

AN INCLUSIVE CONDITION DIAGNOSING SYSTEM FOR PRINTING PRESS

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Abstract: With increasing automation and rising production rates the service and maintenance of a printing machine are gaining significance. A full link-up with wearing and condition of the press is still needed.

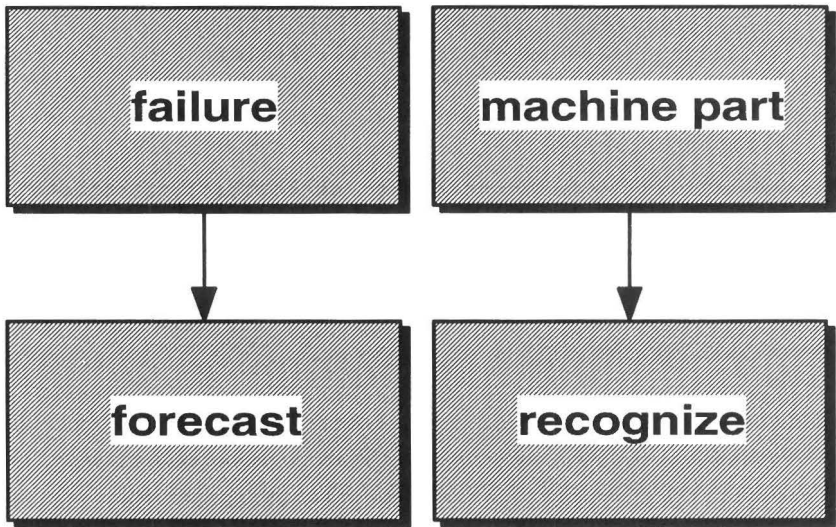
The objective of the new project started in the Technical Research Centre of Finland is to set up a pilot system for the all-in maintenance control of a newspaper press, consisting of the measuring equipment, with a section for the analysis of the measurements, and including an analysis-based expert system, data management for service automation, instructions for maintenance measures, and a user interface. The pilot system will be run by a workstation, using the newspaper printing plant of Sanoma Osakeyhtiö (the Helsingin Sanomat) as the test environment and employing their systems.

Since the projected system is based on press-independent machine part and fault knowledge models, it can be applied at the product development stage to other newspaper presses by simply altering the machine definitions (structural database) and the fault knowledge model.

Basis

With increasing automation and rising production rates the service and maintenance of a printing machine are gaining significance.

Some service supporting systems are already in use with printing machines. But these systems are simply based on previously estimated lifetimes of machine parts and on service intervals. A full link-up with wearing and condition of the press is still needed.

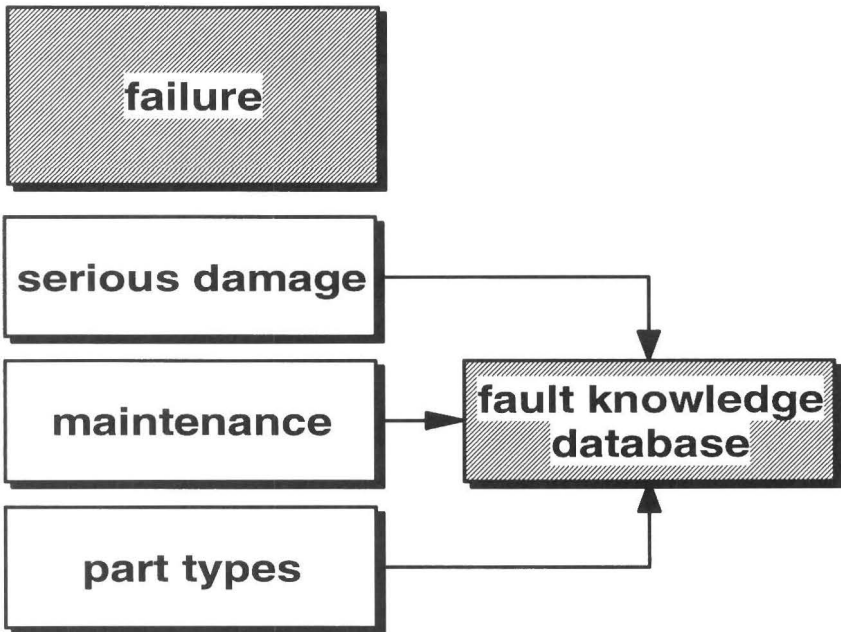


The purpose of this research project is to unite the special know-how of industry and different laboratories of the Technical Research Centre of Finland. The Graphic Arts Laboratory has studied, with good results, detection of typical press faults or failures with vibration measurements on the machine, while the Laboratory of Production Engineering has investigated at length the detection of various faults in rotating machines by means of vibration signals, setting up a related knowledge-based fault database. In the current project, the Machine Automation Laboratory is studying e.g. the application of the latest state-of-the-art methods for signal analysis and acoustic measurement in fault diagnostics and in the maintenance control of machines.

Besides, data collection devices and signal analysers developed by Honeywell Graphic Industry, Automation Center as well as the measuring sensors and gauges installed on the printing press of Sanoma Osakeyhtiö (the Helsingin Sanomat) are employed in this project.

