

# Turnaround Support

## Fast, Accurate Engineering Answers During a Turnaround

### IMPROVING TURNAROUNDS THROUGH DETAILED ENGINEERING

The ability to quickly evaluate equipment is critical for minimizing costs during turnarounds (TARs). There is a wide range of opportunities for cost savings that a company can achieve during a TAR. In typical TAR scenarios, some equipment clearly must be replaced and some equipment can clearly remain in service. For other equipment, the engineering diagnosis is less clear, and decision-making in response to unplanned TAR findings should be focused on maximizing cost savings while preserving HSE risk levels. To this end, a detailed plan should be formulated for run/repair/replace decisions before and during a TAR. This engineering effort should be assigned a high priority since TARs are valuable opportunities to evaluate, discover, and/or monitor damage. In addition, unplanned work performed during a shut-down is usually several times more expensive than planned work.

Planning is important since TARs are typically intense, coordinated efforts. It is often assumed that there is not enough time to conduct fitness-for-service (FFS) assessments on equipment. However, modern engineering tools and practical experience enable FFS assessments to be completed during TARs even when time is critical. Such engineering can be accomplished by pre-planning, pre-modeling, and by providing a supporting engineering staff. This can result in substantial savings for TAR budgets.

### “DAMAGED” DOESN’T ALWAYS MEAN “UNSAFE”

A common misconception is that, if inspectors find any damage, then the equipment is unsafe. Furthermore, some plant operators believe that, due to TAR time constraints, even if engineering could justify that the equipment is safe for continued operation, there is insufficient time to complete the evaluation. It is well known that, even though corrosion, pitting, cracking, distortion, and thermal degradation have very sinister appearances, these conditions may actually represent little or no increased threat to the safe and reliable operation of the affected equipment. Combining tools and experience enables assessments to be made rapidly; quick assessments (i.e., Level 1 and 2) can be completed with significant conservatism while engineering tools and software enable even more complex assessments (i.e., Level 3) to be performed within hours to days.

### MAKING SENSE IN AN UNCERTAIN SITUATION

One of the most beneficial strategies that SES recommends is to include a pool of dedicated engineering resources on the inspection team. Too often a TAR team will be asked to quickly make a repair decision based on limited or incomplete inspection reports that offer only a partial understanding of the situation. Lacking any better guidance, the team’s decisions almost always default to “repair” or “replace” since those recommendations are easiest to justify. In many of these cases, careful assessment of the equipment and damage may have better defined the severity of damage and helped in the decision-making process.

Our teams understand the unique requirements of the TAR environment: You don’t need perfect answers next week; instead, you need good answers right now. You need engineers who understand repair timing, critical-path implications, safety consequences, and the economics of TAR delays, and you need them on site and on pace with the rest of your team.

*Big-picture thinking and overall TAR value are critical!*

## IMPLEMENTING A "TRIAGE-STYLE" WORKFLOW

At Stress Engineering Services, we understand these challenges well and implement a triage-style workflow at our customers' facilities. A team of our experienced engineers working on site with your engineers can streamline the workflow and minimize delays. The focus of most equipment evaluations is to classify equipment into:

**Category 1: Repair or Replace.** In these cases, it is usually apparent that delaying maintenance would result in a hazardous situation. We focus on developing the most cost-efficient and time-efficient repair or replace strategy. At the same time, it is important to evaluate the root cause and consider ways to prevent the problem from recurring.

**Category 2: Evaluate.** Minimizing the time that components remain in this category is the primary job of the inspection and engineering group. The team may be able to immediately justify reclassifying, potentially saving multiple shifts of repair effort. In these cases, engineering and preparation can be of significant benefit, enabling rapid evaluation per API 579-1 and other codes.

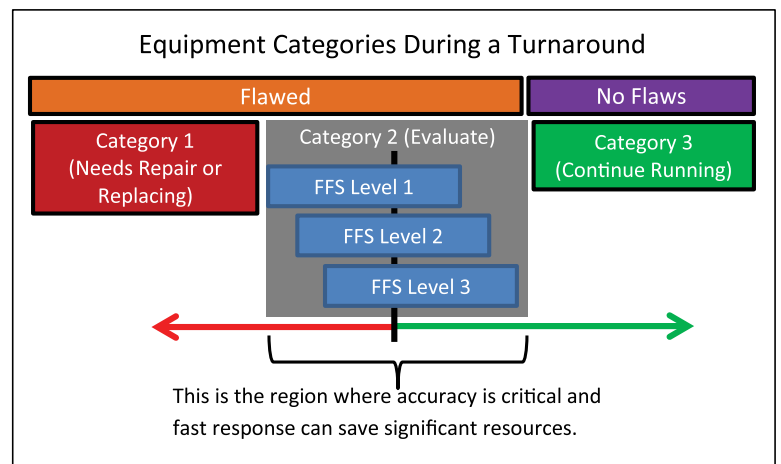
**Category 3: Safe to Return to Service.** For equipment that needs no action, best practices include the reviewing engineer documenting the rationale behind the return-to-service decision and adding notes to the equipment file regarding any future maintenance. This does not indicate that flaws were not found in the equipment, but only that the damage was within acceptable limits. In some cases, it may be recommended to continue running with monitoring (e.g., AE or periodic inspection).

Some companies have formed dedicated corporate teams to help with the task of sorting findings in this way. However, most of these teams are losing experienced talent as skilled workers head toward retirement. For other companies, staffing challenges may tempt management to not spend money on planning or providing adequate engineering support.

## AN INSURANCE POLICY AGAINST MAJOR SURPRISES

A well-staffed team of experienced engineers should be capable of handling all inspection findings in a way that preserves the TAR schedule. Having a dedicated group on-hand, on-pace, and working side by side with plant engineers can mitigate the schedule impacts of enlisting additional help, while still providing the best possible outcomes for major discoveries.

If you need additional engineering support for TARs and other scenarios, we can supply expert engineers to strengthen your team. We can provide FFS, materials, corrosion, and repair advice. We can help pre-plan for assessments by developing models, establishing acceptable flaw criteria, and anticipating damage scenarios. Planning ahead can enable complex decisions to be made during a TAR with the potential of significant cost savings while fully maintaining safety in your engineering and HSE programs.



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