



***AEROSPACE & DEFENSE DIVISION***



*Sensing  
a Better  
World*



## CST—Delivering Innovative Product Solutions

As our name implies, Custom Sensors & Technologies (CST) is your source for sensors, controls, and actuation products—whether you're in the transportation, industrial, or aerospace and defense markets. A global business unit of Schneider Electric, CST is comprised of the industry-leading brands of Crouzet, Kavlico, and Crydom, as well as the former divisions of BEI Technologies, including Newall and Sysstron Donner.

CST is headquartered in Moorpark, California, with operations worldwide. Our extensive R&D resources, market expertise, state-of-the-art manufacturing, customer service, and superior quality practices ensure that our products are always at the forefront of innovation. In short, our designs empower you to be more competitive in today's challenging markets.

Each CST brand has a track record of excellence. With the support of our nearly 4,500 dedicated employees, CST is your global powerhouse for high-volume, OEM, application-specific products.

So whether you need a customized pressure sensor for an automotive application, a micro-control for a breakthrough medical device, or perhaps a rudder position sensor for the next-generation jetliner, there's only one true choice—CST...continuously "Sensing A Better World".

# *Addressing the needs of the Aerospace & Defense marketplace*

Aerospace & defense markets demand highly-tailored solutions for specific mission and application needs. Often, this equipment is flight-critical hardware, necessitating the highest level of quality and reliability. Our customers require cutting-edge technology to achieve levels of performance unimaginable just a few years ago. CST's aerospace & defense products are recognized leaders worldwide. We have a track record of pioneering new technologies in the marketplace. Our more than 50-year heritage reflects the success of our endeavors. State-of-the-art production facilities and the highest quality certifications—teamed with an experienced staff in sales, design, engineering, production, and quality—ensure that CST sensors and systems meet the rigid standards established for these critical applications.

CST brands include:

**Crouzet** – limit switches, proximity sensors, electrical protection and detection equipment, and cockpit devices

**Kavlico** – position (LVDT & RVDT), force, and cockpit devices

**Systron Donner Inertial** – inertial sensors, IMUs and MEMS GPS/inertial navigation systems

**BEI Kimco Magnetics** – voice coil actuators and brushless DC motors

**BEI Duncan Electronics** – position sensors

**BEI Precision Systems & Space Company, Inc.** – encoders, optical scanners, and servo systems

At CST, we are committed to excellence in design and manufacturing. We offer the aerospace & defense industry the best sensors, controls, and systems available to the market—today and in the future. CST provides devices for commercial and military aircraft, missiles and launchers, satellite systems and spacecraft, guided munitions, UAVs and AGVs, military ships and submarines, night vision and electro-optical instrumentation, radar and tracking instruments, telescope mounts, and a host of military vehicles.

Our broad portfolio of products, long history in the aerospace & defense sectors as well as our global presence translate into CST's ability to provide the right product at the right price whether for a commercial airliner, a fighter jet, missile system, or military vehicle.





## APPLICATIONS

- > Inertial Sensors
  - Standby Altitude Indicators
  - Flight Control Systems
  - Attitude Heading & Reference Systems
  - GPS/INS Systems & IMUs
- > Position Sensors (LVDT/RVDT & Potentiometric)
  - Flight Control Actuators
  - Nose Wheel Steering Systems
  - Cockpit Control Systems
  - Engine Bleed Systems
  - Fly-by-Wire Systems
  - Cabin Controls
- > Limit Switches & Proximity Sensors
  - Thrust Reverser Systems
  - Landing Gear Systems
  - Cargo Loading Systems
  - Door Position Sensing
- > Circuit Breakers & Arc Fault Detectors
  - Electrical Circuit Protection & Detection
- > Cockpit Controls
  - Spoiler Control Levers
  - Nose Wheel Steering Handles
  - Grips & Controls
- > Force Sensors for Cockpit Control Systems

## Commercial Aircraft

CST sensors and systems have accumulated millions of hours of service on a broad spectrum of commercial aircraft. From commercial airliners to business jets, CST services aeronautic requirements for nearly every western aircraft flying today as well as all major European aerospace companies. This global presence confirms CST's place as the world's premier supplier for our diverse line of products.