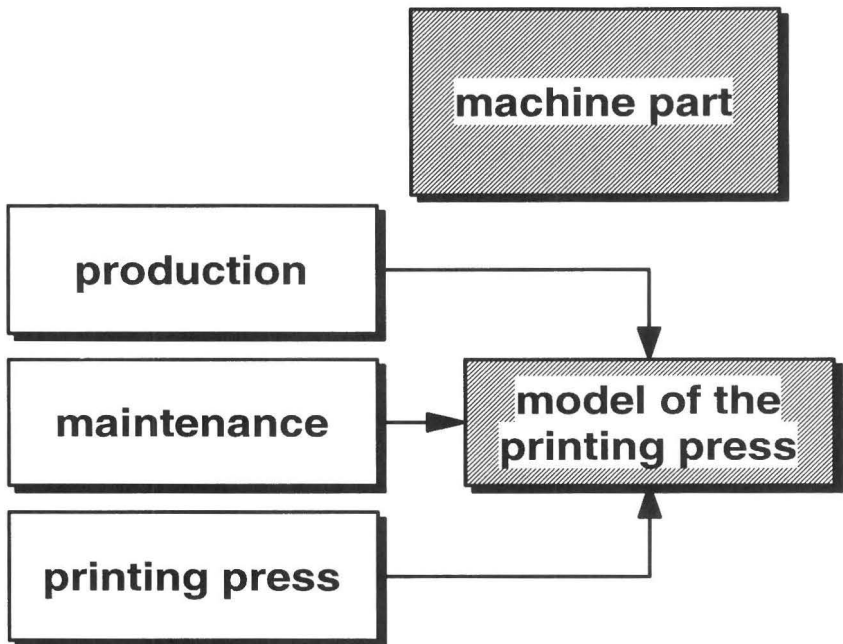
Objective

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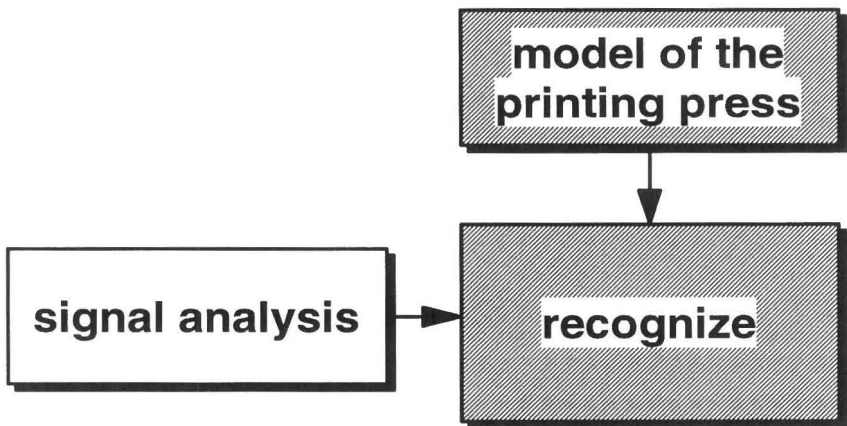
The functional goal of the projected system is a level which will enable to demonstrate

- a) its logical capability of functioning as an inclusive system, and
- b) its capacity to function at a restricted pilot level in production conditions, and
- c) its state of readiness for the launching of a product development project.

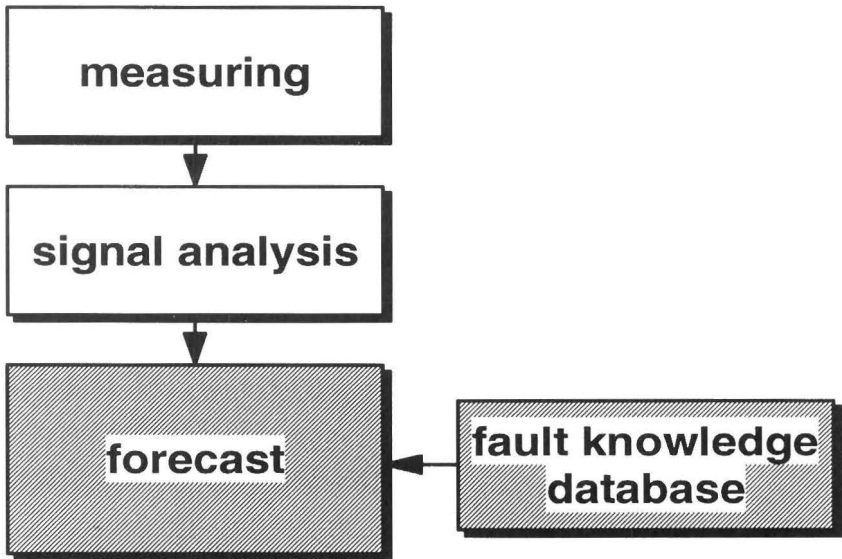
Line of action

The project was started in 1992 and is scheduled to continue till the end of 1993. It is divided into the following steps which are somewhat parallel on the time profile:

1. The details of the project are determined and outlined, and the control points are decided on the printing machine.
2. Sensors and preliminary handling of the signals are planned and taken care of.
3. Required new methods for further processing and analysing of the measuring signals are developed and applied.
4. A common knowledge database is designed and set up for the inclusive system.
5. The structural model of the employed newspaper rotary press is implemented.



6. A fault knowledge database is set up and implemented for the part types chosen for monitoring.
7. An expert system is designed and set up for the maintenance control of the printing press.
8. Further development of service automation and its integration into the system.
9. Testing and trial runs in the laboratory and on the printing press, and processing of the results.



Our plan is an international development project scheduled for 1994. We now seek international companies and institutes who would like to be our project partners.

References

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Tapio Lehtonen, Jukka Tarvo, *Automatic analysis of vibrations in newspaper printing presses*, 20th IARIGAI Conference, Moscow, September 1989.