

SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

Author: Dr. Volodymyr Kukushkin

State Enterprise "PA Southern Machine-Building Plant named after A. M. Makarov", Ukraine,
kukushkin@yuzhmash.com

Mr. Oleksander Levenko

State Enterprise "PA Southern Machine-Building Plant named after A. M. Makarov", Ukraine,
Levenko2004@mail.ru

THE PROJECT OF THE UKRAINIAN REUSABLE AEROSPACE PLANE AND REUSABLE
SATELLITE IN AEROSPACE COMPLEX

Abstract

This report deals with constructional features and peculiarities of the reusable two-stage aerospace plane (ASP) Sura. Problems' solutions of reducing the temperature's influence during ASP returning from the space while reentry, of burning dynamic staging, reaching a side removal (destination) while returning of ASP stages and their landing with the help of parachutes have been considered. ASP modular construction makes it possible to carry out the ASP development step by step. It allows on the first step to apply the ready-made liquid propellant jet engines (LPJE) of Ukrainian development with the carrier rocket Cyclone-3 and the other constructions, having been produced serially, which cuts the terms and reduces the cost of the project realization. Modular construction on the following steps allows replacing certain modules, including LPJE modules in order to switch over for practically suitable, eco-friendly and safe fuel ethyl alcohol + hydrogen peroxide. Intermediate project development steps may go in with other projects, e.g. with the project Airborne Launch, on the basis of the Ukrainian transport plane AN-124. There has been considered in the report potentiality of creating jettisonable solid-fuel combined rocket + aerojet engine, capable of using atmospheric oxygen as an oxidizer. Calculation of the solid-fuel engine has been carried out for certain trajectory for entering into the space with the set velocities and atmospheric parameters. ASP together with its satellites, being orbited, makes the orbital group. Small-size automated two-stage ASP Sura or its orbital plane can take part in interplanetary missions to the Moon, Mars, Venus, with following return to the Earth; for this purpose are applied LPJE with reserved liquid fuel in the tanks.