Managers and operators of municipal waste-water treatment plants appreciate moving-cavity pumps for handling sewage because they have no valves and can handle most of the solids appearing in sewage. However, in this application, moving cavity pumps are affected by a different problem. Rags of many shapes and sizes, from small towels, to large pieces appear. The natural tendency of rags in suspension is to wrap themselves around rotating shafts. As they wrap around the pump rotor, they gradually seal off the flow of liquid. With liquid no longer available to lubricate and cool the surfaces, the steel rotor overheats and burns the rubber stator, resulting in an expensive repair job, plus downtime.

To minimize this problem, the Wastewater Department of the City of Orlando, Florida, instituted a “twice daily” shutdown and cleaning of each of their two pumps at Plant No. One. In spite of this, they burned out rubber stators several times a year. With this as background, an ISD representative held a series of meetings and demonstrations with the supervisor of all wastewater treatment plants for the City of Orlando, the process control engineer for the department, and their instrumentation engineer. Discussion centered around the Stal-Gard Mark II Motion Sensor, manufactured by ISD of Jackson, Michigan.

The Mark II is, by definition, a “rotary-speed-sensor”. Because almost all electric motors are speed-sensitive to torque, the Mark II can operate effectively as a “torque sensor”. It was reasoned as follows: As rags build up around the shaft, slowing the flow of liquid, the friction between the shaft and the rubber stator will increase. This increased load will cause a reduction in pump shaft speed. As the Mark II can detect a speed change as small as 1 RPM, and provide a circuit for alarm/shutdown, it was felt that this sensor could shut down the pump long before stator burnout. The city decided to try a Mark II on one of their pumps.

In addition, their pumps were equipped with an internal coupling pin, which occasionally sheared. Realizing this, it was decided to use the second set point to react to an increase in speed, should the coupling-pin fail. The first Mark II was installed and wired one Monday afternoon. Before 7:00 A.M. the next day, the unit shut down the pump. Upon inspection, a very large rag was found tightly wrapped around the pump shaft. The rubber stator was undamaged. The unit paid for itself the first day! Immediately, the city ordered a Mark II for the second pump. Rags are still periodically found in the pumps, but in the time the Mark II’s have been in service, they have not had to reline a stator on either pump.

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