Technical News
Bulletin

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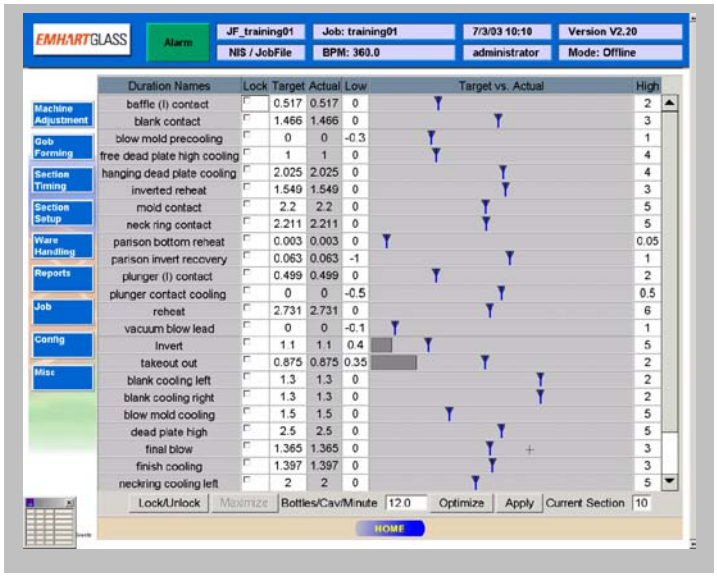
Cycle Optimizer Software

Emhart Glass introduces the first optional software product specifically designed to run on a full servo machine - the **Cycle Optimizer.** This new program has the ability to set NIS thermal process durations and cycle times in order to automatically build a job that is free of mechanism collisions.

The program's information screen has been integrated with all other Universal Console screens for the NIS. The screen shows information on user-defined thermal forming process durations as opposed to giving the operator a choice of standard mechanism timing bar graphs and event names. *Duration Names* are found in the left column in the interface screen.



The Cycle Optimizer screen as seen on the Universal Console

Duration times are automatically calculated by the optimizer program based upon machine timing and target machine speed (in bottles per cavity per minute). It should be noted that before optimization, the target and actual time lengths are exactly the same.

If an operator determines that the existing duration periods *should not* be modified during the optimization process, a simple checked box in the lock column will assure that they remain the same. Operators can select a *Target* time length for the process duration, which may be different than the *Actual* time length. For the optimization to be properly bounded, the target times must fall between the pre-defined *High* and *Low* limits for the duration times. The *Target vs. Actual* column gives the user a graphical representation of what is happening during the optimization process.

The Optimizer's operating mechanics are very straightforward. When the optimization page is first entered, the user should touch the "Optimize" hot button at the bottom of the screen to run the program with the current data shown. From this point, values can be entered into the target data column. High and low limits can be modified at this time, and any durations not being modified can be "locked" as desired. If the target data chosen is between the high and the low limits, and the system determines that it is unachievable, the optimizer will choose the best compromise settings. For example, if the user wished to increase mold contact time to an unreasonable duration given all other

system constraints (including production speed), the optimizer would indicate the compromised value in the *Actual* column. If it is vital that the target be achieved, it should be "locked" after it is entered. If optimization is chosen with the target locked, it will be achieved, but several other items will be changed to support the target time. The Cycle Optimizer does not make judgements on the chosen targets, it only makes the calculations and moves the mechanism angles to support the desired changes.

To maximize the machine throughput, the operator must first touch the "Optimize" hot button, then the "Maximize" hot button. This will change the bottles per cavity per minute display to reflect the minimum cycle time possible for the current settings. At that time, small yellow arrows will appear in the *Target vs. Actual* display to indicate the direction to move each value to further improve the throughput. Once the targets have been moved in the direction indicated by the arrows, they can be "maximized" *again* to further improve throughput. The operator can also specify a production rate and optimize the settings to that rate. The program will do the necessary calculations and set the proper mechanism on and off angles to support the changes.

Once the operator is satisfied with the optimized "durations" and corresponding mechanism on and off angles, the "Apply" hot button is selected to send the new setting information to the subject section. Afterward, a pop-up window asks the operator if the system should *Minimize Risk*. If "Yes" is chosen, the system minimizes the risk of a mechanism collision by spreading any extra time in the cycle over all mechanisms that could collide. A "No" will keep the movement timing at a minimum. Next, the operator is asked if the system should try to *Minimize Wear* on the mechanisms. If "Yes" is selected, the system will slow down mechanism movements within the allowable time to reduce wear. A negative response will cause no alteration to mechanism speed. If all sections are currently stopped, a third window will appear giving the operator the choice of updating all sections. If "No" is chosen, only the current section will be updated.

Operators typically adjust an IS machine's process by changing mechanism angles as a means to control thermal times (durations) since this is the key to making the best containers. The Emhart Glass Cycle Optimizer, in combination with the fully servo NIS Machine, opens a new era in forming technology. Since thermal times can now be programmatically adjusted directly and safely, with minimal concerns of causing mechanism collisions, the time from machine start to producing the best possible container can be reduced dramatically.