

Concept Generation

Aircraft Style

- Monoplane – Traditional single winged aircraft design
- Biplane – two stacked wings; same lift half the wingspan
- More than 2 wings - Same idea as a biplane, but 3 or more wings
- Delta Wing – Plane With a delta shaped wing design
- Flying wing – A plane consisting only of a wing structure; ie. No fuselage
- Dirigible – A lighter than air aircraft such as a blimp or hot air balloon
- Rocket – A rocket propelled craft
- Helicopter – VTOL style craft with horizontal blades and no fixed airfoils. Can have one or more main rotors

Due to the variety of these options it was necessary to narrow down the overall direction of our research prior to generating sub-concepts. After some initial research it was clear we would be working with a fixed-wing aircraft (thus disqualifying the dirigible, rocket, and helicopter options). For more on the selection process please see the Concept Selection section.

Airframe (key features)

- Canards
- Motor / Engine placement
 - Pusher – motor in back of the plane, pushes plane through the air
 - Puller – motor on the front of the aircraft
 - Multiple Power Sources
 - Wing Mounted – motors attached to wings instead of built into the fuselage
 - Twin Fuselage – one motor on the front of each fuselage
 - Push and Pull – one motor on the front, one motor pushing from the back
- Winglets – small vertical stabilizers on the wing tips
- Dual Fuselage – 2 fuselages running parallel, could hold cargo between them
- Twin Boom – 2 extended booms connect the wing / fore-plane to the tail
- Cambered (lifting) Tail
- V-Tail – two ‘slanted’ tails; fighter-jet style
- H-Tail – two vertical stabilizers / rudders on either end of the tail’s horizontal stabilizer
- T-Tail – A traditional tail design but with the horizontal surface at the top of the vertical stabilizer
- Crucifix tail – same as a T-tail but with the horizontal surface half-way up the vertical stabilizer
- Swept Wings – wings swept back fighter-jet style (supersonic wing design)
- Folding Wings – wings that fold for transportation / storage

Airfoil

- Thin wing – Airfoil with a low thickness to chord ratio.
- Thick wing – Thickness to chord ratio of 12% or higher.
- Symmetrical Wing – Symmetric about chord line
- Cambered Wing – Curved airfoil to increase the nozzle and diffuser effects produced by the wing.
- Flat Bottomed Wing – A type of cambered airfoil with a flat, or nearly flat bottom surface.
- Elliptical Wing – Theoretically ideal wing design with an elliptical planform shape.
- Rectangular Wing – Rectangular planform area.
- Tapered Wing – Wing with a longer chord at the root than at the tip. Trapezoidal planform shape.
- Additional Lifting Surfaces (i.e. Canards) – Adds lift, allowing for a smaller main wing.
- Wing Mounting (top / center / bottom)
 - Top – Wing is above the fuselage, above the centre of gravity.
 - Middle – Wing mounted to side of fuselage.
 - Bottom – Wing sits under the fuselage, below the planes centre of gravity.
- Swept Wings – Wing tips are behind the wing's root, swept back, decreasing the speed of the air across the wing.
- Dihedral – Wing with a slight upward angle, with the tip higher than the wing root.
- Anhedral – Wing with a downward angle, with the tip lower than the wing root.

Landing Gear

- Number of Wheels
 - 2 wheels
 - 3 wheels
 - More wheels
- Non-Wheeled Landing Gear
 - Skis – intended for use on snow
 - Pontoons – for use on lakes (which are found near all nuclear power plants)
 - Skids – skid plates on the underside of the plane in place of landing gear
- Retractable Landing Gear
- Wheel Placement
 - Wing Mounted – anchored to the wings instead of the fusilage
 - Tricycle layout – font wheel turns, 2 wheels in the back
 - 'Conventional' layout – aka tail dragger, rear wheel turns, 2 wheels in front
- Launch Assist
 - Car-top – released from the top of a moving vehicle (requires highway)
 - Catapult – instant launch from some sort of a stand. Crossbow design?
- Brakes – reduced stopping distance
- 'leave-behind' landing gear – plane would liftoff from a sled with wheels, leaving the sled behind

Propulsion

- Power Source
 - Electric Motor
 - DC Brushless
 - DC Brushed
 - AC
 - Fuel Powered
 - 2-Stroke (chainsaw / weed whacker)
 - Glow / Nitro fuel
 - Wankel
 - 4 –Stroke
 - Diesel
 - Rocket
 - Rocket as main propulsion
 - Rocket assisted launch
- Exposed propeller
- Inductive Fan
- Jet
- Multiple-Bladed propeller (>2 blades)