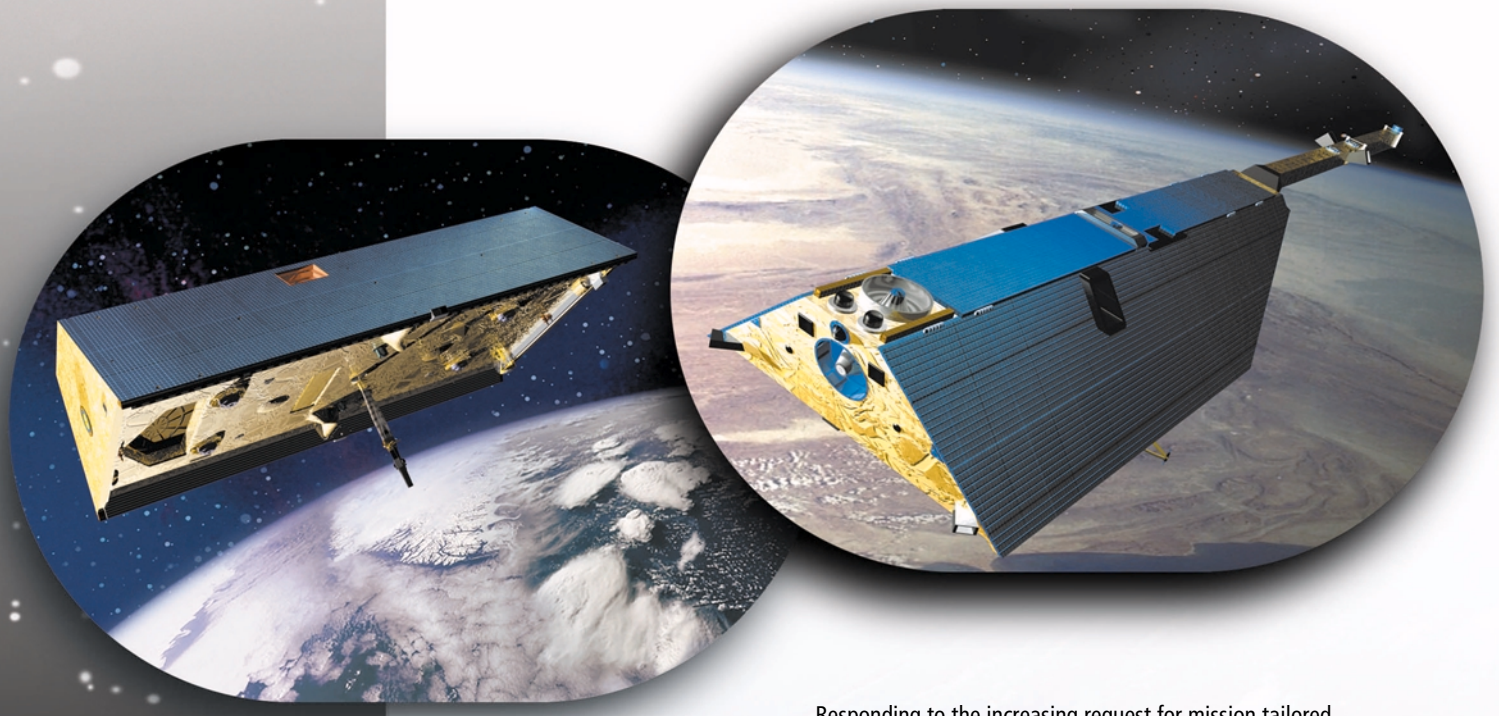
*Flex*Bus:
Mission Tailored Solutions for Earth Observation and Science



Responding to the increasing request for mission tailored solutions in the field of Earth observation and science, Astrium has developed and successfully implemented its satellite bus series, *Flex*Bus. With the *Flex*Bus spacecraft launched so far, it has been demonstrated that individual design to mission and payload needs, high product quality and competitive prices can be mutually compatible.

