CS GROUP'S ESPACE BUSINESS UNIT

OREKIT FLIGHT DYNAMICS SYSTEM
FOR ANY TYPES OF SATELLITES AND CONSTELLATIONS

Thanks to its long-term experience in Flight Dynamics Systems (FDS) and taking into account the New Space requirements (faster development, simpler deployment and cost reduction), CS GROUP is developing OREFLIDS, a turnkey generic multi-satellites product to be used as the core of FDS for any type of mission (LEO, GEO, nanosatellites, multi-satellites, constellation, etc.).

OreFLIDS

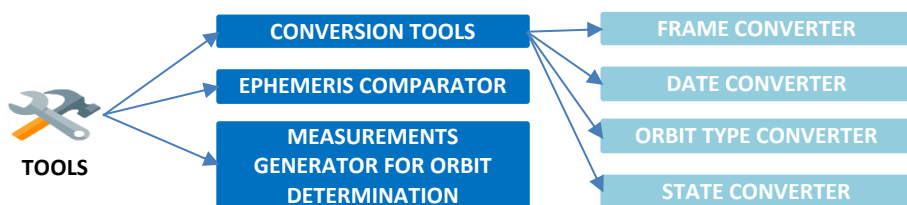**Product from**
GOSMIC
BY CS GROUP

CS GROUP FLIGHT DYNAMICS SYSTEMS TEAMS HAVE BEEN DEVELOPING FLIGHT DYNAMICS SYSTEMS FOR MORE THAN 40 YEARS, FROM DESIGN PHASE TO OPERATIONAL DEPLOYMENT.
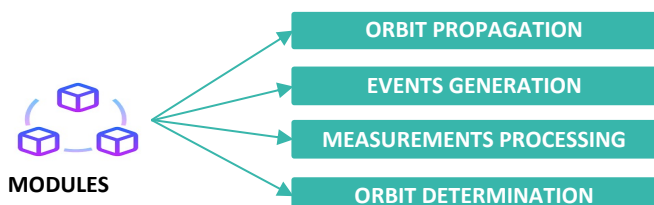
OREFLIDS OVERVIEW

OreFLIDS provides both a set of generic Flight Dynamic Algorithms that can be configured for any mission and an infrastructure to support them. That infrastructure is designed to allow an easy integration of external flight dynamic algorithms. Main services are:

✔ **Tools services**

TOOLS

CONVERSION TOOLS	→	FRAME CONVERTER
EPHEMERIS COMPARATOR		DATE CONVERTER
MEASUREMENTS GENERATOR FOR ORBIT DETERMINATION		ORBIT TYPE CONVERTER
		STATE CONVERTER

✔ **Generic flight dyamic algorithms configurable for any mission**

MODULES

- ORBIT PROPAGATION
- EVENTS GENERATION
- MEASUREMENTS PROCESSING
- ORBIT DETERMINATION

✔ **Import, export and processing of files in CCSDS format**

✔ **Interfacing with any kind of visualization tools**

OREFLIDS FLIGHT DYNAMICS MODULES

ORBIT PROPAGATION
- Used to propagate the orbit and covariance of any spacecraft
- Analytical and numerical propagation are available

EVENT GENERATION
- Used to compute chosen events over a time span in order to produce a timeline
- Typical events: orbital, geographic, station, instrument

MEASUREMENTS PROCESSING
- Sort input measurement files according to flyovers and measurement type
- Filter measurements using user defined selection rules

ORBIT DETERMINATION
- Used to estimate orbit and maneuver parameters from measurement files (CCSDS OEM and TDM files natively, but extendable to other formats as needed)
- OD processes batches of measurements (i.e. it is not a KALMAN filter)

OREFLIDS A POWERFUL OPERABLE SOLUTION

ADAPTABLE
- To every kind of space missions

MULTI-SATELLITES
- Management from one satellite to > 1000 satellites

POWERFUL OPERABLE SOLUTION
- Highly automatable
- Efficient Data management
- Errors & warnings management
- Redundancy solutions
- Secure multiple accesses
- Docker solution architecture for easy and large deployment

USER CENTRIC
- User-friendly interfaces and instinctive workflows accessible to non-expert users

COST EFFICIENT / FLIGHT PROVEN
- Based on open-source products

KEY POINTS
- ✓ CS GROUP recognized expertise in Flight Dynamics
- ✓ Customize solution for any type of mission
- ✓ Innovative solution
- ✓ Compatible with CS NANO solution for Ground Segment Solution

TECHNOLOGIES

Micro service — REST API — Orekit — Java
HTML CSS JS — spring Framework — HIPPARCHUS — docker
— fluentd — kubernetes —

OREFLIDS INTEGRATION WITH CS NANO PRODUCT

- **OREFLIDS** is designed to easily integrate **CS NANO**, the **CS GROUP** Ground segment solution for nanosatellites and constellations.

- **CS NANO** is extensible (possibility to add components), scalable (Distributed Architecture, services & components oriented), adapted to NEWSPACE constraints (Constellations, Nanosats/cubesats, Electrical Propulsion, etc.).

CS NANO

ADEME
Agence de l'Environnement et de la Maîtrise de l'Énergie

INVESTISSEMENTS D'AVENIR

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CS GROUP