













## 7. CONCLUSIONS

1. Something as apparently minor as valve selection, which is usually left to the supplier (who may not have the best information) may cause very expensive failures. In this case, the directly resulting problems were down-time and loss of amine due to breakages, and reduced capacity due to backflow.

Pulsation and vibration control on plunger pumps requires proper valve as well as proper design of pulsation controls (such as bladder desurgers or hard element filters with choke tubes).

2. The source of the problems described in this paper is difficult to detect without specialized analysis. Some serious problems are simply not apparent to human perception.

Conventional spectrum analysis is not enough to detect vibration problems in all cases. In this case, for an example, an overall true peak detectors or a look at the time domain pattern was required.

Moreover, vibration analysis alone would not have been sufficient to diagnose the cause. Time-based pressure readings were also required.

Appropriate measurements and appropriate acceptance guidelines must be used. Oversimplification can lead to a false sense of security.

3. Trial and error problem solving can be much more expensive than state-of-the-art design methods such as computer modelling of system dynamics, since there is a strong possibility that the "trial" may not work or that it may be an incomplete solution.

## 8. FURTHER RESEARCH

Further work is required on operating deflected shapes using time domain data, to clarify the limits of spectrum analysis.

## 9. REFERENCES

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