- **Modular Heritage** - is the key to the *Flex*Bus concept. *Flex*Bus spacecraft consist of flight proven fixed core elements which are used in every mission, amended by space qualified assemblies which are installed according to the specific mission needs. Mission dedicated, new developments are only employed when they contribute to the optimal support of the payload. This concept ensures a high degree of re-usability from project to project for qualified hardware and software as well as for proven integration and verification processes.

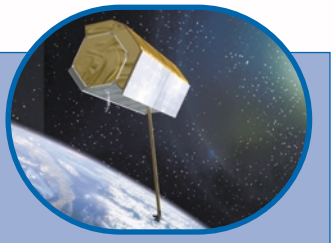
- **Flexibility** - The external appearance of *Flex*Bus satellites varies considerably since the mechanical configuration as well as the implementation of the thermal control is individually designed for each mission and payload. In addition, this approach grants the customer a high flexibility in the selection of the launch vehicle.

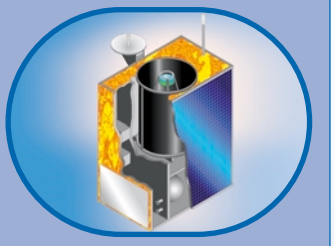
- **Quality** - As a common denominator *Flex*Bus satellites fulfill the high demands for quality required by clients like NASA, the European Space Agency ESA, and the German Aerospace Centre DLR. General single failure tolerance, high quality parts as well as the robustness of the system are the principle characteristics of all *Flex*Bus satellites.

- **Team** - A small and powerful team of competent and multi-functional engineers is a further essential element of the *Flex*Bus success. The team capitalizes on a high degree of engineering expertise and short paths of communication, internally as well as with the customer. Each *Flex*Bus development team, supported by experienced Astrium specialists, accompanies the satellite through all phases of development - from the first configuration ideas until the satellite launch and in-orbit commissioning - thus providing a further essential contribution to the quality of the *Flex*Bus spacecraft.

Core Bus Technical Data

As of today, two *Flex*Bus Missions have been launched, the German scientific multi-mission platforms Champ (2000) and the NASA Gravity twin platforms Grace (2002). All three spacecraft are operating successfully in orbit. Based on *Flex*Bus two further projects are under contract, a German SAR radar mission and a German astronomical mission. Presently under proposal is the NASA mission ECHO.





	RSDO Reference	Growth Potential
Mission Characteristics		
• Application Orbit:	LEO	MEO, HEO
• Mission Life Time:	5 years	
• Payload Mass:	100 kg	~ 500 kg *)
• Payload Power: Avg.	100 W	~ 600 W *)
Peak		~ 3 kW *)
• Suitable Launcher:	Cosmos, Rockot	as per customer request open I/F design
		*) dependent on selected launcher
Development Characteristics		
• Delivery Schedule:	3 years ARO	
Payload Accommodation		
• Mechanical/Thermal:	mission & payload tailored	
• Electrical:	RS422, discrete analog/digital	MilStd 1553, IEEE 1355
Attitude & Orbit Control		
• AOC Mode:	3-axis stabilised	
• Main Actuator:	magnetorquers, cold gas propulsion	monopropellant, reaction wheels
• Pointing Control: Roll	2063 arcsec	60 arcsec (3sigma)
Yaw/Pitch	103 arcsec	60 arcsec (3sigma)
• Pointing Knowledge: Roll	2063 arcsec	10 arcsec
Yaw/Pitch	103 arcsec	10 arcsec
• Position Knowledge:	50 m (1sigma)	30 m (3sigma)
• Command Data Rate:	4 kbps	
• Telemetry / User Data Rate:	32 kbps – 1 Mbps, selectable	300 Mbps X-Band
• Processor:	P 1750	ERC 32
• On-Board Memory:	2 Gbit	256 Gbit

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