Application: Chemical
Intelligent control ends string of failures with overflow pit pumps.

Problem

A petrochemical plant uses an overflow pit to collect the waste from several different chemical processes. Because the waste contains solids and mixed particulate matter, the pit was fitted with two submersible Goulds Trash Hog® pumps, which are designed for superior solids handling. The pumps are also equipped with VFD drive units. However, shortly after installation, a string of failures ensued that resulted in broken pump shafts. There was little agreement among the operators as to what might be causing this problem.

Finding the root cause

In order to diagnose the underlying issue, an i-ALERT2 equipment health monitor was magnetically attached to each of the pumps. The i-ALERT2 is a tiny sensor that measures tri-axial vibration (with spectra), tri-axial kurtosis, temperature and run-time hours as an uninterrupted stream of time-stamped data.

I-ALERT2 immediately identified a severe non-synchronous vibration, which led to an on-site performance test by ITT PRO Services Solutions Engineers. It soon became clear that there were issues with the VFDs: the pumps had been running at different speeds than what was believed. Further inquiry identified the system curve as being much more restrictive than originally thought when specifying 1,600 gpm pumps (which were now being operated at about half capacity).
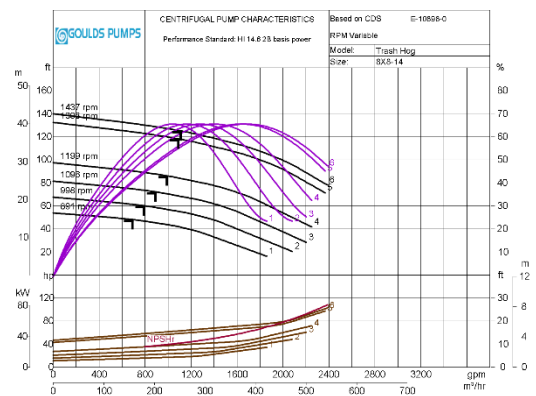
This plot of the system curve against the variable speed curve of the pump revealed a restrictiveness at 1600 gpm.

Solution

The answer to the pumps' underlying speed-control issue was to apply ITT PumpSmart® software to the existing VFD drives. PumpSmart's algorithms deliver sophisticated control that keeps pumps strictly within their reliable region. Now the speeds are controlled perfectly and the pumps run within a few percent of their Best Efficiency Point (BEP) at all times. In addition, PumpSmart logic has taken a lot of the decision-making out of the hands of the operators.

In the final analysis, insufficient and erroneous data was at the core of this problem, as so often is the case with pumping issues. i-ALERT2 provided the missing data and PumpSmart was able to intelligently respond to that data. This has allowed the pumps to operate with far greater reliability, while also freeing up the plant's operators to spend their time on other important tasks.