

Using the ADMAG Flow Converter with Existing Flow Tubes

Industry: Pulp & Paper
Product: Field Instruments
Admag AXF Magnetic Flow Meter

Introduction

A popular feature of the Yokogawa magnetic flow converter is its ability to drive other manufacturers flow tubes. The converter's unique noise reduction circuitry provides the accuracy and noise immunity required in today's demanding process environment. A case in point is the use of a Yokogawa ADMAG flow converter to drive a 24" AC flow tube at a major paper mill.

Application

An AC magmeter was in service on a 24 inch line carrying 4.1% to 4.3% stock to the headbox of a board paper machine. The meter's output exhibited large periodic excursions that were rendering it unusable for control. Air entrainment had been a suspected problem for some time in this line. A tee with a rotating disc density meter was located a few diameters upstream of the 24 inch meter inlet and it had been proposed that air was building up in the tee and periodically releasing into the meter. This caused erratic readings and the occasional drop out as the air slug isolated the flow tube's electrodes.

The magmeter had been connected to the manufacturer's converter, but in an effort to address the excursions the converter's output had been jumpered to a later model converter equipped with improved signal processing capability designed to eliminate the problem the customer was experiencing. However, it failed to address the problem. Repeated requests to the manufacturer for follow up and resolution of the problem went unanswered and the decision was made to use Yokogawa's ADMAG flow converter.

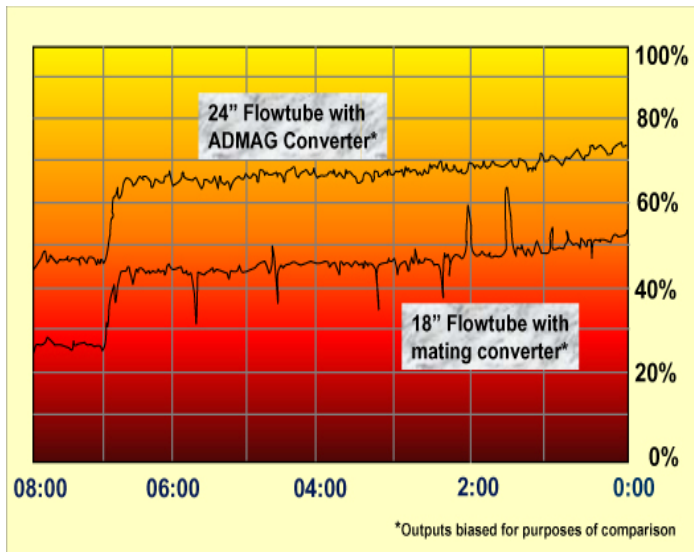
Solution

An ADMAG flow converter was mounted next to the existing converter in the control room and the signal wiring switched to the ADMAG flow converter. The system was powered up and flow read on the ADMAG flow converter. The next step was to determine the meter factor for the combination so that the indicated flow would accurately reflect what was passing through the flow tube. This was accomplished by calculating a correction factor, which was the ratio of the ADMAG flow converter's indicated flow to the



known flow as read by an 18" magmeter installed further upstream of the 24" meter. The 18" meter was exhibiting the same erratic readings so a damped signal from this meter was used to adjust the meter factor and bring the 24" measurement into agreement with the measurement of the 18" meter. The correction factor was applied to the factory default meter factor programmed into the ADMAG flow converter.

The ADMAG flow converter's dead time and rate limit noise reduction circuitry was then used to eliminate the spikes which had been plaguing the output of the competitor's meter. With this feature process excursions can be minimized or eliminated without resorting to extended damping which would also work to smooth the output, but also dramatically delay response to actual changes in the process.

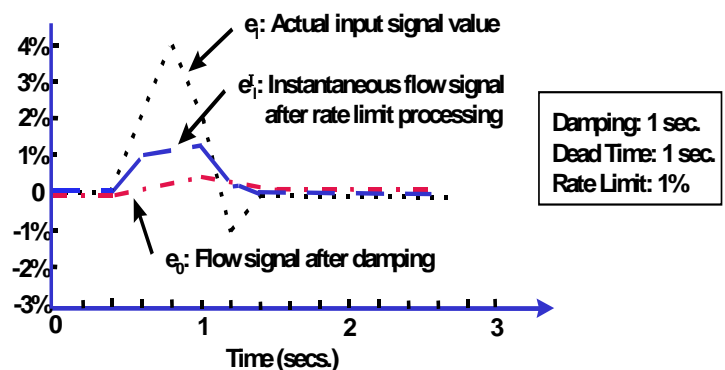


Rate limit holds an changes in the process variable to a customer defined level so that wide swings in the output don't have an immediate impact on the analog output. The dead time defines the number of seconds that the rate limit is in effect. If the flow change in one sampling period (the dead time) is more than the preset amount (the rate limit), but continues for a time shorter than the dead time period, than the rate limited flow value is output. If the out-of-limit condition (for either positive or negative rate limits) continues for longer than the dead time, then the measured value is used as the flow value. The output will only be damped by the 1st order damping. In this situation, the excursions were lasting as long as 5 seconds so a 10 second value was used for the dead time setting.

Traces from the DCS show the output of both the 18 inch flow tube and the 24 inch flow tube with the ADMAG flow converter. The flow rates are identical, however the outputs have been biased so that the individual traces can be distinguished. The traces demonstrate the effect that the dead time and rate limit function had on the output from the 24 inch flow tube. Excursions can be seen on the 18 inch meter output, while the excursions previously plaguing the 24 inch meter are no longer present. The improvement was so significant that this meter is now being used for control of the stock flow to the headbox on this machine.

The mill was so pleased with the results of this test that they pulled a new "High Signal" type flowtube/converter on a 10 inch broke return line and replaced it with an ADMAG flowtube and ADMAG flow converter, again taking advantage of the benefits of dead time/rate limit and Admag's unique dual frequency excitation technique to combat the flow noise problems that the high signal approach had not been able to resolve.

Response to Noise



This application is just one of many where the ADMAG flow converter has been used to upgrade existing flow tubes. The converter has been combined with tubes ranging from 0.5" to 72" diameters and applications have included water, sludge, 14% pulp stock, nitric acid, black liquor, beer, mud slurry, iron slurry and cement slurry.

AXFA 11Magnetic Flow Converter

- Dual frequency excitation technique
- Dead time/rate limit noise reduction function
- BRAIN or HART communication
- Less noise and more stable output
- Universal converter for all manufacturers flowtubes