WALTER M. HIGGINS III
GENERATION STATION
PRIMM NEVADA

ACC MECHANICAL MAINTENANCE

Condition Based Maintenance

- We have a solid CBM program at Higgins. Everyone is involved and takes ownership of the plant and systems.
- Part of the CBM program are monthly meetings. All critical equipment is divided up into twelve divisions and each month one division is discussed.

The meeting agenda

- Maintenance History
- Safety issues
- Operational Issues
- Maintenance Issues
- Possible continuous improvements
- Action Items/dates
- Individual responsibilities

Some of the ‘finds’ from CBM meetings about the ACC

- We determined a need for a safer method for the removal and installation of gear-reducers.
- A way to remotely monitor gear-reducers and motors.
- Planned and scheduled maintenance versus condition based maintenance.
- Ways to add value as well as reliability

What the CBM program has produced to date.

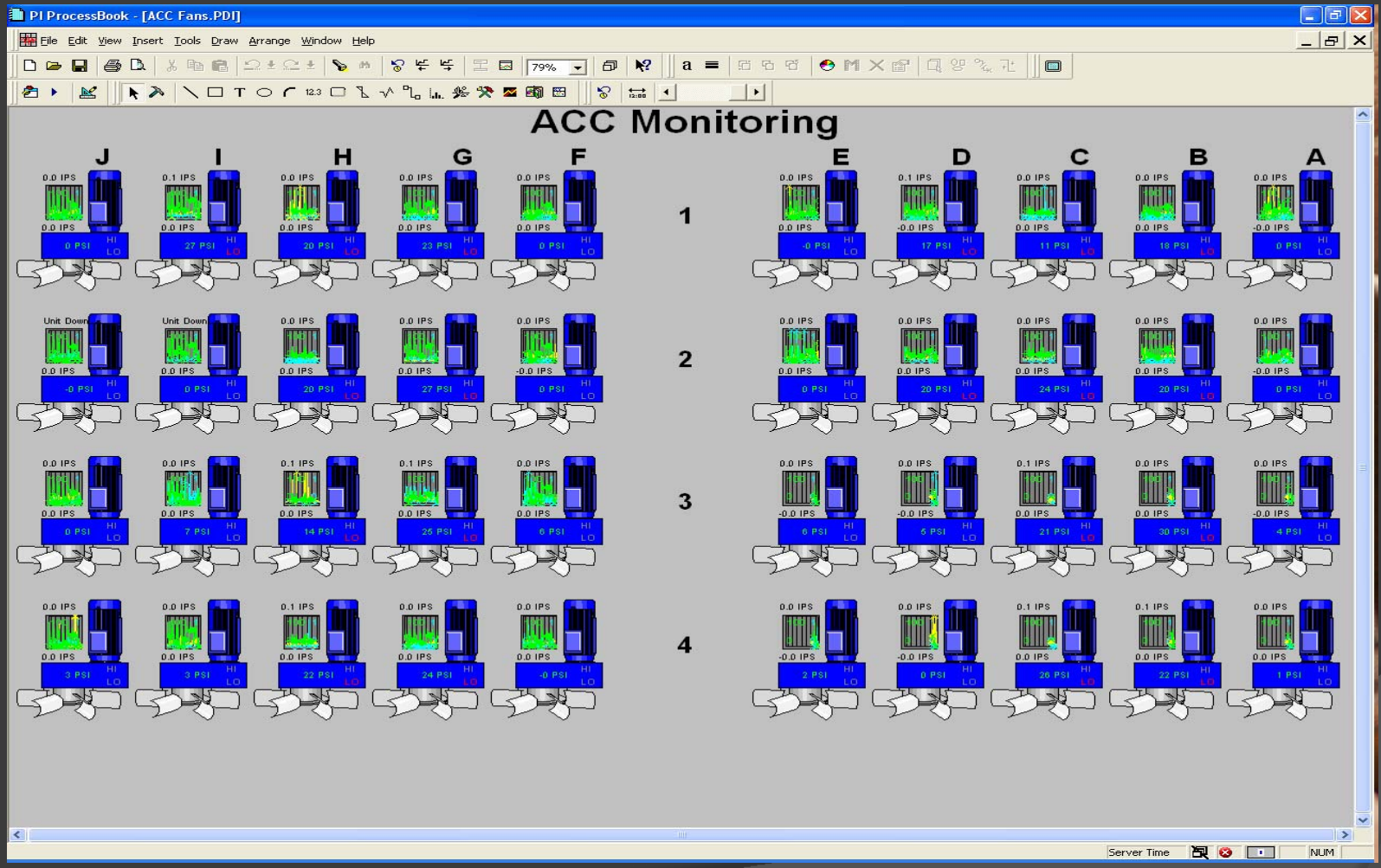
- All oil changes are dictated by oil sampling. Sampling is done prior to filtering.
  The gear-reducer lube is filtered biannually.
- Blade angle and condition is checked annually. The blade angle is checked at the hub and at the tip, a record kept of both readings. (Annual PM)
- Weekly walk-downs of the ACC system by mechanical staff include equipment and structure inspections

