

The IMPACTxp Condition Monitoring Module allows the user to carry out predictive maintenance, or "just in time maintenance" on an item of plant. Equipment rarely breaks down without exhibiting some warning signs. Unlike usage or time based maintenance, the Condition Monitoring module therefore seeks to assess the general health of equipment via condition indicators.

Any combination of indicators can be used, provided they can be represented digitally and include:

- Temperatures*
- Scrap Rates*
- Pressures*
- Chemical Levels*
- Physical Tolerance*

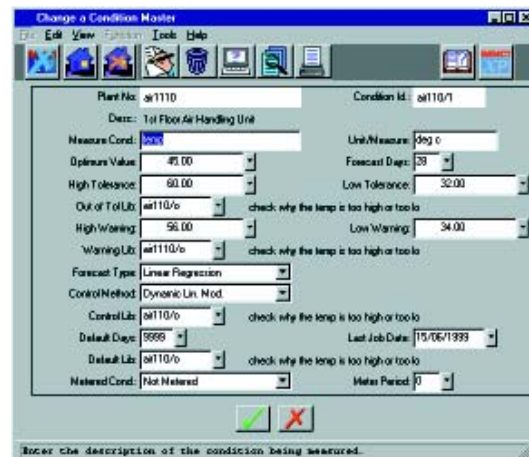
Uncharacteristic trends in the condition of a plant item will then be detected and a work order that has been previously set up in the system will be triggered for investigation and correction before a breakdown occurs.

The benefits of utilising the Condition Monitoring module therefore include:

- Ability to plan ahead*
- Reduction in breakdowns*
- Less waste in materials and manpower*
- Lowers the direct cost of repair*

● **Integration with plant equipment**

The user first decides what the individual or combined condition indicators are for an item of plant equipment, for example *exhaust gases*. Readings from the chosen condition indicator can be accessed from many types of condition monitoring equipment and fed into the system via the Generic Interface module.



[Change A Condition Master]

IMPACTxp can even be set up to automatically take a reading at pre defined intervals. Alternatively, the user can input readings by hand prompted by the production of a work order scheduled from a library job at fixed intervals. The user can also be prompted by the system to take a reading upon completion of any work order associated with condition monitored plant. All types of work order including breakdown and library jobs can prompt for this reading.

● **Trend Analysis**

The user specifies what the upper and lower reading levels are in terms of acceptable operating condition. When condition data is entered, the system immediately informs the user if a pre-defined limit has been passed. With the use of the IMPACTxp mail system, other users can also be informed of any unacceptable operating conditions and will therefore be aware of any future planning needs.

More importantly however, after analysing past and present indicators, the system is able to predict future readings and therefore the future condition of the plant item. The system will then alarm any equipment that is likely to need servicing at some point in the future via alarm messages.

There are three limits that would create an alarm if a prediction were to cross it:

- Prior experience limits*
- Concern Level*
- Non-Operational limit*

There is also more than one technique involved for the forecasting of readings to ensure complete accuracy:

- Exponential Regression*
- Dynamic Linear Model*
- Linear Regression*

All three techniques are employed, with the most accurate result being automatically adopted after a thorough comparison.

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● *Work Order Planning*

One of the benefits of utilising the Condition Monitoring Module is the ability to plan ahead. When a reading crosses the concern level the system may inform the user via the use of messages. However more serious readings or predictions would automatically trigger links into jobs that have been set up previously in the library file. In the case of a prediction, the user can plan ahead by ensuring that the correct materials and tools are booked out and that the correct personnel are available to carry out specific tasks.

When the condition of a plant item remains satisfactory, the system automatically defaults to time based maintenance and produces a work order for servicing at pre-defined intervals.

● *Multiple Library Jobs*

Any number of different maintenance schedules can be attached to the same plant item. For this reason, condition monitored equipment can trigger multiple work orders when exhibiting a fault. Each work order may involve different departments, crafts or skills.

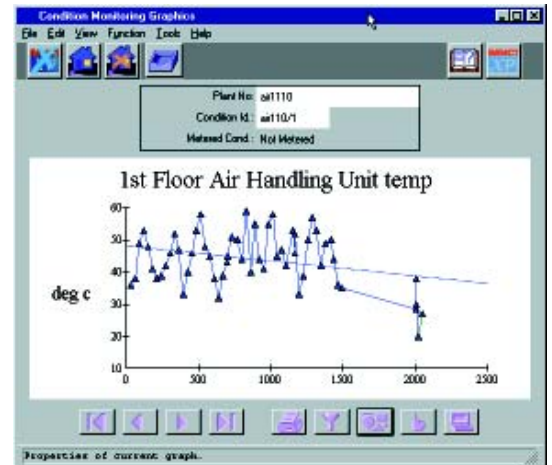
● *Multiple Level Servicing*

The father/son approach to maintenance (multiple level servicing) is a feature that can be utilised within the Base Module and the Run Time Scheduling Module for the scheduling of time-based or run time tasks. It can also be used for the scheduling of Condition Monitoring tasks. It revolves around the concept that some tasks may be more complex than others.

Infact part of a complex task may involve the same work to be carried out as the smaller tasks. For instance, the checking and changing of oil. Within the Condition Monitoring module a work order may be triggered to check the oil when it gets up to 10 degrees hotter. A work order could also be triggered to change the oil when it gets up to 20 degrees hotter. When the oil needs changing there is no need to check it. The system therefore suppresses this less senior task and avoids a waste of resources.

● *Graphical Presentation*

IMPACTxp is highly user friendly and like other modules within the system, Condition Monitoring provides an instant overview of the health of equipment in the form of a graphical presentation without the need for exporting data. A simple click of a mouse reveals when faults are likely to occur and therefore when a work order is likely to be produced.



[Condition Monitoring Graph]

● *Other Schedules*

Condition Monitoring is an effective way of predicting scheduled work and is the only method that provides certainty that the work needs to be carried out giving the user the ability to plan for the optimum utilisation of resources.

IMPACTxp offers 3 other methods of scheduling work to cope with every maintenance situation:

Based upon elapsed time (Base Module)

Based upon run hours or volume produced (Run Time Scheduling Module)

On call-off when circumstances allow (Base Module)