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We recently asked our staff to identify what they feel are top ways that a refinery may consider to help weather the current market conditions. Most of these are generally good practices regardless of market conditions, but may be more significant in the current environment. This is the first article in what will likely be a short series on this topic.

## Top Ways a Refinery Can Use to Help Weather Current Market Conditions

*By John Aumuller, P.Eng.*

In general, a \$1 improvement in the bottom line is equivalent to \$10 - \$25 needed on the top line.

- Reduce labor costs by adjusting the organization to match current needs.
- Reduce input costs (e.g., cost of fuel gas, electrical power). Negotiate / renegotiate contracts.
- Operate equipment to its available capacity (know your equipment).
- Identify incremental upgrades with big returns (e.g., equipment, practices, training).
- People. Are the best people being accessed, either via direct hire or contract, and used to their maximum capabilities and potential (e.g., engineering, inspection, operations)?
- Are rational management processes in place to support operational integrity?

### 1. Reduce maintenance costs

Review maintenance operations. Identify:

- Recurring "bad actors", such as repetitive equipment failures. Identify the root cause for repeat failures and potential improvement opportunities.
- Review maintenance schedules to identify opportunities to delay or extend maintenance activity without impacting reliability or safety. Is maintenance activity based on long time past practices or are they best practices?
- Review turnaround schedules to identify opportunities to delay or extend time between turnarounds. Can on-line maintenance / unit squat be used to avoid a full unit turnaround?
- Are industry best practices known and implemented?
- What is your competitor doing that is better?

### Upcoming Training Courses

- **API 510 Pressure Vessel Inspection**  
March 14-16, 2017  
Fort Erie, Ontario, Canada
- **API 936 Refractory Inspection & Code**  
March 21-23, 2017  
Fort Erie, Ontario, Canada
- **API 650 Storage Tank Design & Maintenance**  
April 4-6, 2017  
Cold Lake, Alberta, Canada
- **API 650 Storage Tank Design & Maintenance**  
April 18-20, 2017  
Edmonton, Alberta, Canada

For more information, see our website at [www.carmagen.com](http://www.carmagen.com).

### Work Highlights

#### Coker

- Provided delayed coking and technology knowledge transfer support to a domestic refiner.

#### Process

- Assisted a local client's review of procedures for application and use of Flexlance technology.
- Performed a jet fuel handling assessment including recommendations for a confidential domestic client.

#### Safety

- Provided HF API-751 assessment support under Attorney Client Privilege for multiple clients at various domestic locations. CEI typically has 2-3 assessors on the audit team focused on continuous process safety improvement, and one is frequently the team leader.

## 2. Learn the equipment, improve operations.

- Case Study. Recently reviewed a cogeneration heat recovery boiler and found unit running 12% under design unbeknownst to site operations personnel.
- Case Study. Reviewed production capacity of steam generating units and found 3% - 5% additional capacity, which translated directly to the same percent increase in oil field recovery.
- Ensure that any new projects have equipment capacities verified by field acceptance testing.
- Case Study. Found steam generators were being placed into production without verifying design capacities by normally conducted standard performance testing.
- Run performance test of any critical equipment to confirm production capacities.
- Consider use of third parties to perform the work as a benchmark against OEM practices.
- Reduce auxiliary fuel gas use in fired equipment using plant waste fuel streams. Fuel gas minimum rates may be adjusted downwards, say from 10% to 2½ % support, by proving new operation.
- Attend industry trade conferences with focus on technical and operations to learn from others experiences, innovations, improvements. (Ask Carmagen for recommendations.)

## 3. Apply rigorous engineering-based decision making. Be on guard against decisions that are based on intuition, fad, trend, or "conventional wisdom."

- A recent trend in upstream oil recovery facilities is to use low alloy Cr – Mo alloy piping in heat recovery steam generators [HRSG], adding a substantial premium to investment costs. The metallurgical evidence suggests that standard carbon steel components are adequate when correctly specified with the addition of minor alloying elements that are already identified in the specification.
- A recent trend in delayed coker units is to use a weld overlay (WOL) technique to restore the service life of damaged drums; however, the WOL technique is not sufficiently proven and may pose future reliability and safety issues.

### **About the Author**

*Over 35 years' experience in the execution of refinery, oil sands, heavy oil, power, and petrochemical plant projects as a project manager and mechanical engineering specialist in piping and pressure equipment stress analysis, including use of finite element analysis, refractory systems evaluation, and as a project engineer and manager. Extensive expertise in execution of maintenance and plant mechanical engineering activities. Fields of expertise include Fitness-for-Service (FFS) and remaining life assessments using ASME FFS-1/API 579. Experienced in use of Triflex and Caesar II piping analysis software, PVElite, COMRESS and CODECALC pressure vessel design software, COSMOSM finite element software, and AFT Fathom transient fluid hydraulics software. Familiarity with AutoPipe and ANSYS. Expert knowledge of industry relevant codes, such as ASME Boiler and Pressure Vessel Code Section VIII Div 1 and 2, Section I, B31.1, B31.3, CSA Z662, and related standards, including API standards.*

*Please contact Vince Carucci (vcarucci@carmagen.com) if you'd like more information on Carmagen's expertise in this area.*

