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The Papermachine Simulator brings the challenge of setting up and efficiently running the papermachine direct to your PC, no matter where you are – whether at home, the workplace or the training room. It allows trainees to develop competence, confidence and understanding of the papermaking process.

Investment in the Simulator is quickly returned as potentially costly operating errors are greatly reduced.

Papermachine Simulator

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This state-of-the-art software has been developed by papermaking and training experts and provides a complete and realistic simulation of the papermaking process from mixing chest to reel-up. All the stages of the process are covered; stock blending, stock approach, formation, pressing and drying; with vacuum and steam/condensate control included as well. It is realistic, just like being in front of the computer screens found in machine control rooms around the world.

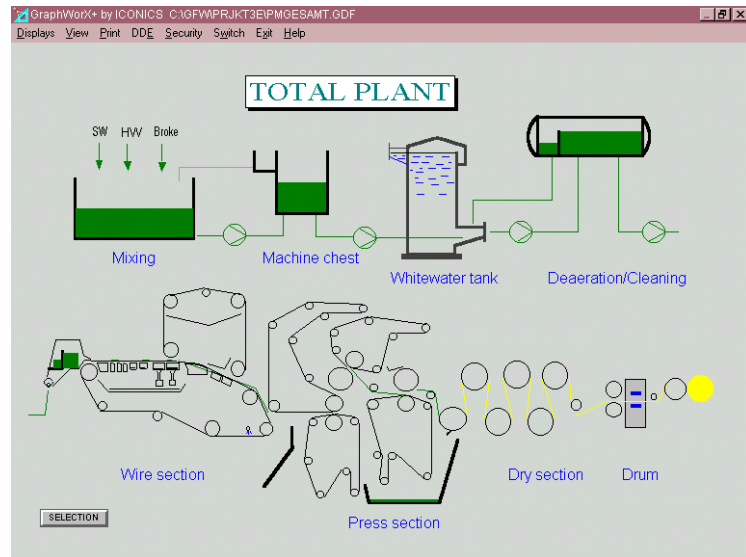


Figure 1. Overview of the simulated process

Figure 1 above shows an overview of the “total plant” contained within the simulation. Each stage has one or more interactive screens through which the operator drives the process, such as that shown below, in figure 2, for the wet end.

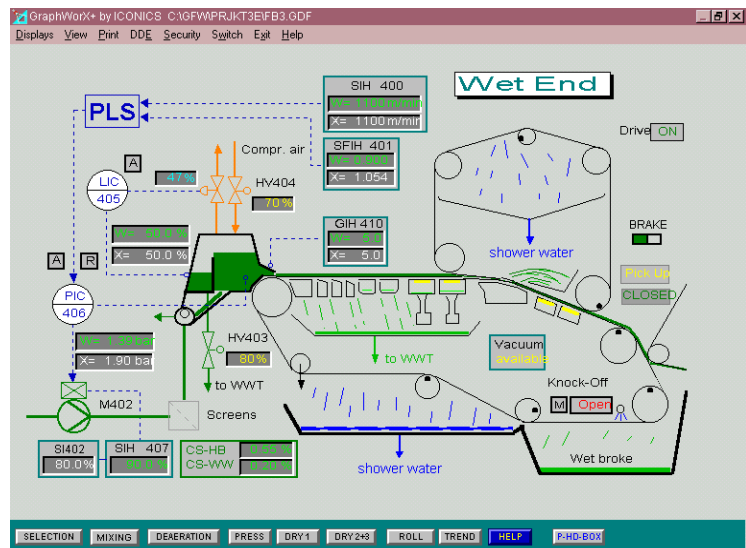
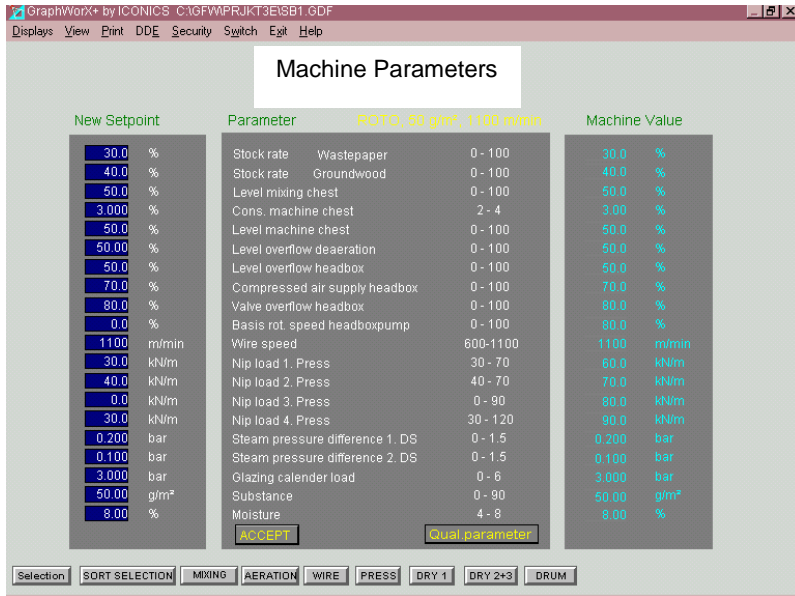


Figure 2. Wet End

As you move the cursor across the screen, sections will illuminate to show where control changes can be made. Movement through the various stages of the process is achieved by clicking the control buttons located at the foot of each page.

