

How Do You Build Helicopters?

Just in case you were Curious: 20+ Questions To Ask

Some Example Questions to Figure Out How Aircraft Mission are Designed: Aerodynamic Configuration, Flight Performance, Control, Airframe Structure & Weight, Propulsion, Rotors & Hubs, Mission Equipment.

The appropriate questions differ greatly for the different roles aircraft play. Advanced technology might be incorporated in weapon carriage & employment, in cargo handling, in surveillance, in communications...

Aerodynamic configuration:

Does the design incorporate a configuration that has not been used in flight?

How similar is the configuration to that of aircraft that are successful?

Does the configuration impose limitations on control authority, stability, structural rigidity, or strength?

Is stability acceptable at high angles of attack?

Are stability and control acceptable during configuration changes in flight?

Flight performance:

Is the lift-to-drag [L/D] ratio being used in range calculations consistent with that being achieved by operating aircraft?

Has this L/D ratio been confirmed by wind tunnel tests corrected to full-scale, trimmed conditions?

Are takeoff and landing distances based on achievable lift coefficients & installed thrust?

Control:

How is the aircraft controlled & how does it interact with the operator? How much autonomy is it required to have?

Can it operate without pilot intervention?

Are there operational concerns in autonomous modes?

Airframe structure and weight:

Is the structural weight fraction consistent with operating aircraft of the same type?

Are lower fractions justified by use of more efficient materials or structural designs?

Do the materials & structures have stiffness and fatigue properties suitable to the application and has this capability been demonstrated with full-scale sections and representative loads?

Propulsion:

Do the engine hot sections rely on new materials?

Have these materials been tested to the temperatures, loads & dynamic environment of expected flight?

Are the results for thrust and specific fuel consumption from ground tests consistent with the estimates?

Have the inlets been tested at flight flow rates?

Rotors and hubs:

Has the rotor type been used before in a similar application?

Has testing been limited to static conditions?

Has a similar type of rotor been tested at a relevant scale?

What is the test basis for the durability estimates for the rotor & hub?

Do the cyclic & collective control mechanisms differ from common practice & How have they been tested?

Mission equipment:

What limits the operational effectiveness of this design?

How is advanced technology contributing to more effective performance of the aircraft mission?

Are any of these technologies unproven in this application?

What requirements for the aircraft program depend on mission payloads?

Are the requirements for the payload consistent with those of the aircraft platform?