KNIGHTHAWK TECH NOTES

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What is the Load?

It's your first week on the job at the new, world class production facility. Much of the equipment has been scaled up from previous operations at other locations. There have been many questions as to whether capacity requirements can be met. Everyone is in a relaxed mode once the startup conditions have been achieved and product is being made within specification. Then during the morning meeting the "A" Operator informs you that capacity is being lost from a productive train. Then a drive shaft breaks and there's a shutdown. No problem, a spare is brought out of the warehouse and the unit is up and running in two days, one day sooner than expected and the "bean counters" are happy product is being shipped out the door. But as the Maintenance Superintendent you have a looming question, "Why did it fail"? A quick check with the operators and you note that everything was running fine, then suddenly production fell off and the drive shaft failed. A team is assembled and the original equipment manufacturer (OEM) is called and a root cause failure analysis proceeds. After all the "fishbone" diagrams and sticky notes decorate the conference room the group determines nothing, it should not have failed based on the available data. What's next?

Obviously the equipment failed and the following are some, but not necessarily all the possible considerations:

1. Faulty design of the equipment
2. Process issues
3. Operations issues
4. Maintenance issues
5. Material defects

All the calculations suggest the shaft should not have failed. The question comes down to what was the load on the drive train? With the current train running, there is a possibility to get data. The rotor is out for repair and there are no spares and operations are reluctant to mess with an operating unit that is making product within specifications. But the problem is the last failure happened when things were rocking along and the management was happy. High speed data needs to be taken to shed some light on the problem. Well there is a way to insure data and information can be attained at the lowest risk. The following are some but not necessarily all the steps in a field study that should be considered.

1. Development of a test protocol. A lead field service engineer is usually assigned to tackle this task and there are few steps he or she will follow.
   a. The first step is to discuss the testing with the root cause failure analysis team and determine what data they need. Realize that they will always want more data than they really need so make sure you find out what is really important. Determine what the goals and objectives are from the testing.
   b. Gather a set of drawings and documents to understand the ball game.
   c. Next a visit to operations to obtain an understanding of the process and equipment you are dealing with.
   d. If possible, visit and tour the site and understand the area available. Determine where you can set up your data acquisition station. Sometimes a temporary monitoring station needs to be built.
   e. Risk Management Review – This is an important step to determine all hazards to the field service team and the overall safety of the operation. It is also a time when contingencies can be established to handle any unexpected conditions.

   f. It is important that a sketch be made of the proposed test indicating:
      i. Tie points
      ii. Control station
      iii. Wiring diagram
      iv. Telemetry components, etc.
   g. Equipment list – The protocol should have a list of equipment with test certificates as appropriate. Electrical service rating for operating area should be specified.
   h. Process Data – Check P&IDs for process measurements, kept in the historian. Identify those that will provide assistance in achieving your goals and objectives.
2. Draft Protocol – After the test protocol is developed it should be circulated to maintenance, operations, safety, and engineering. All groups should sign off on the test protocol and any details should be finalized.
3. Final Protocol – This should be issued to the entire team.
4. Pre Test meeting – At this meeting the safety, operation, and all pertinent conditions of the test should be discussed.
5. Field Setup – The equipment should be set up in the field and checkouts and testing of the equipment should be done to make sure it all will work.
6. Operations Communication – Appropriate communication with operations should be set in place prior to commencement of the testing.
7. Testing – Conduct the testing and perform any testing with hand held equipment for cross checks. Also make sure to capture the process data from the historian before it is reduce though averaging.

With a good field test loading may be identified that might shed some light on why the equipment failed. The data is never any better than the test itself, so make sure it is done right when you have the chance.

Testing should be supervised by qualified professional engineer with the proper expertise and training to perform the work.

Cliff's Notes: KnightHawk has evaluated and performed many advanced tests in the off shore, petrochemical, Nuclear, shipping, and many other industries to gather the most complex data. We can develop remote data acquisition systems to send high speed data to your computer from anywhere in the world. We have the right team to get the job done with the data you need.

We are off to a new year and we are excited about what we have to offer. We are looking for another good year and we appreciate your business. Football is over with and now we have to wait for March Madness…

Take care and God Bless,

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KnightHawk Project Update

- CFD of PSV Systems – Petrochemical
- 19 MW Diesel Engine Failures – Power
- Combustion CFD Analysis – Power
- Liquid Ring Compressor Failure – Oil & Gas
- CFD of Separator – Petrochemical
- Rod Mill Failure – Power
- Air Compressor Failure – Petrochemical
- Critical Pipe Stress – Petrochemical
- Vertical Cast Transporter Failure – Nuclear Power
- Compressor Cross Head Failure – Oil & Gas
- Transient Fluid Dynamics – Petrochemical
- API Tanks FFS – Petrochemical
- Gear Pump Failure Analysis – Petrochemical
- Transfer Line Exchanger – Petrochemical
- Flare Efficiency Analysis – Petrochemical
- Fit for Service Analysis – Petrochemical
- Tensile Testing – Manufacturing
- Pump Vibration Analysis – Petrochemical
- Gas Pipeline Coupling Failure – Oil & Gas
- Ultra High Pressure Vessel Fatigue Analysis – Petrochemical
- Reciprocating Compressor Re-Design – Petrochemical
- Gasifier Equipment Design – Power
- High Temperature Molten Salt Tank Design – Green Energy
- Gas Plant Fire & Explosion – Oil & Gas