Start-up procedure: By selecting a grade of paper, out of the nine provided in the grade menu, the operator automatically establishes new setpoints for the main machine parameters. These are available for view on the left hand side of "machine parameters" screen, *figure 3*. Upon accepting these values they are transferred to the machine value column, right hand side, of *figure 3*.



Quality parameters are set in a similar way, through a separate screen. The simulation now uses these values as the start-up process settings and quality control settings. Comprehensive operating manuals accompany the simulation package which give full operating instructions. On site training conducted by Simulator experts is also available. The operator now works his way through the simulation starting up each stage of the process in the same manner that would be followed by a competent operator driving a real papermaking machine.

Figure 3. Machine parameters

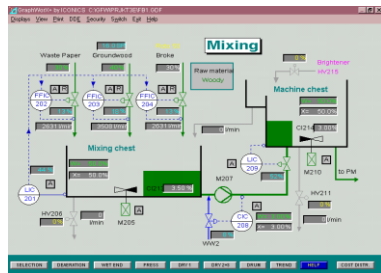


Figure 4. Stock mixing

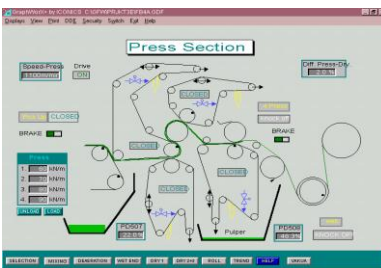


Figure 6. Press section

Process control: Controllers for each aspect of the process, contained within a screen, can be monitored independently and their parameters tuned to optimise response time. A global trend display can also be summoned, for each page, to view the process as it comes under control, *figure 8*. Failure to follow the correct start-up and running procedures will result in machine instability and recurrent web breaks.

He brings stuff forward from stock preparation, at a wetness decided by himself, and begins to fill the mixing chest; *figure 4*. When ready he pumps forward to the machine chest; stuff is consistency controlled en-route. Successful starting of the various stages contained within the approach flow, represented here in *figure 5*, followed by; the wet end, *figure 2*, press section, *figure 6*, dryer section, and reel-up, *figure 7*, will see the sheet established around the shell.

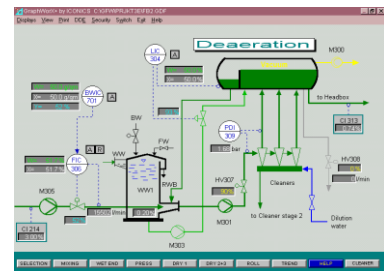


Figure 5. Part of approach flow

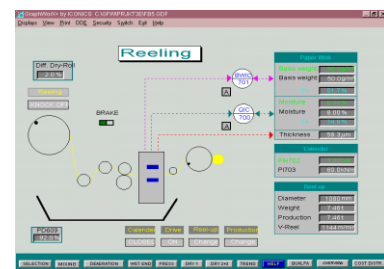


Figure 7. Reel-up

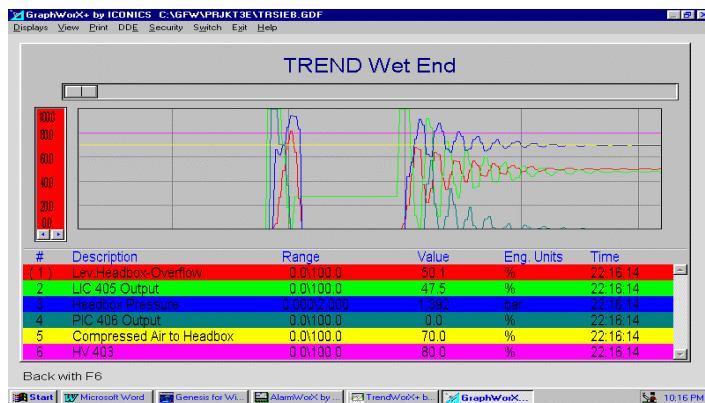


Figure 8. Trend, Wet end

Troubleshooting: Several diagnostic tools are made available to the operator to enable him to systematically resolve problems.

