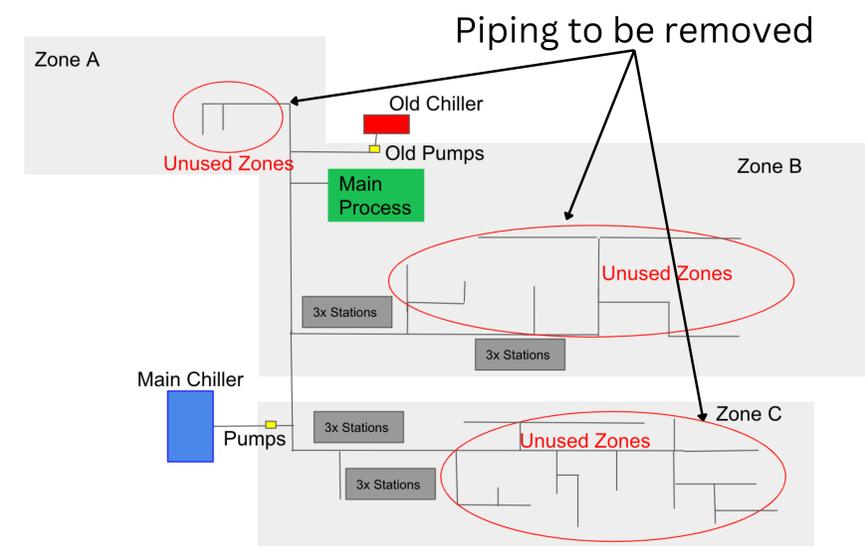
Problem Statement

The existing chiller and piping system at the John Deere Harvester Works Facility is to be modified as needed to eliminate the risk of significant coolant leakages. Proposed changes to the chiller system and its piping should not have any negative impact on the facility processes that require their cooling and implemented changes should not significantly affect the flow of production wherever possible.

Scope of Work

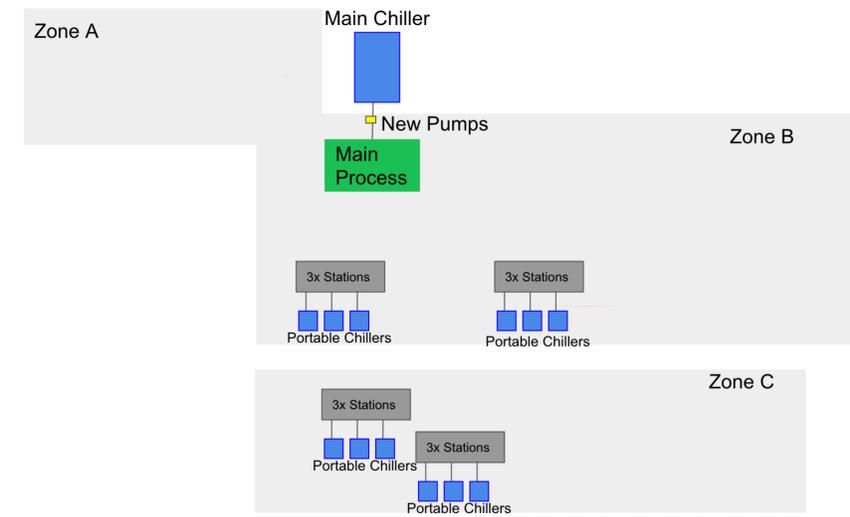
The scope of this project is to reduce the risk of spills of chilled water and adapt the infrastructure to work within the proposed solutions at the John Deere Harvester Works facility. The finalized project will be limited to creating detailed plans; therefore, no implementation of the recommended changes will be required for this project.

Current Layout



- All current piping contains chilled coolant

Final Design



- Total volume calculated for removal process
- Portable chillers sized for two types of workstations
- Proposed 7 sections of piping to be removed in 3 phases

Requirements Matrix

Req. #	DESIGN REQUIREMENTS	DESIGN TARGETS	VALIDATION
	RATIONAL		
1	Unneeded piping removed	Successful if the highlighted areas on map are removed	Valid if systems are able to work without this piping
2	Add portable chillers to weld cells stations	Successful if piped water is no longer needed and the weld cell stations can work at same capacity as they do currently.	Valid if operations can continue as they are now
3	Replace paint "weekend chiller" with main chillers	Successful if chillers can be swapped.	Valid if operations can continue as they are now
4	Proposed changes need to be removed with as minimal disruption to production as possible.	Successful if production is seen to be able to continue	Valid if proof is present production will not go offline
5	Pump system for weekend chiller must be able to sustain main chillers.	Flow outputs, piping size, and pipe/valve durability/capacity for weekend chiller system must be able to meet the demands of the main chillers flow.	Data comparison between the two systems
6	Redundancy must be added to main chiller system if it is moved.	Successful if weekend chiller system has redundancies in place, exactly like how the current main chiller system does.	Validated if redundancies necessary are all present and feasible and supported by infrastructure in place or planned to be in place
7	Expansion tank must be added to weekend chiller system	Successful if expansion tank is present in modified weekend chiller system	Valid if the expansion tank is present, works with system, and meets specifications required of its operation.
8	Cost analysis of proposed ideas	Successful if analysis is completed for every aspect of the planned changes.	Valid if analysis is present.
9	Ensure changes follow safety standards	Successful if no proposed change directly violates any safety standards.	Valid through checklist against relevant standards.

Design Calculations

- Roughly 29,000 gallons of glycol to be drained before piping removal
- Resized infrastructure that will remain based on new process load
- Proposed portable chiller options based on sizing calculations
- Proposed pump and pump infrastructure options based on sizing calculations

