

Nuclear Plant Modification Assessment Tool (PMAT)

Working under the auspices of the International Atomic Energy Authority (IAEA), Risktec has been involved in developing a spreadsheet based tool that facilitates the rapid assessment of proposed modifications to existing Pressurised Water Reactor (PWR) nuclear power plants.

More is Not Always Better and Better is Not Always Necessary

One of the drivers is that some plants are being asked to make more changes than they can afford and need to be able to set some priorities for investment.

If a plant is to stay in business, the need is for cost-effective safety. Safety is essential, but improved safety should be justified.

The key questions to be answered:

- Are upgrades or new requirements "worth it"?
- Are the costs greater than the benefits?

To help answer these questions Risktec developed a method to determine the change in the cost of risk associated with implementing a modification.

The focus is the whole commercial risk rather than just the safety risk to public and workers. Hence the method considers a range of costs and benefits, including the cost of risk.

The approach is the basis for IAEA's overall Plant Modification Assessment Tool (PMAT). PMAT calculates the

increase or decrease in the cost of risk and presents the findings alongside all other more readily quantifiable costs and benefits of the proposed plant modification.

Benefits of PMAT

The key attributes of PMAT are that it:

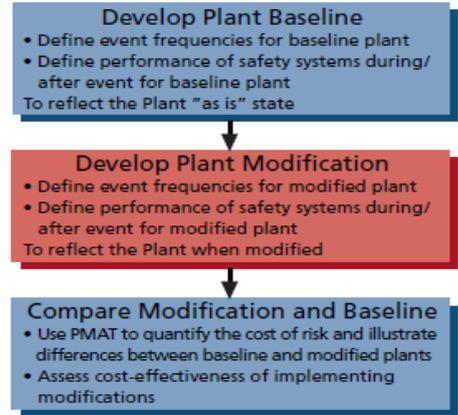
- Supports cost-effective ALARP Assessment
- Allows easy definition of baseline and modification cases through use of simple interface screens
- Makes use of Probabilistic Risk Assessment (PRA) data
- Provides a full picture of costs and benefits
- Enables rapid reassessment of a large number of options which is not possible with complex tools
- Identifies the optimal modification based on considerations of both economics and safety

PMAT has initially been developed for PWR plants, but variants adopting the same modelling philosophy are to be developed for other reactor types.

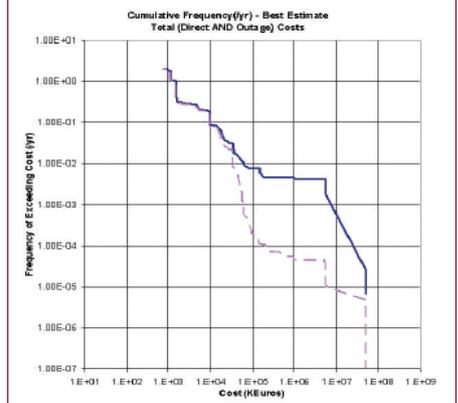
References

1. L. Langois, I. Facer, I. Jalal, IAEA. Cost effectiveness of plant modifications - The benefits of risk reduction. Presented at 2nd international workshop "Communication on Risk Reduction", 7-9 June 2004, Moscow.
2. Nuclear Plant Modification Assessment Tool, PMAT_PWR, Technical Manual. Risktec Solutions Report, IAEA-01-R-02, Issue 1, 30th April 2002.

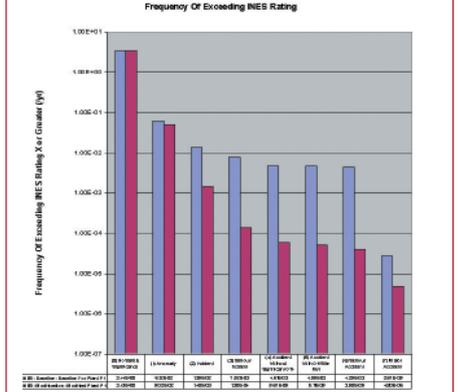
PMAT Modelling Sequence



Loss Exceedance Curves



Frequency of International Nuclear Event Scale (INES)*



* Note: the International Nuclear Event Scale (INES) developed by the IAEA is a means for promptly communicating to the public in consistent terms the safety significance of events reported at nuclear installations.

Benefits and Costs Considered in PMAT

Benefits

- Improvements in efficiency or safety functions, e.g. increase in operating revenue, decrease in maintenance, spares or purchased power costs
- Improved on-site and off-site safety and environmental consequences
- External benefits, e.g. reduced insurance premiums

Costs

- All direct expenditures associated with modification, e.g. design, hardware, installation, training costs
- Indirect impacts on plant performance, e.g. changes in plant or system efficiencies and outage time
- External costs, e.g. licensing

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