

CEDRAT TECHNOLOGIES (CTEC) actuators, sensors and electronics for Air, Space & Defence (ASD) can be found in optic instruments, embedded cameras, telescopes,... inside airplanes, helicopters, missiles, unmanned micro aerial vehicles (MAV), satellites, nanosat, spacecraft, ... to address following mechatronic functions & applications:

- Compact and dynamic actuation
- Precise positioning
- Sensing and detection

CTEC has been involved for 20 years in a multiple space missions and aircraft/defence applications and has reached the required standards and recurrent production for several customized products. These customized solutions are especially designed to withstand severe environment (vibrations, shocks, vacuum, humidity, wide thermal range including cryogenic) in partnership with customers. They have to be extremely reliable. Following this approach, more than 5 000 piezoelectric or magnetic actuators from CTEC have been delivered and are successfully used in operations in ASD fields.

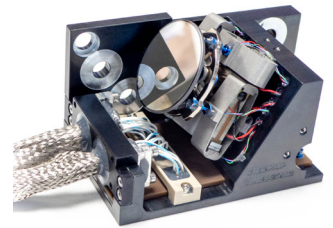
Because of their double space & optronic heritage, offering both high performance & cost effective, CTEC products are relevant solutions for New Space business : In particular, they can cover FSM and PAM functions as requested in constellations performing optical communication (FSO).

For example [the table below \(page 2\)](#) shows the Aerospace & Defence Heritage of CTEC piezoelectric and electro-magnetic actuators, at different stage of qualification, with a variety of customers and functions.

To learn more about functions & applications of CTEC mechatronic components and systems for Aerospace & Defence see our [related publications](#).



Rosetta



CTEC DTT60S-SG with a SiC mirror Point Ahead Mechanism (PAM30)



CTEC Scan Mechanism Motor Engineering Model (MTG)





THALES



CSEM



MISSION	CUSTOMER	CURRENT STATUS	PRODUCTS	FUNCTION
Rosetta / Midas	ESA/ESTEC SCI SO (NL)	✈ Flying (Feb. 2004)	Piezo Stage XYZ	AFM scanning mechanism
ISS / ACES / Pharao / MEF	EADS SODERN (F)	Flight model delivered (2006)	Piezo Tilt DTT35XS	Pointing mechanism for laser
ISS / ACES / Pharao / LCE	EADS SODERN (F)	Flight model delivered (2006)	Piezo Actuator PPA10M-SG	Laser Extended cavity control
GOCE	AMPAC-ISP	Engineering model delivered	Piezo Actuator APA200M	Cold gas Micro propulsion
ADM-Aeolous / Aladin / TXA	Selex Galileo (IT)	✈ Flight model delivered (2007)	Piezo Actuator HPPA	Laser Extended cavity control
FOTON M3 / DIMAC	Redshift (BE)	✈ Flying (Sept.2007)	Piezo Actuator APA	Free floating mass repositioning
LISA-PF / LMU / OPDA	Oerlikon Space (CH)	✈ Flying (Dec. 2016)	Piezo X Stage	Optical delay line
PICARD / SODISM / SMP	CNRS Aeronomie (F)	✈ Flying (June 2010)	Piezo actuator PPA40M-SG	Telescop Fine Steering Mirror
MARS-MSL / CHEMIN	NASA-JPL (USA)	Engineering model delivered	Piezo actuator APA120S	Powder shaker for X-ray analysis
MARS-MSL / SAM	NASA-GSFC (USA)	✈ Flying on board Curiosity (Nov. 2011)	Piezo actuator APA100M-NM-TW	Piezoelectric sieving
SWARM / Magnetometer	CEA-LETI (F)	✈ Flying (Nov. 2013)	Piezo motor RSPA	Laser Fiber Extension control
LISA / PAAM	TNO (NL)	Model delivered	Piezo actuator PPA40M	Fine Steering Mirror
ISS / MISSE7	Univ of Florida (USA)	✈ Flying (Nov. 2009)	Piezo actuator APA50XS-TW	Reciprocating tribometer
EARTHCARE / ATLID / TXA	Selex Galileo (IT)	Qualified model delivered	Piezo Actuator HPPA	Laser Extended cavity control
EARTHCARE / ATLID / BSA	AIRBUS SODERN (F)	Flight model delivered	Piezo Tilt DTT60S-SG	Laser Beam steering of the lidar
TARANIS	CNES	Flight model delivered	Electromagnet pin puller BRUCE	Hold Down & Release Mechanism
MTG / FCI / EWM	SENER (SP)	Breadboard model delivered	Limited Angle Torque Actuator	Large Angle Scan mechanism
MTG / SCA / FCI-IRS N / S and E / W motors	SENER (SP)	Flight models delivered	Magnetic Rotating Voice Coil Motor	Large Angle Scan mechanism
EChO	ESA/ESTEC (NL)	Breadboard model delivered	Piezo Cryo Fine Steering Mirror	Telescop Fine Steering Mirror
MTG / IRS / CCM	CSEM (CH)	Flight model delivered	Magnetic Linear Voice Coil Actuator	Corner cube actuation
IASI / MV3 / CCM	CSEM (CH)	Flight model delivered	Magnetic Linear Voice Coil Actuator	Corner cube actuation
TRP LAFP	CSEM (CH)	Engineering model delivered	Cryo Large Angle Rotating Voice Coil Actuator	Large Angle Scan mechanism
SIFTI	CNES (F)	Engineering model delivered	Piezo tilt incl. ECS	Highly Dynamic & High Precision Scan Mechanism