Machine conditions that fall outside the parameters accepted in *figure 3* cause an alarm system to flash in the top right hand corner of the active screen. By referring to the alarm page, he is presented with a chronological account of alarm events, which he can act on and acknowledge as he sees fit. Also visible on this display is an event log which catalogues the actions he has taken during the machine run. On-line help pages are also made available, see *figure 9*, these explain the interlocks that are designed into the simulation and give other useful hints and tips to get the operator moving again. If all else fails he can refer to the user's manual!

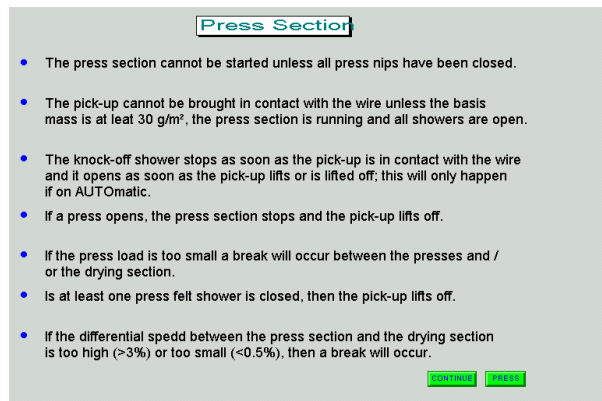


Figure 9. Help page, Press section

Quality control: Once the backbone of the simulation, the papermachine, has been started up and settled down the operator may now attempt to bring the required quality parameters into specification. *Figure 10* provides an overview in bar-graph form showing whether all quality parameters are “too low”, “in tolerance” or “too high”. The target specifications were set when the grade was chosen from the grade menu, as described earlier. Quality parameters shown in yellow are those that are critical for the grade being made at the time. Specifications are displayed in four groupings; “basic”, “strength”, “surface” and “optical”. The “basic qualities” display with accompanying trend plot is shown in *figure 11*. Machine parameters are featured in the bottom left of this page and give the operator a hot link into the process pages where he can make changes to running conditions to bring the specifications into control. To support the other diagnostic tools described earlier, in this section of the simulation, the operator also has access to a “quality matrix” page that shows, in diagrammatic form, how process parameters affect quality parameters.

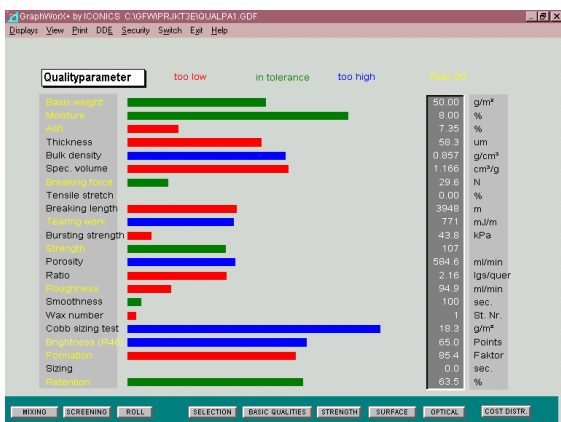


Fig 10. Overview of Quality parameters

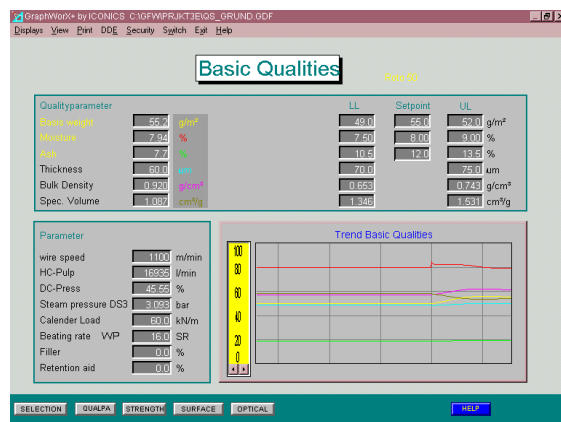


Fig 11. Basic qualities

Cost accounting: “There’s more to papermaking than making paper”. The “more” in this case is a neat facet of the simulation that displays, on separate screens, the cost impact of making the various process and quality decisions. Mills can input their own variable costs to give added realism and cost awareness for the benefit of the trainee.

Who benefits?: This simulation provides the opportunity to help a broad range of mill employees. Maintenance people can gain hands-on experience of running a papermaking process and as a consequence be able to fault-find from an operator’s viewpoint. Experienced operators can review the fundamental aspects of running the process and gain fresh insights. Managers and supervisory staff, without practical experience of papermaking, can gain operational competence and a deeper understanding of paper technology. New starters can grasp the concepts of running a papermachine before being exposed to the real thing. The Simulator places demands upon trainees to work in a proceduralised manner and heightens awareness to process, quality and cost efficiencies and their impact on the overall business performance of the organisation. In short a highly effective training tool that can be used for the operational training and development of everyone; and flexible too, learning can take place wherever there is a PC - either in the workplace, college, or at home.