

API Risk-Based Inspection

The Optimal Management System for Inspection Planning

Risk-Based Inspection (RBI) has become integral to the plant work process, as it refocuses maintenance dollars where they're needed most, using risk as a basis for prioritizing and managing an in-service inspection program. The industry standard for implementing RBI is methodology that was developed by the American Petroleum Institute (API). Here's why API RBI stands above the rest:

API consensus process for technology

The technology was developed through an ANSI-approved consensus process, and all technology enhancements continue to be reviewed and balloted by owner-user companies through an API-sponsored Joint Industry Project (JIP). Once approved, the technology is programmed into the software and a field test is conducted for validation.

Technical basis documentation

The technology is documented and will continue to be updated in API 581, available for purchase from API. The software is a validation of solid technology, as its output is tested against this documentation for accuracy.

Quantitative vs. qualitative

A truly quantitative tool calculates risk over time - that is, risk due to increasing Probability of Failure (PoF) as in-service damage potentially occurs. API RBI is the only RBI tool that provides metrics and calculates PoF due to ongoing damage. This PoF will generate a location in the Risk Matrix that could move (increase) over time, depending on the impact of damage rate on equipment integrity.

Risk-based cost benefit and decision-making

Because a discreet risk is calculated and can change with time, a cost benefit approach can be used to determine the date where inspection is required. The ability to generate cost benefit (in terms of risk reduction and \$ spent) leads to better information for risk management and assists with making sound budgeting decisions.

Risk-based to recommend inspection intervals

API RBI technology uses a true risk-based interval. The methodology offers the option to set a maximum interval (in practice 20 to 25 years) and recommends re-evaluation of the RBI study and basis at a minimum of every 10 years (shorter if operating conditions change). That is, the decision logic generating a recommended inspection is not limited by or based on half-life calculations or prescriptive interval approaches. The impact of this approach is MORE emphasis on high risk equipment (increasing inspection costs) and LESS emphasis on low risk equipment (decreasing inspection costs). The net result is usually a significant reduction of overall risk, while still reducing costs.



An effective RBI program confirms equipment condition, identifies damage mechanisms and rates, and predicts the likelihood of failure. Inspection managers can control the probability of a failure in fixed equipment by recognizing the type of damage possible and using the correct inspection method at the right location and frequency to find it. API RBI risk assessment technology helps managers make informed decisions about how, when and where to inspect assets.

Various companies have developed RBI approaches based on API 580, but most tend to be "black-box" or are too generic to accurately define an auditable inspection plan that provides measures of inspection program improvement. API RBI technology systematically factors risk into decision-making, helping identify areas of vulnerability and reducing the uncertainties of equipment performance. The difference is sound technology that produces Probability of Failure, Consequence of Failure -- and risk numbers you can trust.

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The API RBI Software Difference

Developed by subject matter experts from top refiners and backed by a prestigious industry association, API RBI software reflects industry best practices and the expertise of the best minds in the industry. The most comprehensive risk assessment and management tool on the market today, it includes:

- New state-of-the-art fluid property modeler completely rewritten to use improved algorithms that are more robust and accurate to calculate the properties of multi-component fluid streams and two-phase fluid mixtures over a wider range of operating conditions
- User-defined process streams created from a fluid property database of over 500 fluids compiled from such sources as the industry-standard DIPPR database, which is regularly tested and updated for accuracy
- Outputs that include both the qualitative risk matrix and quantitative data expressed in risk per unit area per year and/or financial risk, in addition to numerous risk, PoF and CoF reports. Inspection plan reports can be easily generated for each piece of equipment
- For each component, risk-weighted damage curves for each damage mechanism to show when that mechanism's contribution to end of life shifts - important for developing equipment end-of-life strategies or assessing operating condition changes
- Ability to provide quantitative output, such as risk in ft^2/yr (or m^2/yr), enabling the user to compare risk reduction for a component, group of components, or unit to the amount of money spent on the fixed equipment reliability program, or the cost of repair or replacement
- Most extensive materials properties electronic library available for associating each component with the appropriate year of the appropriate code for T_{\min} calculations

API RBI software includes a comprehensive module for Pressure Relief Devices (PRDs) that provides systematic and in-depth documentation for inspection planning consistent with API 510. The Atmospheric Storage Tank (AST) module is consistent with API 653. The Heat Exchanger (HE) Bundle module, which serves as a management database, provides vast improvements over existing industry bundle reliability management practices.

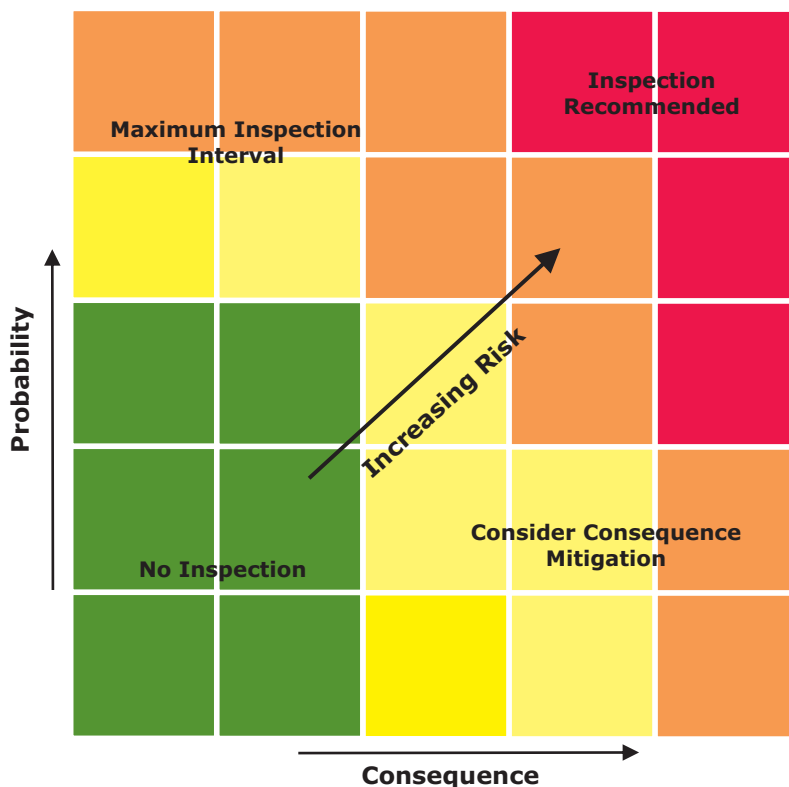
Official API RBI Trainers

The Equity Engineering Group (E²G) is the official API subcontractor for API RBI training programs (API 580/581) and leads way in the effort to continually update the technology provided in API 581. E²G is committed to keeping the API RBI software consistent with API 581.

E²G also offers official courses on Fitness-For-Service (API 579-1/ASME FFS-1), Pressure Relief System Design (API 520) and Damage Mechanisms (API 571). These courses are certified by the API TPCP certification program which monitors industry courses worldwide.

Contact Us

For more information on E²G products and services, please check our website or contact Valerie Magyari at vlmagyari@equityeng.com and 216-283-6016 or Greg Alvarado at gcalvarado@equityeng.com and 281-537-8848.



API RBI Risk Matrix – Optimizing Inspection Efforts

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