

# [Summary as smaller aircraft do not have the](https://assignbuster.com/summary-as-smaller-aircraft-do-not-have-the/)

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SummaryThis case analysis evaluates the placement of the differentengines that can be found in the aircraft design. As the placement of theengines has a very big impact on the aircraft performance. Therefore, this caseanalysis will evaluate how the placement of the engines will influences theaircraft in many ways. For instance, safety, structural weight, drag, control, maximum lift, propulsive ef? ciency, maintainability, and aircraft growthpotential. Significanceof the ProblemEveryone’ssurely has their own view and reason on the different placement of the enginesin the aircraft design. For instance, wing-mounted engines, aft fuselage engineplacement, and three engine designs. AlternativeAction 1Wing-mountedengines normally can seem using on larger aircraft.

AdvantagesSuchengines placement will help to minimum the parasite drags and probably minimumthe weight. Engines are quite heavy therefore placing them in the correctposition will help to keep the balance of the aircraft, so that the aircraftwon’t tend to pitch down or up during flight. In a situation where the engine failure, the inboard location will help to minimize the yaw moment of the aircraft dueto the asymmetric thrust. DisadvantagesThiskind of engine placement poses as a threat to the basic wing structure becausein an event if a blade or turbine disk failure, it will result in verydifficult to maximize the inlet efficiency and making accessibility for theengineers on the ground to perform the maintenance much more difficult. In anevent of making improvement to the existing engine design. For instance, increaseengine to larger diameter in the later date, designers and engineers will haveto redesigned and rebuild the whole entire wing.

The point of placing theengine at the correct position will help to keep the balance of the aircraft, therefore it is a challenge that the designers face during the design phase ofthe aircraft to determine the position of the engine if not it will affect thebalance of the aircraft. AlternativeAction 2Aftfuselage engine placement normally can seem using on smaller aircraft. Assmaller aircraft do not have the extra space for the placement of the enginesunder the wing and still maintain it adequate wing nacelle and nacelle-groundclearances. Therefore, the next most suitable location will be aft fuselage. AdvantagesThiskind of engine placement will result in having higher CLmax due to theelimination of the exhaust-flap interference and wing-pylon that why flapcut-outs are not required. Which also minimize the drag experience thatgenerally occurs in the critical part of the taking off climb phase due to theeliminating of the wing pylon interference. In an event of engine failure, theasymmetric yaw will be much less due to the engine close to the fuselage. DisadvantagesOne of the main problem for this particular type of engineplacement is that the aircraft will face much more difficulty in balancing andrequire generally a larger tail to do so due to the center of gravity (CG) ofthe aircraft had been moved to aft.

Which results in the center of gravity (CG)to be well behind in its payload. Thus, this kind of engine placement aircraftwill require the much high enter of gravity (CG) range. As aft fuselage mountedengines will help in the reduction of the rolling moment. Therefore, thesignificant rolling moment that created by the asymmetric stalling could be adisadvantage that resulting in an excessive roll rate during the stall. AlternativeAction 3Threeengine designs placement is considered to be the second generation of the jetairliners because of the innovative engine locations which include theadvancement of the turbofan technology.

Therefore, we can find this type ofengine placement in both middle and small size aircraft as large aircraftrequires much strong engine power. AdvantagesThis kind of engine placement will be much lighter in weightdue to the number of engines being used on the aircraft. This design also helpsto reduce in the drag experience, effectiveness in the reverser, and give theengineers much bigger space in the maintenance of the engines. DisadvantagesThreeengines design placement will result in a small inlet loss due to the length ofthe inlet and there will be an increase in fin structural weight in order tosupport the three engines. As fuel efficiency may be another problem in thistype of design because three engines designed aircraft will normally consumemuch more fuel than a normal twin engine designed aircraft. RecommendationThis case analysis shows that every single engine placementdesign done on the aircraft have their own possible with advantages anddisadvantages. For me, I think that wing-mounted engines are the best designsamong the three because it helps in the balancing of the aircraft andpreventing the aircraft wings from bending upwards due to the incoming winds.

However, when removing the weight of the engine from the wings, it means thatmuch more strength and consideration has to be put into the wings structure inorder to prevent it from bending upwards during flight like a piece of paper. One of the main problem I think that the design teams will face when designingthis particular engine placement will be the position of the engines, if thisis not done properly it will have a very big impact on the aircraft balance. Iwill recommend that the design team to work hand in hand with the engineers todo couples of tests to find out the best position for the engines beforebuilding the real one.