Most refrigeration and air conditioning compressors would prefer to run continuously, rather than cycle excessively. Obviously, somewhere in-between these two extremes would be ideal. In general, refrigeration systems cycle at a higher rate than the typical air conditioning system, due to their basic design, loading, and controls. However, excessive compressor cycling can be a concern for both types of systems.

When investigating the pros and cons of compressor cycling, many factors need to be considered. The following are some of those factors.

1. Starting the oiling system – Every time a compressor starts, it has to get its oiling system operating. Until full oil flow occurs, the bearings run with the oil remaining on them during the off cycle. Reducing cycling helps to minimize the time the bearings are not receiving the full benefits of the oiling system.

2. Oil pump out – When a low side compressor starts up with its housing containing liquid refrigerant, it pumps out a lot more oil than normal. The liquid refrigerant/oil mixture flashes into vapor and foam when the suction pressure suddenly decreases, and the oil is carried into the system. Depending on the quantity of oil removed from the compressor, the bearings could be getting insufficient lubrication each time this happens.

3. Oil dilution – During the off cycle of a unit, liquid refrigerant may drain, or migrate, back to the compressor. When the compressor starts up, the lubricating properties of the oil are reduced due to the dilution caused by the liquid refrigerant.

4. Floodback on startup – Most of the time when a compressor starts, whatever refrigerant is in the evaporator floods back to the compressor. This can wash the bearings, dilute the oil, or slug the compressor.

5. Flexing of the motor windings – Every time a compressor starts and stops, the motor windings flex. This flexing, over time, can lead to insulation breakdown from the minute rubbing of adjacent wires. Even though failure from this type of flexing is not very probable, the higher the cycle rate, the higher the probability.

6. Electrical components – Electrical contacts and components are stressed less, if cycled less.

7. Internal movement – Many compressors have their internal mechanism mounted inside their housings on springs. They also have a discharge tube leaving the housing. When a compressor starts and stops, the greatest stress is applied to both the springs and the shock loop, and they must absorb some of the energy that is produced. They need to move repeatedly without breaking. The external mounting of the compressor, whether it

be with soft rubber grommets and sleeves, or external spring mounts, is very important for the life of the internal compressor springs and shock loops. Reducing the number of compressor cycles, extends the life of these mechanical parts.

8. External movement – Each time a compressor starts and stops, it moves, putting stress on the system tubing that connects the compressor to the system. The system tubing configuration must be designed so as to withstand this movement for the life of the unit. The greater the cycle rate, the more stress it must withstand.

9. Sound/Vibration variation – When a compressor starts up on a system, the loading on the system is constantly changing as the compressor pulls through the load toward stabilization. During this time the sound and vibration produced by the compressor/system are also changing. Sometimes resonances can be reached that, although very short in duration, are annoying. The fewer the cycles, the less often the start up noise is heard.

Based on the above concerns, Tecumseh Products Company recommends a compressor cycle rate of no more than 4-5 cycles per hour, with sufficient run time to ensure that the proper quantity of oil will return to the compressor. If a cycle rate greater than this is anticipated, please contact Tecumseh Application Engineering.

Tecumseh Engineering Department