Products currently used in the commercial aviation sector include position sensors (LVDT & RVDT), limit switches, proximity sensors, rate of rotation and inertial measurement sensors, electrical protection devices (circuit breakers, arc fault circuit breakers, and ground fault interruptors), cockpit controls (grips, push buttons, levers, tillers, and sticks), as well as force and pressure sensors.



# Providing sensors and controls for complete aircraft systems



This wide range of products has been adapted to fit the unique application specifications found on the following airline platforms.

<b>Airbus</b>	A300, A310, A318, A319, A320, A321, A330, A340, A340 COMB1, A340-500/600, A380
<b>ATR</b>	42, 72
<b>AVAC</b>	ARJ21
<b>BAE</b>	146
<b>Boeing</b>	717, 727, 737, 747, 757, 767, 777, 787, Boeing business jets
<b>Bombardier</b>	Global Express, Global 5000, CRJ-100/200/700/900, Dash 8, Challenger 300, CL-601/604
<b>CASA</b>	CN235, C212
<b>Dassault</b>	Falcon 50, 900, 900 EX, 2000, 2000 EX, F7X
<b>Dornier</b>	DO 228, DO 328, DO 728
<b>Eclipse</b>	500
<b>Embraer</b>	ERJ 135/145/170/175/190/195, Phenom 100/300
<b>Fokker</b>	50, 70, 100
<b>Gulfstream</b>	G200, G450, G500
<b>Lockheed Martin</b>	L1011
<b>McDonnell Douglas</b>	MD-11, MD-80, DC9, DC-10
<b>NAL</b>	SARAS
<b>Pilatus</b>	PC-7, PC-9, PC-12
<b>Raytheon</b>	Hawker Hoizon
<b>Sino Swearigen</b>	SJ-130

At CST, providing sensors and controls for a complete aircraft system is our business. Our resource base allows us to coordinate rapid design and prototyping, provide certification, qualification testing, reports, and documentation—then transition quickly to production hardware providing full customer support which includes troubleshooting, and AOG service.





# Military Aircraft

The market for military avionics equipment requires application-based solutions with high precision, reliability and performance. Once again...CST is the source for advanced technology, high reliability, innovative motion control components, sensors, and systems. With over five decades of experience and our broad scope of products, we provide customers with a unique approach in developing mission critical components that meet the exacting standards and specification criteria for long-range programs.

CST products manufactured for military aircraft include position sensors (LVDT & RVDT), limit switches, rate of rotation sensors, inertial measurement units, electrical protection devices (circuit breakers and arc fault detectors), cockpit controls (grips, push buttons, levers, tillers, and sticks), accelerometers, optical encoders, and infrared scanners.

CST products for military aircraft are installed and operating on the following platforms.

## APPLICATIONS

- > Inertial Sensors
  - Flight Control Systems
  - Electro-Optical Infrared Stabilization
  - Airborne reconnaissance Image Stabilization
  - Fatigue Monitoring Systems
  - Flight Test Instrumentation
- > Optical Encoders
  - Electro-Optical Tracking Systems
  - Infrared Scanner Systems
- > Grips & Controls for Cockpit Control Systems
- > Limit Switches for Canopy Latch Systems
- > Circuit Breakers for Electrical Circuit Protection
- > Position Sensors (RVDT/LVDT)
  - Flight Control Actuators
  - Nose Wheel Steering Systems
  - Cockpit Control Systems
  - Engine Bleed Air Systems
  - Fly-by-Wire Systems



### Fighters & Reconnaissance

F-111 Aardvark, F-4 Phantom 2, F-14 Tomcat, F-15 Eagle, F-15E Strike Eagle, F-16 Falcon, F-18 Hornet, F-22 Raptor, F-35 JSF, U2, TR1, SR-71, EFA, JAS-29, X45, Predator, Eagle Eye, Tornado, Rafale, Mirage F1, JAS 39 Gripen, EFA Eurofighter

### Bombers & Attack

B1 Lancer, B2 Stealth Bomber, B52 Stratofortress, A4 Skyhawk, A6 Intruder, A7 Corsair, A10 Warthog

### Special Purpose

C5 and 5A/B Galaxy, C-130 Hercules, C-141 Starlifter, C-5A, C-17 Globemaster, AV-8B Sea Harrier, S-3A Viking, P-3 and 3C Orion, KC-10 Extender, T-45 Goshawk, T-6 Texan JPATS

Whether for a jet fighter or reconnaissance plane, bomber, attack or special purpose aircraft...CST delivers.

