

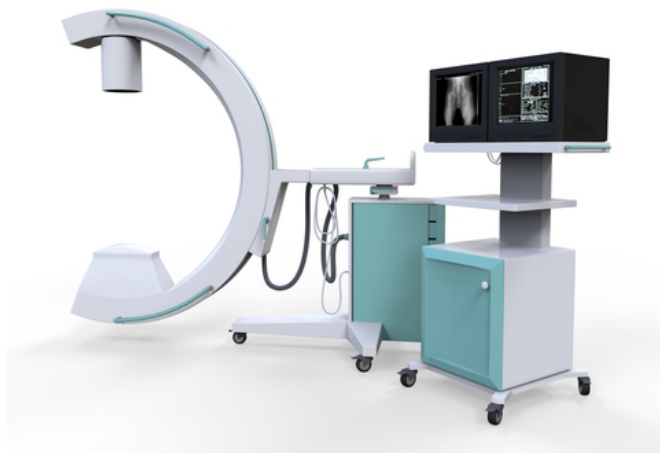
## C-Arm Medical Applications

### Elmo Motion Control Solution in Medicine

#### The Background

Used in fluoroscopic imaging during surgical, orthopedic, critical care and emergency care procedures, C-Arms have become a vital tool in advanced healthcare delivery. Precise control, immediate responsiveness and patient safety are paramount in the use of today's most advanced C-Arms.

Employing a counterbalanced, isocentric design that allows orbital rotation to provide virtually unlimited projection possibilities, the C-Arm moves about the patient under the direct control of the doctor. It maintains a constant distance between the imaging source (e.g., x-ray) and the body region being imaged. The central beam always remains in the isocenter saving procedure time and reducing dosage to the patient. The doctor operates the C-Arm in real-time via a console/foot-switch that controls all of its operating modes and movements.



#### Intensive Computer Processing

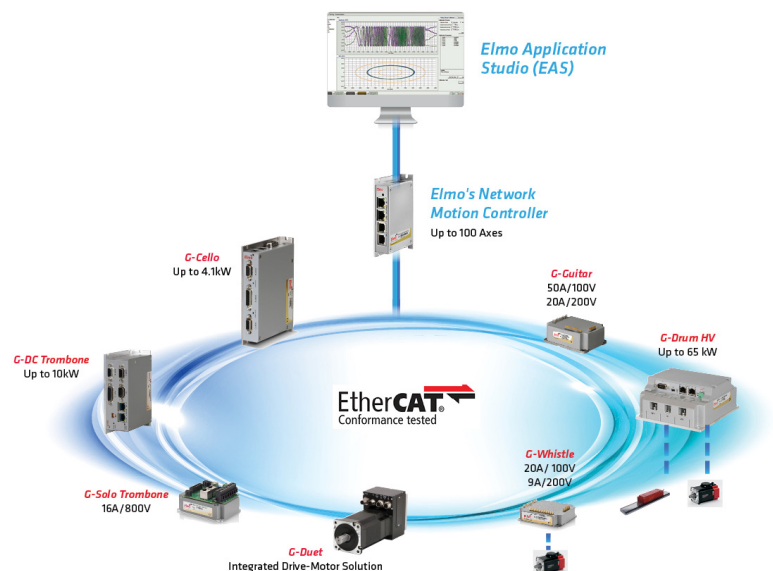
The C-Arm's motion is controlled by an intensive computer application that directly manages the C-Arm's movements in real time based on the doctor's inputs via the console. In addition to real-time motion control, other computer applications acquire, process and present high-resolution images that the doctor views while working. Computer-intensive rapid acquisition, processing and presentation of high resolution images enable the doctor to perform critical medical procedures at the highest level. However, providing a consistent stream of high-res images is encumbered by the demanding motion-control since the computer must also control, in real time, the numerous intricate movements of the C-Arm.

## Elmo's Solution

The Elmo closed-loop solution unburdens motion control from the computer application allowing it to devote its resources to rapid image acquisition, processing and presentation to the doctor. While all motion control commands to the C-Arm are streamed through the computer application, their numerous complex, real-time calculations are orchestrated by Elmo's Gold Maestro network controller.

Gold Maestro is the most advanced multi-axis network controller and works with any type of Elmo smart, robust and power-dense servo drive. Its distributed topology lends itself to an intelligent and modular design of the entire motion control system, enabling easy and seamless integration of the appropriate servo drive for each axis, providing the most accurate and responsive motion control. Under the supervision of Gold Maestro, the servo drives precisely control and monitor each and every motion of the C-Arm making the overall motion system extremely efficient while retaining a compact design.

The Elmo solution brings all the benefits of industrial experience and standards to the C-Arm. At the technical level, the computer is connected to the Gold Maestro via a standard Ethernet cable. The entire motion control network is comprised of nodes, each node a servo drive with a unique EtherCAT identity that can be closely controlled and monitored by the Gold Maestro.



## Advanced network-based motion control solutions

## Advantages of the Elmo Solution

- **Safety for the patient.** Elmo drives qualitatively power the motions of the C-Arm to the highest precision at any voltage so as to provide the doctor with the best operation and the patient with the lowest dosage during the procedure. Furthermore, all Elmo drives are designed with safe torque off (STO) for safe operation.
- **Accuracy.** Elmo's distributed solution lets each part of the C-Arm system perform at its optimum. The computer application can concentrate on imaging while Gold Maestro orchestrates the motion control network. Each Elmo servo drive controls its specific axis to the greatest precision.
- **Responsiveness.** With the highest density of power and intelligence, compactness and distributed technology, the Elmo distributed solution makes the C-Arm a very precise and responsive assistant.
- **Reliability.** Elmo drives deliver power and performance for years and years with exceptionally high MTBF.
- **Elegance with cost-effectiveness.** The Elmo solution constitutes a sleek, standards-oriented, minimalistic design for ease of implementation, operation, and upgradability.