



Application Solutions Case Study: Cardiac Imaging Scanner

Featured Product – Whistle
WHI-1/60 & WHI-5/60 & Maestro



Machine Description:

The Cardiac Imaging System employs nuclear imaging techniques and innovative technologies to provide very high throughput and improve image resolution. It can complete a Gated SPECT study in only 2 minutes, which is a significant improvement over current technologies that require 12-20 minutes. This breakthrough in speed and image quality is due to the manufacturer's advanced technology which has the following features:

- Larger radiation collection angles and a unique scan pattern provide ten times more efficient photon collection, leading to improved count statistics and higher quality images.
- Novel design of scanning solid state detectors and unique reconstruction algorithms that improve resolution by up to a factor of two.
- Automation and personalization of acquisition.

Machine Design:

The machine consists of nine collimators placed on rotary axes that scan the target angularly.

A tenth axis moves the base of the nine collimators angularly to align them with the target body.

All scanning motion is internal in the machine, and invisible to the patient.



The Challenge:

When designing an application solution based on Elmo's products for the cardiac imaging system, we are faced with the following challenges:

- Moving all the heads and stabilizing them in a window of just 40 msec from the time that the computer issues a command for them to be at the next point where the image will be captured.
- The solution needs to be compact and space saving.
- The mechanical integration must take place in a tight machine space.
- Due to the space constraints, only minimal wiring can be used.
- Due to the medical environment and EMI issues, the solution must be compliant with the relevant EMI standards.

Elmo's Solution:

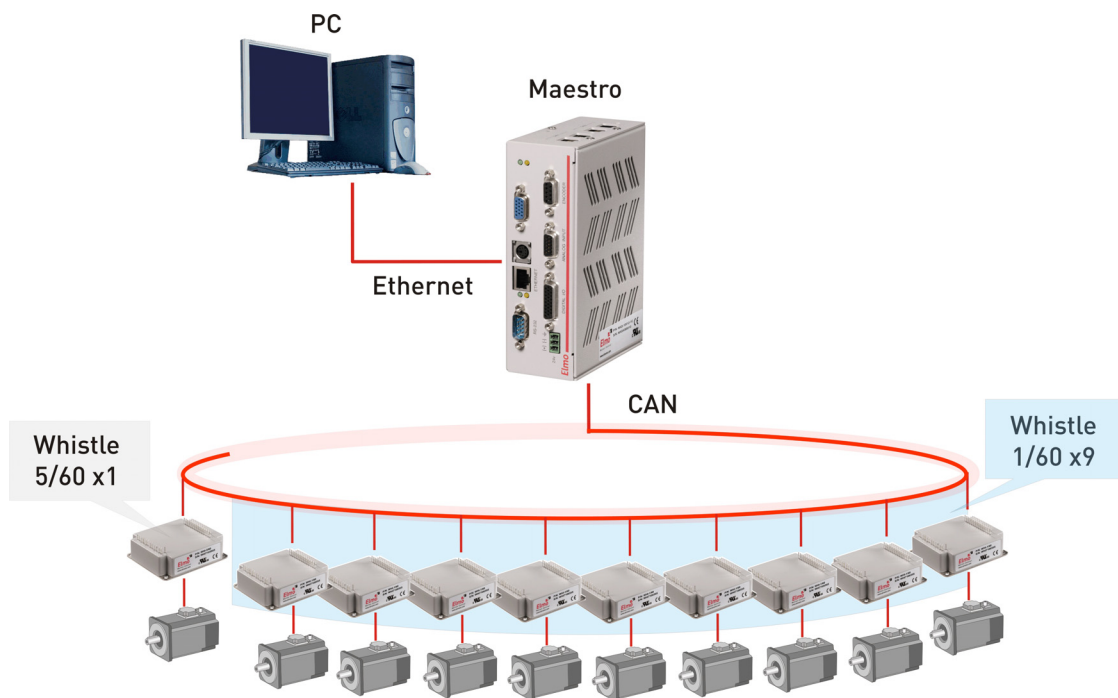
The compact nature of the cardiac imaging system requires compact electronics and a minimal amount of cabling. High performance drives designed with high power density that have a fast serial communication channel are an optimal fit.

The **Whistle** digital drive was chosen for this application, due to its compact size and ability to integrate within the constraints of the machine's interface.



Whistle
Intelligent Digital Servo Drive

- Nine WHI-1/60s were chosen to move the collimators' angular axes.
- One WHI-5/60 was chosen to move the collimators' base angular motion.
- A Maestro is used as the main controller to control the motion of all the axes. It communicates with the ten Whistles via CANopen communication.
- The cardiac imaging system's PC is used to issue commands to the Maestro using TCP/IP communication.



By using the Maestro, the manufacturer's engineers did not need to use the scanner's on-board processor to handle the CANopen communication or the motion control processes.

Elmo provides the service of supporting PCB interface boards that are designed by its customers, as well as designing custom interface boards when requested. In this case, the Whistle's interface board was designed by the manufacturer with the assistance of Elmo in order to match the machine's mechanical constraints. The interface board was then tested and approved by Elmo's engineers.

Why Elmo:

- There is very limited installation space, and Elmo's compact Whistle driver can fit in the machine's limited space.
- Elmo's high servo performance enables the machine to meet the high demands of the motion profile.
- The Whistle, like all of Elmo's drives, is compliant with medical EMI standards. Hence, an external filter is not required.
- The distributed communication requires a minimal amount of cabling, saving both space and costs.
- Elmo's Maestro motion solution was integrated quickly with the machine motion, and together with its advanced software this shortened the time to market.
- Elmo provided comprehensive support to the medical engineers who designed and built the cardiac imaging system.

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