MIET2565 | MIET2566
Systems Engineering Principles

Introduction to Systems Engineering – Tutorial – Human Jet

RMIT UNIVERSITY

Human Jet

Principles of systems engineering

Systems are created for specified purposes	Fly in jet speed without in an aircraft Intended as a sport
Systems have users	Single person use. Person will be trained before actual flying.
Systems interact with the environment around it	Flying altitude same as sky dive. All parts of system are exposed to atmosphere. Not for flying over build-up areas. To be guided and monitored by a ground station.
System boundary should be clearly defined	All components carried with the person. Communication via defined RF channel.
Systems are made by integrating components	All components are coordinated by the flying person. Person has visibility and control of flying conditions.
Systems are designed by the application of engineering science knowledge	Wing profile and person posture follow aerodynamics design requirements. Engines designed to deliver calculated propulsion.
Systems engineering tasks are often not repeating	Every person is different so as the system design for the wing, engine, helmet, etc.
Systems development and operations are multi-disciplinary	Disciplines involved: mechanical, electronics, telecommunication, GIS

Describe the steps that a user operates this human jet

1. Launch into the air method 1 –
    1. This system with the user is mounted under the wing of an aircraft
    2. The aircraft flies into the air, reaching suitable speed
    3. Human jet starts the engine, reaching suitable performance requirements
    4. The aircraft pilot releases the system into the air (free).
    5. Human jet will take control of the flight control
2. Launch into the air method 2
    1. Go to highest building in Ho Chi Minh City (Landmark 81 - 461m). Go out to the launch platform.
    2. Tie up to the glider platform
    3. Start the engine, reaching suitable operating requirements.
    4. Glide off the building (from glider platform)
    5. Human jet takes control from the flight control

Note that only one launch method will be decided for system development.

Describe the steps that a user operates this human jet

1. Land safely method 1 –
    1. Human jet maneuver position in the sky behind an aircraft.
    2. Aircraft back door opens. A cable tie is extended out (like mid air fueling).
    3. Human jet controls speed and position until person can grab the cable tie.
    4. Human jet fixes body to cable tie.
    5. Staff in aircraft winches the cable tie and human jet into the aircraft.
    6. Secure and release person in the aircraft. System becomes a cargo.
2. Land safely method 2
    1. Human jet slows down and starts to descend.
    2. Human jet adjusts posture to drop down position.
    3. As human jet drops down to suitable speed, open the parachute.
    4. Person lands to target field on the ground.

Note that only one land method will be decided for system development.

While in the air operations

1. Read information GPS, map, altitude, speed, fuel status
2. Adjust speed
3. Control altitude
4. Communicate with base station

Other possible operation methods

1. Launch into the air method –
    1. Have a launching mechanism to that runs on a runway to get human jet up to launching speed (similar to aircraft carrier)
    2. Eject from a cannon

2. Land safely method –
    1. Control engine propulsion direction for soft landing
    2. Slow down and jump into an aircraft's open deck (like space shuttle)

Components used on this human jet

1. Wing
2. Engine
3. Helmet
4. Telecommunication system
5. Flight information system
6. Parachute (depends on landing method)
7. Aircraft wing hanger (depends on launching method)
8. Ejecting mechanism (depends on launching method)
9. Straps
10. Flying suit
11. Flying shoes
12. Emergency Parachute
13. Gloves
14. Paddings for safe landing
15. Heat protection from jets

Questions?