CST's production capabilities are unrivaled, allowing us to support large programs. In fact, CST is the single largest source for aerospace sensors in the world. Our sophisticated quality practices and standards dictate that we concentrate on defect prevention rather than detection ensuring that the products we ship meet the customized standards specified during the design, prototype, and qualification stages of each project.



# Missiles and Guided Projectiles

In this segment of the defense market, systems and controls only have one opportunity to function correctly. There is no margin of error permitted. And again, CST devices are selected to perform reliably and with the best accuracy for these sensitive warfare applications.

**Our inertial sensors, position sensors, and actuators are found on the Sidewinder, JCM, THAAD, AAGRM, NLOS, MX Peacekeeper, Trident, Poseidon, LOSAT, Predator, Maverick, ITALD, and Titan missile systems.**

## APPLICATIONS

- > Inertial Sensors
  - Seeker Stabilization
  - Launcher Platform Stabilization
  - Flight Control Systems
  - Guidance, Navigation & Control
- > Voice Coil Actuators for Seeker Stabilization
- > Optical Encoders for Precision Guidance Projectile Kits
- > Position Sensors for Missile Fin Control



## APPLICATIONS

- > Inertial Sensors
  - Autopilot Systems
  - Fire Control System Stabilization
  - Flight Control Systems
- > Grips & Controls for Cockpit Control Systems
- > Position Sensors (LVDT/RVDT & Potentiometric)
  - Flight Control
  - Fuel Control Systems
  - Valves
  - Cockpit Controls
  - Engine Bleed Air
  - Fly-by-Wire Systems
  - Rotor Tilt
  - Tail Position
- > Circuit Breaker Panels for Electrical Protection
- > Limit Switches
  - Tail Folding



## Helicopters

CST addresses this segment of the market with the same dedication to quality and performance as its fixed wing counterparts. No matter the mission...CST sensors and systems are configured to meet the challenge. Easily integratable, our products operate on both commercial and military rotorcraft where safety and reliability are crucial elements of our design standards.

CST supplies inertial sensors, electrical protection devices, limit switches, cockpit control equipment, position sensors, and accelerometers for numerous critical flight control applications.

Presently, our products are employed on the following platforms:

<b>Agusta-Westland</b>	A109P, A119, A129, AB139, EH101
<b>Bell</b>	CH146, 412, 427, 430, H-1
<b>Boeing</b>	AH-64, V-22
<b>Denel</b>	Roojvalk
<b>Eurocopter</b>	Super Puma AS332 and AS225, Cougar AS532 and EC725, Gazelle, Ecureuil AS 350, AS 355, and EC130, Fennec AS550 and AS555, Panther AS565, EC120, EC135, EC145, EC155, EC165, EC175, EC365, EC635, NH 90 and NH 90 Marine, Tiger
<b>Hindustan Aeronautics</b>	ALH, Cheetah
<b>Sikorsky</b>	CH53, UH-60

When the mission calls for troop transport, combat support, cargo transfer, search and rescue, medivac service, or law enforcement surveillance functions...CST is there with products that make the difference.





*Playing a key role in flight control stabilization and navigation*



Images by: Werner Kuster / Photostock.com

## Autonomously Guided Vehicles (AGVs)

AGVs/UAVs are playing an increasing role in intelligence surveillance and reconnaissance missions and will have a significant impact upon future operational activities. Whether expendable or recoverable, remotely piloted or autonomous flyers, AGVs/UAVs provide a wealth of information without putting a crew into harms way. Understanding the complexities of these unmanned systems is a function of CST's partnership with those who design and manufacture these systems for military use. CST's inertial and position sensors play a key role in flight control stabilization and navigation for many of these vehicles and anticipates increased activity in this area as more applications are undertaken to exploit the use of these vehicles.

