

IAF SPACE SYSTEMS SYMPOSIUM (D1)  
Interactive Presentations - IAF SPACE SYSTEMS SYMPOSIUM (IP)

Author: Mr. Jewel Pervez  
Etamax Space GmbH, Germany, j.pervez@etamax.de

Dr. Karl Dietrich Bunte  
Etamax Space GmbH, Germany, k.bunte@etamax.de

Mr. Julien Forest  
Artenum, France, j.forest@artenum.com

Mr. Benjamin JEANTY-RUARD  
Artenum, France, ruard@artenum.com

Mr. Fabrice Cipriani  
ESA - European Space Agency, The Netherlands, Fabrice.Cipriani@esa.int

DATA EXCHANGE BETWEEN SPACE ENVIRONMENT ANALYSIS TOOLS USING THE NEUTRAL  
STEP PROTOCOL

**Abstract**

Data sharing and exchange is essential, since many companies are participating in space projects and have to exchange information across countries or even continents. Hundreds of CAD/CAM and various analysis tools are used for designing the systems and the designs need to be shared and exchanged between different tools. The issue is that each tool uses its own native format, which inhibits the exchange of data with other tools unless there is a dedicated import/export interface. An elegant solution to improve the interoperability between software tools is the use of a neutral data exchange format.

The ISO 10303 STEP is one of the widely used neutral standards for data exchange, sharing and archiving. There are different STEP protocols for different application domains such as automotive, building construction, shipbuilding, electronics and many others. Currently the aerospace industries are mostly using the STEP-AP203/214 (3D modelling domain) and STEP-TAS (thermal analysis domain) protocols. However, none of the STEP protocols addresses the interoperability needs of the space environment domain, e.g. between the tools for radiation analysis, surface charging simulation or space debris and meteoroid impact risk analysis. ESA's newly developed STEP-SPE protocol wishes to cover the entire space environment domain.

STEP-SPE provides a product data standard, which is independent from any proprietary data exchange format. This standard is intended to be used by space environment analysis tools such as for instance ESABASE2, SPIS 5.1, Geant4/GDML, FASTRAD, SYSTEMA, COMOVA, during the mission design phases to transfer information between different tools, computer systems and organizations (e.g. engineering and construction contractors).

In this context, this paper provides general results of a research activity addressing the interoperability capabilities between several space environment analysis tools via STEP-SPE. The evaluation was conducted in the framework of the ESA contract "Interoperability for Space Environment Analysis Tools", carried out by the etamax space GmbH and Artenum SARL.

The paper describes the STEP-SPE protocol and the current exchange capabilities of the four main space environment analysis tools (EASABASE2, FASTRAD, Geant4/GDML and SPIS 5.1). The results are based on comprehensive interoperability testing and on the identification of existing gaps in the STEP-SPE protocol. Finally, the roadmap for an update of the STEP-SPE protocol and the respective software interfaces will be outlined. The named activities are required to overcome current limitations

in the interoperability between the involved tools and to extend the interoperability to analysis tools of other space project domains.