MISSION	CUSTOMER	CURRENT STATUS	PRODUCTS	FUNCTION
Aircraft SHM	AIRBUS (F)	FP6 / FP7 AISHA I & II completed projects (2009, 2012)	LWSD45-2	Acoustic SHM & Pulse-echo SHM
Helicopter SHM	ONERA (F)	Product delivered (2013)	LWSD45-2	Pulse-echo SHM
Aircraft SHM	ENSAM (F)	H2020 ReMAP Eu projects (2019, 2022)	LWSD v2	Acoustic SHM & Pitch-Catch Pulse-echo SHM
Aeronautic	ONERA	Breadboard model wind tunnel tested	APA500L-CFRP Carbon Fiber Reinforced Polym.	Active Flap for BVI noise cancellation
Aeronautic	Aeronautic institute	Breadboard model delivered	APA1000L	Active Flap for BVI noise cancellation
Aeronautic	Helicopter manufacturer	Breadboard model rotor tested	APA1000XL	Active Flap for BVI noise cancellation
Defence Optronic	Confidential	Recurring production	Piezo XY Stage	Image enhancement
Defence Optronic	Confidential	Recurring production	Piezo X Stage	Image enhancement
Defence Optronic	Confidential	Qualified model delivered	Piezo linear motor Stage	Auto Focus
Defence Optronic	Confidential	Recurring production	Piezo Tilt Stage	Field tracking compensation
Defence Optronic	Confidential	Recurring production	Piezo FSM Stage + controller	Image Stabilisation
Defence Optronic	Confidential	Qualified model delivered	Piezo XY Stage + controller	Image Stabilisation
Beta-Pictoris with a 3U nano-sat (PicSat)	LESIA - OBSPM (FR)	Flying (PicSat not responding since Mars 2018)	Piezo XY Stage XY400M	Fine pointing mechanism for optical fiber
PSYCHE / DSOC / PAM30	L3-HARRIS Technologies	 Flight Models	Piezo Tip Tilt DTT60S-SG with a SiC mirror	Point Ahead Mechanism for Deep Space Optical Communication
Space Meteo Satellite	Confidential	 Flight Models	Piezo Tip Tilt DTT60S-NM-SG with a SiC mirror	Beam Steering Mirror for LIDAR
Space Meteo Satellite	Confidential	Engineering Model	Piezo XY stage	Microscanning
TRP Hydrogen Compressor	ESA/ESTEC	BreadBoard Model	Joules Thomson Compressor	Hydrogen Liquefyer for Zero Boil Off 20K Cryogenic Storage