### APPLICATIONS

- > Inertial Sensors
  - Flight Control Systems
  - GPS Navigation Systems
  - Instrumentation & Payload Systems
  - Electro-Optical Infrared Stabilization
  - Hyper Spectral Imaging Systems
  - UAV Turret Stabilization
- > Position Sensors (RVDT)
  - Flight Control Systems

<b>Naval Research Laboratory (NRL)</b>	Finder
<b>EMT</b>	Luna
<b>Northrop Grumman</b>	BQN 34 Aerial Target
<b>Thales UK</b>	Hermes
<b>General Atomics</b>	Predator
<b>Geneva Aerospace</b>	Dakota
<b>Galileo Avionica</b>	Falco
<b>AAI Corporation</b>	Shadow
<b>Bell Helicopter (BHTI)</b>	Eagle Eye
<b>Boeing</b>	X45 UCAV
<b>Northrop Grumman</b>	X47



# Military Vehicles

In addition to avionics, CST designs and manufactures sensors and control devices for ground vehicles such as tanks and armored personnel carriers. These non-airborne applications also require products that can withstand the rigors of extreme environments and working conditions. At CST, we partner with you to develop products that function in this arena, meeting your specification parameters while maintaining, quality, reliability and performance in cost effective configurations.

CST Products found on ground vehicles include inertial and position sensors, optical encoders, and infrared scanners.

Our devices are currently utilized on the following programs.

Tanks	Bradley, Avenger, Linebacker, M1A2, Korean K1, Canadian Reece, Swedish CV-90, Challenger, Breacher, GKN Warrior, AARM Missile, LAVIII, Paladin, Stryker
Specialty Vehicles	Patriot Missile Launcher, Flying Tiger Keots System, AAV Amphibious Assault Vehicle

## APPLICATIONS

- > Inertial Sensors for Target Acquisition Platform Stabilization
- > Encoders
  - Tank Turret Gun Position Systems
  - Missile Launcher Systems
  - Vehicle Odometer Sensing Systems
  - Target Acquisition Systems
- > Ring Torquer Motor for Target Acquisition Platform Stabilization
- > Infrared Viewer Scanner Systems
- > Position Sensors (LVDT & RVDT)
  - Drive Control Systems



*Offering an  
unequalled heritage  
of capabilities*

## Spacecraft

Over 90% of the optical encoders currently flying in space-related programs today have been designed and manufactured by CST. Products supplied do not include just encoders, but inertial sensors, position sensors, and servo systems. This unequalled heritage validates our extensive range of capabilities in support of these one-of-a-kind opportunities that exist in space programs.

CST has supplied products for the following programs.

<b>Satellites</b>	DMPS, SBIRS, COMETS, SeaWiifs, TRMM, UARS, ERBE, XTE, GOES, Hubble, MARS, Observer, ADEOS, LANDSAT, CRISM, VIIRS
<b>Rockets</b>	Ariane
<b>Space Vehicles</b>	Space Shuttle, Gemini, Apollo, Space Station



### APPLICATIONS

- > Encoders
  - Manipulator Arm Systems
  - Instrument Position Servo Systems
  - Antenna Positioning
- > Inertial Sensors for Satellite Flight Control
- > Scanners
  - Infrared Systems
  - Radiometer Mirror Systems
- > Servos for Optical Telescope Positioning Systems
- > Position Sensors (LVDT)
  - Propulsion





## APPLICATIONS

- > Optical Encoders
  - Radar – Azimuth & Elevation Control
  - Ground Based Range Tracking – Azimuth & Elevation Control
- > Optical Displacement Sensors for Antenna Structural Measurement

# Radar and Optical Tracking

Radar and optical trackers are important systems for detection and position monitoring of a wide array of aircraft, missiles and spacecraft activities. Radar systems are utilized to obtain and track aircraft and missiles in close proximity. Optical trackers are utilized for tracking of spacecraft launches and orbiting satellites.

These highly sophisticated systems are designed to report on the positions of objects in the skies and in space. Their performance requires precision and accuracy in the position sensors which monitor their azimuth and elevation. BEI developed the first optical encoder to provide increased resolution and accuracy to the positioning of radar systems. BEI's encoders are the standard in the pointing and tracking world for both precision and reliability for radar and optical tracking systems. Our optical encoders can be found on both ground-based and space-based tracking systems and incorporate advanced technology, that has passed the rigorous engineering and system design challenges of these systems.



