

## SpaceDev Advanced Systems

The entrepreneurial space industry that has been emerging over the past years is changing the course of how space is accessed, explored and utilized. As this paradigm shift occurs, SpaceDev is in a unique position of leading this charge with its broad technology base, its depth of capability, and its entrepreneurial roots. The Advanced Systems group is chartered with developing the advanced systems and technologies that are supporting this sea-change in our industry.

A primary current focus of the Advanced Systems group is an overall space transportation system based on the NASA HL-20 lifting body spaceplane. Christened the Dream Chaser™, it is being designed to carry passengers and cargo in the sub-orbital and orbital flights regimes, including flights to and from the International Space Station. Leveraging the work performed on the NASA HL-20, the Dream Chaser™ will provide a safe and affordable, solution for commercial space operations, will launch vertically and land horizontally on conventional runways. Leveraging the work performed on the NASA HL-20, the Dream Chaser™ provides a safe and affordable solution for commercial space operations.

### *SpaceDev Dream Chaser™ Space Transportation System*



SpaceDev is currently working in conjunction with NASA Commercial Orbital Transportation Services (COTS) office to develop and configure the system for ISS servicing. In parallel, SpaceDev has signed a memorandum of understanding with United Launch Alliance (ULA) and is evaluating man-rating the Atlas 5 launch vehicle and configuring it for use with Dream Chaser™ to provide a launch

configuration based on the exceptional heritage of the Atlas family of launch vehicles.



#### **SpaceDev's Dream Chaser™ Piloted Lifting Body Spaceplane Characteristics**

- Derived from NASA HL-20
- Over 1200 hours of NASA wind tunnel testing
- Builds upon seven years of NASA development
- Low re-entry deceleration Loads (< 1.5 g)
- Large cross range (1600km) → Frequent Landing Opportunities
- Low impact recovery (conventional runway landing)
- Exceptional crew safety: (non-explosive space vehicle propulsion)
- Onboard hybrid propulsion & high lift provide flexible abort options
- Designed for Commercial Orbital Transportation Service: Simple maintenance, quick turnaround

#### **SpaceDev's Dream Chaser™ - Hybrid Propulsion**

- Based on our proven hybrid rocket propulsion technology
- Over 10 years of development

- Over 300 firings
- Based on motors designed for SpaceShipOne (SS1)
- Human flight rated motors
- Hybrid propellants are safe, non-toxic, storable & human flight tested
- Propellants: nitrous oxide (N<sub>2</sub>O) & rubber (HTBP)
- Common Space Vehicle Hybrid Propulsion Modules (SVPs)
- Modular construction simplifies production and handling
- Throttleable & restartable
- Thrust vectoring control (TVC) by N<sub>2</sub>O injection; no nozzle gimbals
- Reaction Control System (RCS) uses N<sub>2</sub>O