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# E190 E2 fuel consumption reduction vs. E190 E1

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# The wing

- **Totally integrated wing design:**
  - 3D optimization process from the very beginning,
  - Customized wing for every member of the family, with structural and aerodynamic optimization, in particular for the wing tip.
- **The wing gull shape allowed:**
  - limiting the landing gear length.





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# The high lift devices and landing gear

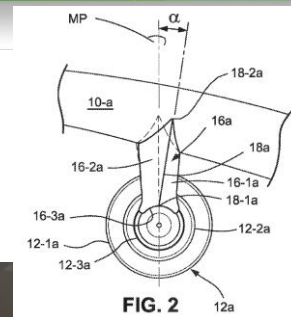
- Optimized wing slats allowed to have single slot and thus lighter flaps.
- Cleaner aircraft belly with landing gear doors.
- In addition, the landing gear configuration allowed advancing the wing (0.9 m) in order to have an after CG in flight, good for fuel consumption.





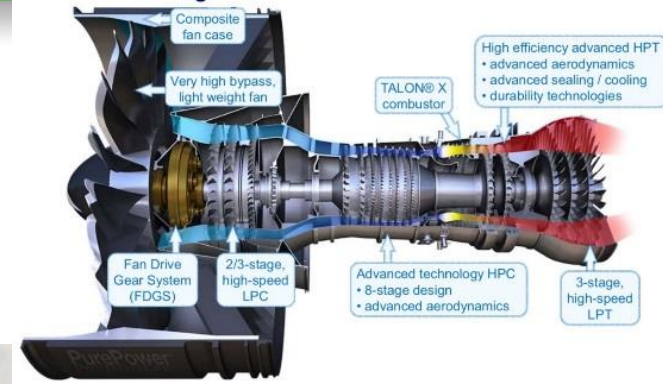
# The pylon and nacelle

- Shorter pylon - minimal detrimental effect on the airframe drag (US patent).
- Structural link between the engine and the wing, unique in the industry, allows reducing wing flutter loads on the wings, and thus the aircraft weight.
- Nacelle strakes - minimize induced detrimental effect of the engine installation on the wing aerodynamic performance.



# The engine

- Pratt & Whitney PW1900G
  - 73” fan diameter
  - High Bypass ratio - 12
  - 11% contribution to fuel consumption reduction





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# Tail cone and rudder



- Aerodynamic cleanliness of this airframe:
  - The tail cone only has an inlet door (APU inlet) on the upper side and a drain outlet on the lower side.
- 17% engine takeoff thrust increase vs. the E190 E1.
  - On a conventional development process, expected rudder increase to cope with one engine out situation. This increase would have impacted the airframe weight and drag.
  - Thanks to E2 Fly By Wire special feature, no rudder size increase was necessary.



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# Conclusion

- The E190 E2 demonstrated a 17.3% fuel consumption reduction vs. the E190 E1:
  - Propulsion system: 11%
  - New wing, aerodynamic improvement and fly by wire: 6.3%



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