

SYNCHRONIZED TURNTABLES

PROBLEM:

Our client requested controls for a large showroom that contained ten turntables, each of which allowed motion control/position reporting capabilities and could be controlled independently or in synchronization with any number of others in the showroom. In addition, they requested that these controls be accessible wirelessly via iPad connectivity.

SOLUTION:

Carousel-USA engineers designed a control panel that contained a large HMI touchscreen with distinct screens, each with a distinct purpose, to monitor status of all turntables, to control turntables individually, or to control numerous turntables at once using the same movement commands. This HMI touchscreen was also able to independently cast a screen mirroring to any device connected to the same ethernet network via VNC viewing.

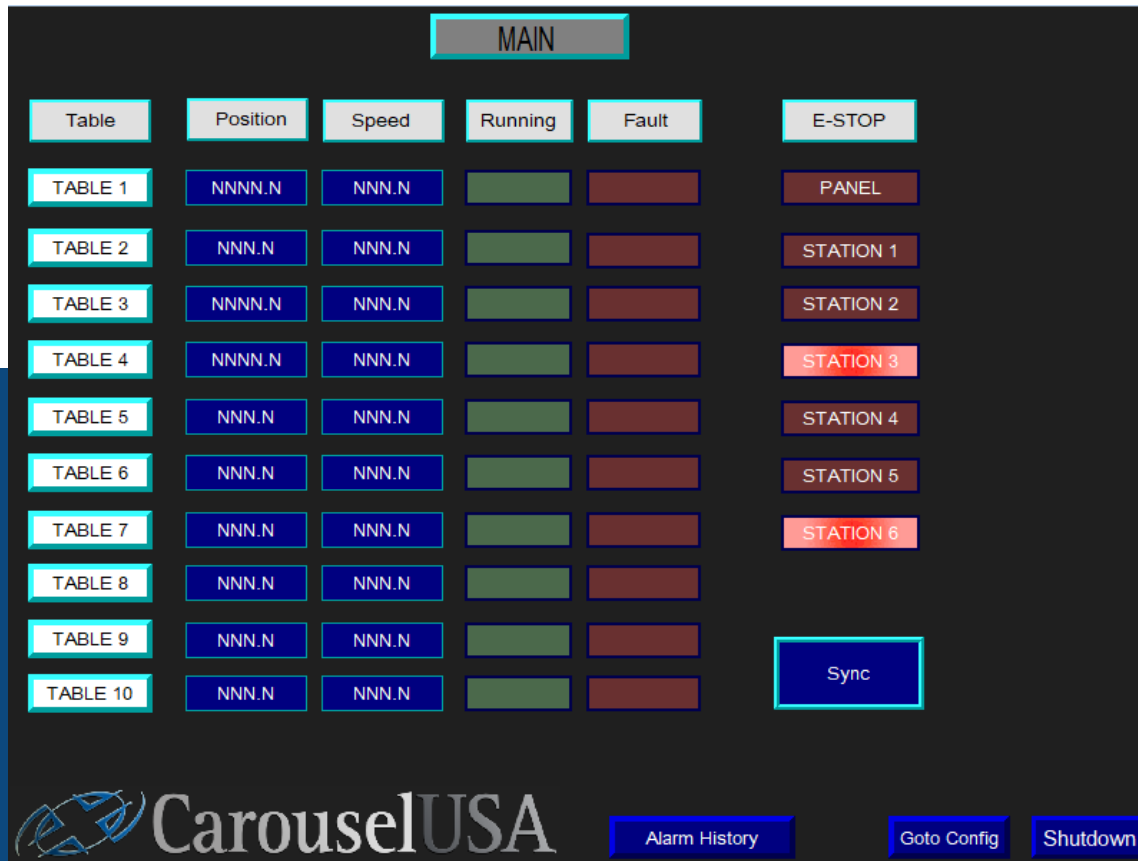


Figure 1: Main Control Page. Used to monitor the status of all turntables, their position, speed, running or stationary status, fault status, and e-stop status