Other CBM items developed

- We found a need to monitor vibration and oil pressure remotely.
- It was determined that one accelerometer on the motor and one on the gear-reducer would monitor vibrations sufficiently enough for a warning as well as sending data to PI
- Oil pressure is monitored through a digital pressure gauge that allows data to be sent to PI.
- PI screen for ACC is utilized during weekly walk-down inspections so trends can show a need for closer inspection on equipment.

Oil pressure and vibration

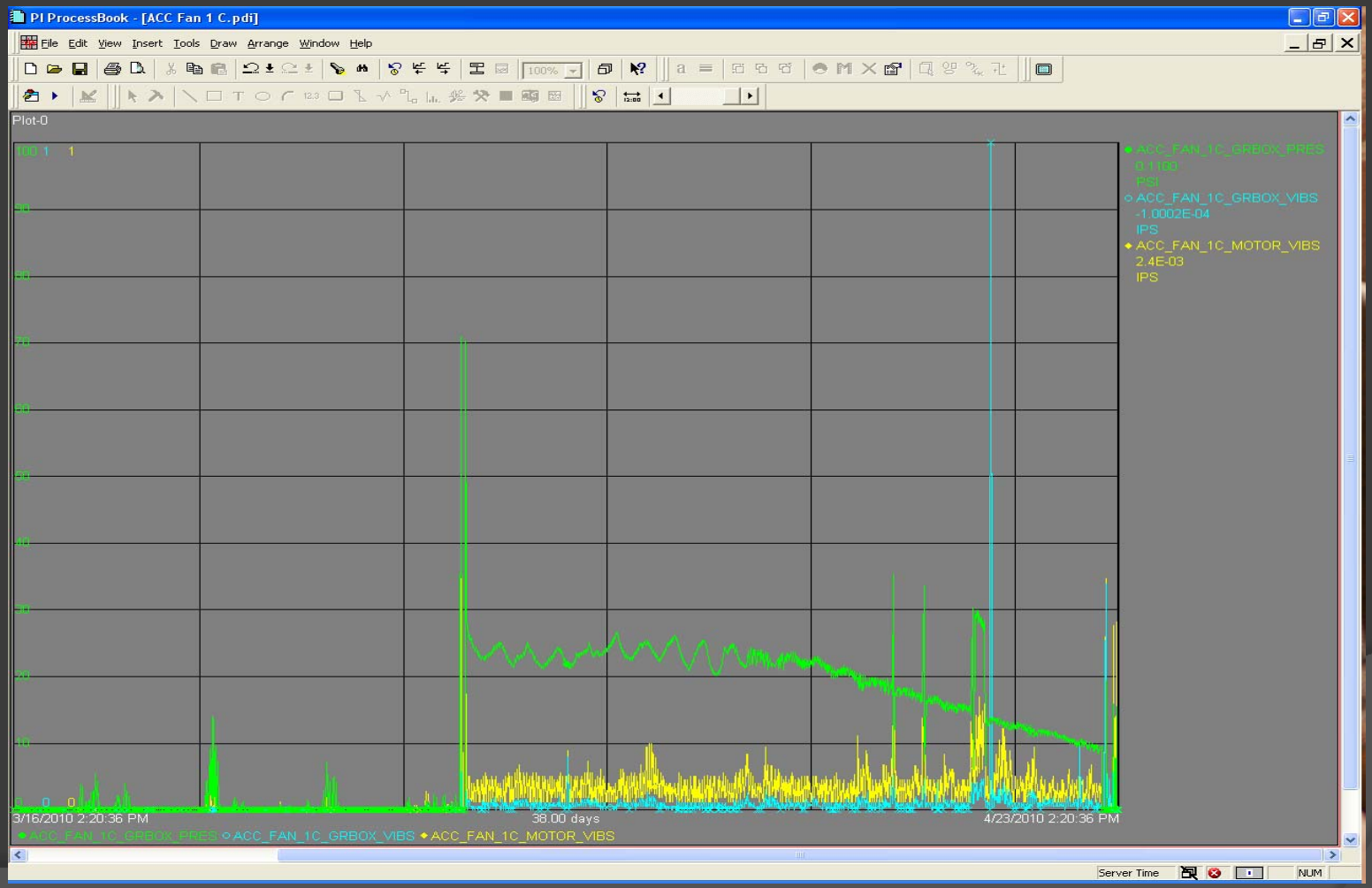
PI screen for ACC



Monitoring catches

- Right after installation of the oil pressure/vibration units we caught a gear-reducer oil pump failure.
- We've trended eight gear-reducer filter clean/change's. (as seen in next slide)

Typical trend showing lube oil pressure drop off due to clogging filter.



Filtering

- The COMO oil filtering unit removes water as well as final filters to 10 microns.
- It handles the Mobil gear oil SHC ISO 320 well, though this lube is very ‘stiff’,(high viscosity) even when warm.
- We filter long enough to allow for a minimum of eight ‘changes’ of lube.

