

Drives

Machine Drive System

by Marja-Liisa Parkkinen, Global Communication Manager, ABB

—● Improving the customer's operational efficiency today requires exceptionally strong performance of the drive systems and special attention in the system's most important functional areas; reliable functions and responses for process variations, safety of personnel and ease of operation. Process availability in a broad sense includes the smooth and efficient project execution and a fast start-up to production. Reliable system operation requires certainly firm and proven product platforms, but as well a deep understanding of combining product features into the process behaviour. ABB starts up a Paper Machine Drive system twice a week in average, and shows a track record of over 2,700 references, whereof over 1,300 are AC drive systems only. In most production lines, an overall uptime in practice, for relatively large and complex drive systems, is only few decimals from a full 100%. Obviously there are unavoidably critical components and subsystems, but when the production needs and conditions vary, the systems and the equipment must be available for a new run without delay. High response level requires a lot of attention, not only to the preventive maintenance of the hardware, but also to the system optimization functions, to react quickly to any unfavourable phenomena in the process, having affect to the web control, and functionality to analyse and adapt the system also to the slowly developing changes during the operation.

This system is designed to prevent any unnecessary downtime of the equipment. The system control optimizes the drives to adapt promptly to the variations in the production. This is done with specific software functions, e.g. such as an adaptive friction compensation, optimized load balancing in acceleration, or other dynamic situations within a group or a pair of drives, oscillation damping features and many others, and thus primarily protect the web from

breaking. These coordinated drive application capacities have evolved through a vast experience of different type of paper machinery.

Services

Fast and efficient drive start-ups, with the knowledgeable experts, and optimization of functionality allows more effective days of the production for the investment made. In addition to that, ABB has site auditing programs, specific to Paper Machine Drives, to make a fair assessment of the maintenance and upgrade need or other necessary actions for the highest availability in long term, as well as effective preventive maintenance programs to keep the drives products, machines and motors in a proper shape and condition alltimes. The service ability is a result of continuous track record of references, and strong organisation – locally and globally – with a very specific Paper Machine Drives knowledge.

Operational safety

The safety of machinery is dictated by different international, regional and local standards and directives. Only the very basic (A-type) standard of electrical safety (EN 60204-1 or IEC 60204-1) alone, of e.g. the drive system, is described in hundreds of pages, referring to dozens of other standards (IEC 60364, IEC 60034-5, IEC 61310, ISO 13850, IEC 60447, etc.) all affecting directly or indirectly to the safe operation of a drive system. In addition to international IEC, ISO or regional directives and standards (such as the harmonized European EN standards for safety), there are different levels, such as A-type, B-type and C-type standards, including also safety related standards particularly set for safety of Paper Machinery. The quality of safety depends on having the resources and the ability of adopting the

relevant information from the standards to all the parts of the system delivery. This requires continuous follow-up of the changes and good knowledge of machinery and processes, to determine the relevancy and applicability of each standard. With a strong emphasis on pre-designed safety, ABB has invented unique solutions to increase the safety levels of the Paper Machine Drives e.g. for simple things like the alarming of starting the machine.

The Paper Machine Drive PMC800 systems are based on global system concept, developed in one expertise domain, where the relevant safety aspects are designed into the drive line-ups, software functionality, operating devices and to any other system aspect. This global solution is the released and maintained to be a starting point for all local engineering and tailoring taking place in customer projects.

All the PMC solutions, from the low investment cost solution PMC800 Basic Drive, up to the state-of-art PMC800xA Direct Drive, are based on the same principal design for functionally, safety, and ease of operation. Many of the safety issues are designed already in product manufacturing, also on the terms of the applied industry. Many of the paper machine safety points are covered yet in the system design. The better the supplier will handle the safety design, the less concerns the customer has.

Easy operation

Fast and easy drive monitoring and operation is a subject of a continuous process improvement. At the simplest, and adequate in many drives systems, the Paper Machine drives operation is done in local control desk panels. Detailed drive monitoring, however, is done usually in the electrical room with different

datalogging, parametrizing and programming tools. Many times those tools are not continuously in use, so the user routines are not developed to the daily usage level. The demands are high, to be able to manage the software coordinating tens, or even hundred drives – biggest at megawatts size – to keep the newspaper-thin web running between tens-of-ton rolls. The programs must be sophisticated, yet easily accessible and understandable.

ABB's Paper Machine Drive application software is made visually user friendly by modular software entities in graphical presentation form, called Control Modules. Furthermore, viewing simultaneously the different parts and levels of the program is made again in graphical form, by special Interactive Windows. E.g. the whole reference calculation chain, which tells the coordinated relations of all the drives in the machine, can be seen on one display with the most relevant control data; drive point speeds, cumulative of speeds, slack control mode, tension control mode, etc. This main

view is hierachially linked to more detailed interactive windows showing e.g. the complete control sequence of one drive in graphical diagram, and allowing interactively to make new settings and changes in that window without a need of reprogramming. Direct access to the main support tools, such as system support and document navigation tools, and drive maintenance tool are linked to the main displays – from the interactive windows in electrical room and from the drive monitoring displays in control rooms.

Control and operation

For advanced drive control systems with operator monitoring stations in control rooms, the pre-designed display sets are built to avoid too broad selection of operator views, thus having a possibility for any self-built features allowed by the 800xA platform. Same main control views are also available for the operator desk panels, in the same format to avoid unnecessary misinterpretations.

Diagnostics

One of the main functionalities to provide a combination of the high availability, ease-of-use and simple operability, is the fast diagnostic and troubleshooting of the whole system, and the inverters and other products within. With the help of clear Diagnostics and Status displays of the Interaction Windows, the electricians will have e.g. the detailed status and dia-gnostics data per drive, stop and state histories with time stamp, storing of drive commands and reasons of stop-pages.

Sources of the commands are identified (e.g. operator panel, PPA, interlock), the inverter unit control commands and status are shown and all the inverter unit alarms and fault information are available either for the full operator workplaces or electricians interactive windows. Even the documentation is automatically interlinked to the fault messages with the new support tool, available as a standard add-on.

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