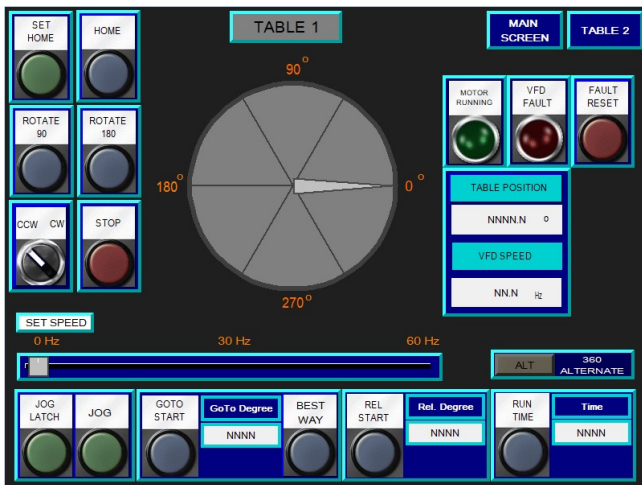


Figure 2: Individual Control Pages. Used to control each turntable individually, there are a total of ten screens, each dedicated to a different turntable. From here, each turntable can be commanded to jog in either direction, run to a customizable degree angle along the circle, run to a customizable degree angle from its current position, run for a customizable time, or run a full 360° and then back indefinitely. All of these run modes can be done a variable speeds.

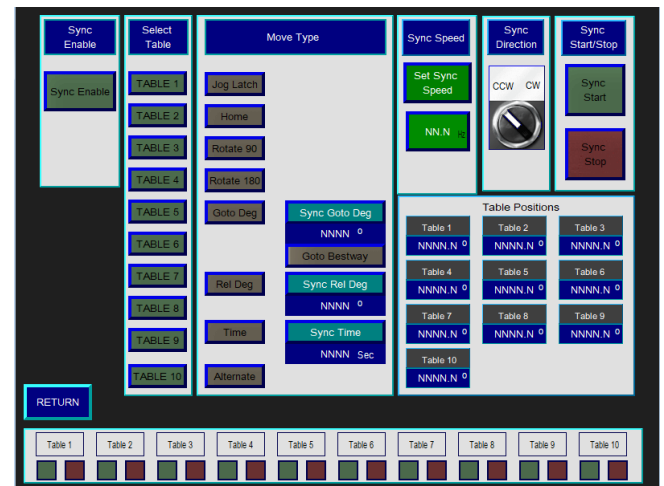


Figure 3: Synchronized Movement Page. This screen contains all the same movement types as the Individual Control Pages, but allows the user to select any/all turntables to execute the same movement simultaneously

DESIGN PROCESS:

In order to allow wireless iPad connectivity, we specifically sourced a large HMI touchscreen with VNC screen mirroring capabilities and networked it through an ethernet switch to a wireless access point with enough range to connect to an iPad in the showroom rather than the nearby control room. By using a wireless access point, we also avoided unnecessary networking with the client's internal IT network, making the iPads a plug-and-play solution specifically for our turntables.

IMPLEMENTATION:

During implementation, we realized that running all ten turntables (and therefore all ten variable frequency drives) simultaneously created too much heat in the control cabinet for the integrated exhaust fans in the drives themselves. To remedy this, we added a temperature-based relay that would activate an enclosure fan to cycle cold air into the bottom of the enclosure and hot air out of the top of the enclosure. We set the temperature of the relay to activate the fans when the enclosure rose above 85°F but allowed space for it to be lowered if necessary. During commissioning, it was also discovered that the control panel would be accessible to non-authorized users, therefore necessitating the addition of login access levels/passwords. This was implemented in such a way that a non-logged in user could only access the Main Monitoring Page but no other. In addition, we added a regular user access level, which could only control the turntable movement, and an admin access level, which could control turntable movement AND set new "HOME" or "0°" Positions for each turntable.

SUMMARY:

In conclusion, Carousel-USA was able to design an effective, secure control method for the client's showroom using sleek iPad control, seamlessly connected to the more sophisticated controls tucked away in a control room.