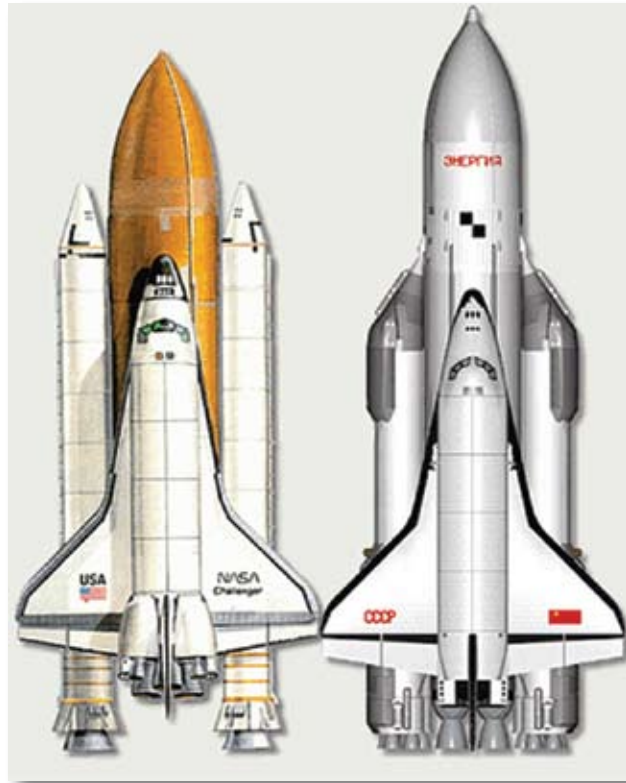


BURAN The Story of a Failed Russian Shuttle

By Johan de Villiers



officials also raised the concern that the Space Shuttle could perform a sudden dive-bombing run on Moscow once in orbit, which turned out to be a physical impossibility.

The Buran project eventually turned out to be the most expensive flight project in Russian history by the time it was cancelled by President Boris Yeltsin in 1993. Some flight historians put the figure at close to 20 billion roubles!

To the casual observer, there are many visual similarities to the American Space Shuttle at first glance and originally the opinion prevailed that Cold War espionage was responsible for this. Remember the cloned Russian version of the Concorde, the Tupolev Tu-144? As it turned out, Russian engineers developed very different strategies in their overall design.

For starters, the Buran spacecraft did not have main rocket engines like the Space Shuttle. It rode piggyback on an Energia carrier rocket into

orbit, thereby freeing up space for additional payload. The main engines of the Energia rocket, using liquid propellant, was thus destroyed after use in the atmosphere, where as the Space Shuttle had re-usable engines (using solid rocket fuel) integrated in the airframe.

The Buran could thus carry a payload of 30 tons (return to earth payload 20 tons) versus the Shuttle's original lift-off payload of 25 tons (return to earth payload 15 tons). The Buran was designed to carry two jet engines to assist with the return journey after orbit. The Space Shuttle relied entirely on its ability to glide back to base.

The Russians designed their spacecraft to have a fully automated landing capability for when it was performing an unmanned mission. This option was only retrofitted to the Space Shuttle many years later and has never been tested.

During transportation on the ground, the Buran was moved in a horizontal fashion on train



Above: "Buran sitting on top of AN-225 heavylift plane"

It is road unknown to most of us, the USSR quietly developed their own re-usable spacecraft, the Buran during the Cold War Era. The Buran (Russian for Snowstorm or Blizzard), actually managed to complete an unmanned flight during 1988 and had the primary objectives of supplying the Mir space station and boosting national pride. Ironically, when the Mir space station was finally visited by a spacecraft, it turned out to be the American Space Shuttle.

The roots of the Buran Space project actually started with the Burya high-altitude jet, which was designed in the 1950's to deliver nuclear bombs to

the USA and return to base. This project was scrapped when the decision was made to adopt ICBMs to fulfill that role. Thereafter, the Russians developed a prototype spacecraft called the Zvezda in the 1960's until the Buran re-usable project was initiated in 1974.

Another reason for the Buran project was that the Russian military was concerned over the American Space Shuttle's ability to carry a payload of 25 tons into space and to return with a payload of 15 tons back to earth. Their reasoning was that it was clearly destined to carry laser weapons into orbit to target Russian satellites. Some



Above: En-route to launch pad with AN-225.



Above: Buran lift-off on Energia rocket.

tracks and then into an upright position at the launch pad. This was a more effective mode of transport than the vertical mobility crawler that the Shuttle still uses, which only moves at 1.6km/h!

The Buran with a crew of 10 had a better lift to drag ratio of 6.5 against the Space Shuttle's 4.5 (which seated 7) and their nose landing gear was situated further down the fuselage.

Russian engineers laid out the thermal protection tiles as longitudinal slits that were orthogonal to the flow line of the fuselage. Sharp angles of tiles are thus completely absent. The Buran thermal protection tiles had a life expectancy of 100 flights!

Three kinds of thermal protection tiles were developed for the Buran: - "carbon-carbon" tiles with a maximum operating temperature up to 1650 degrees C for the components with the highest thermal load, ceramic tiles for parts heating up to 1250 degrees C and flexible tiles for surface parts with the temperature not higher than 379 degrees. All of the above surpassed the NASA specifications

The Buran also used a safer maneuvering propellant with better performance once in orbit. Finally the booster rockets of the Buran did not utilize O-rings which were prone to failure, such as in the Challenger disaster.

After construction began in 1980, the Buran's first suborbital test flight took place in 1983. As mentioned, it was lifted into orbit by a giant Energia booster rocket.

The first full orbital launch took place on 15 November 1988 and was unmanned with a flight duration of over three hours. It performed a faultless fully automated landing at the Baikonur Cosmodrome. Strangely, no software was installed on any of the flight computer displays and there was no life support system onboard! The Buran landed within three meters of its lateral target on the runway and within ten meters longitudinally.

Interestingly, the Americans tested the Space Shuttle's handling characteristic by the traditional carrier plane/air drop method, whereas the Russian designed the first Buran with four jet engines mounted at the rear. This would then take off as a normal jet and glide back to base during testing. Twenty-four of these flight tests were performed by the Russians.

The grounding of the Space Shuttle in 2003 made a number of observers ponder if the Buran could be revived. Unfortunately, the last Burans were destroyed in Kazakhstan at the Baikonur Cosmodrome in 2002 when the hangar they were housed in collapsed owing to structural failure of the roof during a maintenance project. •



Right: Carbon thermal protection tiles.