## *Functioning in strategic applications*



### **APPLICATIONS**

- > Optical Encoders
  - Torpedo Loading Systems
  - Throttle Control
  - Missile Launch Control
  - Radar Azimuth & Elevation Control
- > Position Sensors (RVDT & LVDT)
  - Valve Control
- > Inertial Sensors
  - Antenna Stabilization

## *Ships*

CST...servicing the air, land, and sea. Our shipboard applications require our products to operate in severe service conditions, where salt-spray and other environmental factors play a key role in the operational lifecycle of our devices. Designed to perform...CST products function in strategic applications on submarines, aircraft carriers, tankers, and even recreational seagoing craft.

Our optical encoders and position sensors control critical positioning systems for a variety of shipboard applications.

# *A Look Into Our Future...*

Our mission within the Aerospace & Defense Division is to ensure a steady stream of new and improved products that meet the future needs of our customers. We are investing in new product developments and performance enhancements in each of our operations. Here are just a few of the exciting innovations the operations of CST will be launching in the near future...

## **Crouzet High Spec Sensors**

- New plastic grips and control wheels, sophisticated buttons and joysticks
- Arc fault circuit breakers and solid state power controllers featuring DO-178B and DO-254 certification
- Second generation intelligent FPGA based proximity sensors

## **Kavlico Aerospace**

- Cockpit control offerings including tillers, spoiler control levers, landing gear levers and throttles

## **Systron Donner Inertial**

- Advanced feature sets for MEMS GPS/inertial navigation systems including magnetic heading and air data aiding, vertical gyro and AHRS output
- Enhanced accuracy MEMS based inertial rate sensors and inertial measurement units for higher performance inertial systems

## **BEI Kimco Magnetics/BEI Duncan Electronics**

- New high RPM non-contact torque sensor for helicopter and aerospace transmission applications

## **BEI Precision Systems & Space Company, Inc.**

- New standardized rotary and linear optical encoders for military platforms such as tanks, missiles, fighter aircraft, and guided tactical munitions
- New linear gap displacement sensor for demanding aerospace engine monitoring

**If you have interest in any of the above technologies and product developments, please contact our CST operations directly or visit us at [www.cstsensors.com](http://www.cstsensors.com).**





# CST Operations



## **CROUZET**

2 rue du Docteur Abel BP 59  
26902 Valence Cedex 9  
France  
+33 (0)4 75 44 88 44  
[www.crouzet.com](http://www.crouzet.com)

### **Product Description:**

*Position sensors, micro-switches, micro-controls, motors & actuators, limit switches, solid state relays, cockpit equipment, electrical protection devices for the transportation, industrial and aerospace markets*



## **BEI KIMCO MAGNETICS**

2470 Coral St., Bldg. D  
Vista, CA 92081  
(800) 572-7560  
[www.beikimco.com](http://www.beikimco.com)

### **Product Description:**

*Voice coil actuators and brushless DC motors for the industrial and aerospace markets*



## **KAVLICO**

14401 Princeton Avenue  
Moorpark, CA 93021  
(805) 523-2000  
[www.kavlico.com](http://www.kavlico.com)

### **Product Description:**

*Pressure, position (LVDT & RVDT), force, level, tilt, media quality, and other specialty sensors, transducers, transmitters and devices for the transportation, industrial and aerospace markets*



## **BEI DUNCAN ELECTRONICS**

170 Technology Drive  
Irvine, CA 92618  
(949) 341-9500  
[www.beiduncan.com](http://www.beiduncan.com)

### **Product Description:**

*Position sensors for the transportation, industrial and aerospace markets*



## **SYSTRON DONNER INERTIAL**

2700 Systron Drive  
Concord, CA 94518  
(925) 979-4400  
[www.systron.com](http://www.systron.com)

### **Product Description:**

*Inertial sensors, IMUs and navigation systems for the aerospace market*



## **BEI PRECISION SYSTEMS & SPACE COMPANY, INC.**

1100 Murphy Drive  
Maumelle, AR 72113  
(501) 851-4000  
[www.beiprecision.com](http://www.beiprecision.com)

### **Product Description:**

*Encoders and servo systems for the aerospace market*



14401 Princeton Avenue  
Moorpark, CA 93021

Tel: (805) 552-3599  
Fax: (805) 552-3577  
E-Mail: [info@cstsensors.com](mailto:info@cstsensors.com)  
Web: [www.cstsensors.com](http://www.cstsensors.com)