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QUALIFICATION OF A NOVEL STAR TRACKER BASED ON APS DETECTOR PAVES THE WAY  
TO A NEW ERA IN THE SPACECRAFTS' ATTITUDE CONTROL

**Abstract**

SELEX Galileo started early in 2002 the activities aimed to develop a novel Star Tracker based on an APS (CMOS) detector, being convinced that the use of this technology allows for lower cost, reduced mass and size, when compared to CCD based star tracker versions, combined with a significant burst in tolerance to harsh radiation environment.

First activities have been done within an ESA contract dedicated to the development of a Demonstration Model (DM), to secure the technology for the future Bepi Colombo ESA mission to the planet Mercury. This contract showed the feasibility of a compact, light and simple star tracker based on APS detector. As a follow on, SELEX Galileo was awarded another contract from ESA, devoted to the realization of a Flight Configuration Model (FCM) of the Bepi Colombo sensor, to be flown as an experiment on the PROBA-2 satellite, currently scheduled for a launch within mid April 2009. In the frame of this contract the sensor design has been refurbished replacing the former STAR1000 APS detector with the state-of-the-art and more performing "High Accuracy Star-tracker" (HAS) APS detector.

In July 2008 SELEX Galileo has completed the development and on-ground qualification of an APS based star tracker, called AA-STR, dedicated to the ALPHABUS platform Product line for GEO Satellite Telecommunication (TLC) applications. The AA-STR sensor configuration for ALPHABUS is based on the HAS APS detector and has several characteristics in common with the sensor configuration which is on board PROBA-2.

The AA-STR sensor product, although it was initially developed for a GEO Telecommunication spacecraft, has demonstrated a large flexibility and, even if it was presented on the market quite recently, has already found applications in Scientific (Bepi Colombo - ESA, Astro-G - JAXA), Earth Observation (PRISMA) and other Commercial programs.

The AA-STR EQM and the HAS APS detector have been subjected to a full qualification/evaluation program, including electrical, functional, performance and environmental tests. The sensor has demonstrated its ability to achieve the design goals both in terms of performance and survivability.

In this paper is reported an overall description of the AA-STR, together with the main results obtained from its qualification campaign.