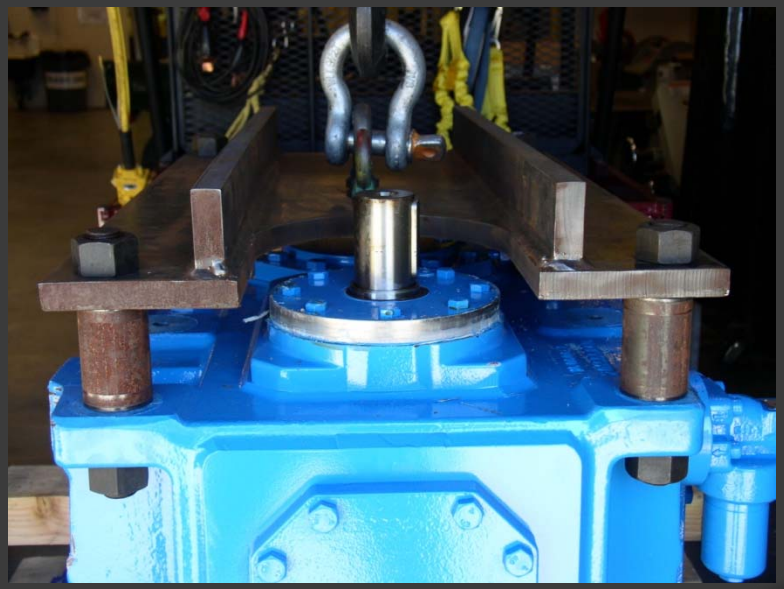
Filtering lube oil

Lifting fixture enhances safe handling of gear-reducers

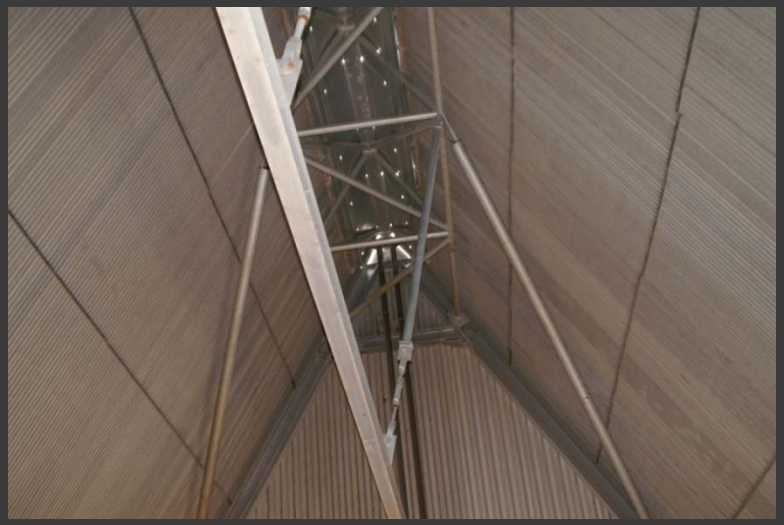
- The fixture lowers rigging height by a substantial amount, allowing gear-reducer to be moved safely without removing doors or headers in each cell.
- Picking eyes mounted on fixture allows for a positive and safe rigging change from hoist to crane while suspending gear-reducer.

Lifting fixture for gear-reducers

Lifting fixture in use



Weekly Walk-down inspections



Weekly walk-down inspections

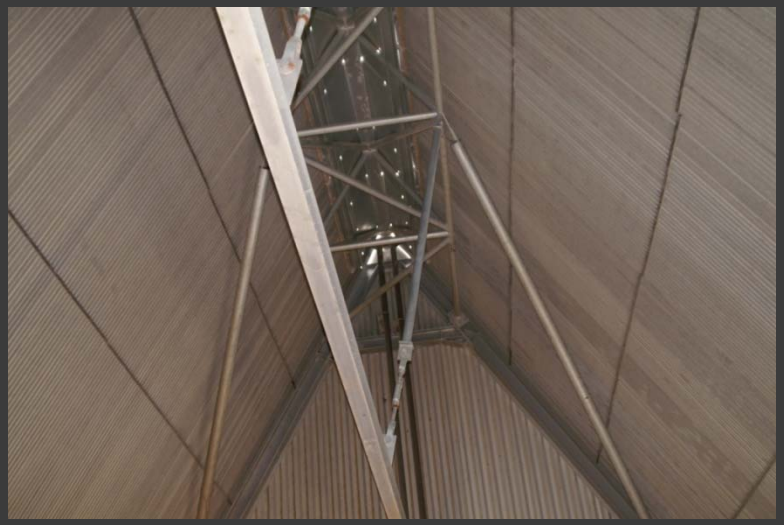
- Inspection of structure and equipment has caught many issues over time.
- Puts maintenance specialist ‘on deck’ for visual checks
- Helps determine solutions to various issues that come up.
- Insures reliability

Decking issue caught by walk-downs

Repair procedure for decking (CBM related fix)

- A 3/8” hole drilled in deck plate.
- A ¼” pan head bolt threaded into deck support beam.
- A ‘Fender-washer’ used to complete fastening, allows for movement between deck plate and support beam
- Bolt is lock-tite held in position

Finding structural issues



- Noted that over time turnbuckles loosen up. Walk-downs catch these and repairs are scheduled to fix.
- Lock nuts on turnbuckles are marked when tightened now for easier visual check.

Other issues found during walk-downs

- Sealing media falling out of position between tube bundles and cell walls.
- Door hinges failing.
- Lights not working
- Windsock condition / repairs needed
- Structure bolting, missing, loose.
- Decking or grating fastened properly and in place.
- General cleanliness and clean up /pickup

Procedures and tools developed at Higgins

- Have added value.
- Save time when performing work.
- Save time when troubleshooting.
- Cut overall costs to maintenance.
- Increased safety.
- Lowered downtime.
- Increased availability.
- Increased reliability.

Thank you