

Role of an Engineer in Aircraft Industry

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What is an Aircraft ?

- The thing that can fly
- The thing that can take off and landing
- The thing that can be systematically control while flying
- The thing that having aerodynamic shape that can take off and landing and systematically control while flying

Aircraft is :

The thing that can fly

The thing that can take off and landing

The thing that can be systematically control while flying

The thing that having aerodynamic shape that can take off and landing and systematically control while flying

Wikipedia

An **aircraft** is a [vehicle](#) that is able to [fly](#) by gaining support from the [air](#), or, in general, the [atmosphere](#) of a planet. An aircraft counters the force of gravity by using either [static lift](#) or by using the [dynamic lift](#) of an [airfoil](#), or in a few cases the downward thrust from [jet engines](#)

What things are needed from an aircraft engineer ?

- Attitude
 - Skill
- Knowledge

Attitude



Commitment

Discipline

Curiosity

Integrity

Honesty

Skill

Computer operator

Computer programmer

Computer data
acquisition and
reduction systems

Computer data
processing

Knowledge

Aeronautical engineering background

Computational Fluid Dynamics

Experimental Aerodynamics

Flight Testing Analyst

What are the component of an aircraft ?

- Aircraft structures
- Aircraft propulsion systems
- Aircraft hydraulics and control systems
- Aircraft avionics and electronics systems

Who is the aircraft integrator ?

- Aircraft aerodynamicist ?
- Aircraft structure engineer ?
- Aircraft propulsion engineer ?
- Aircraft hydraulic and control engineer ?
- Aircraft avionics and electronics systems ?
- Aircraft performance, stability and control ?
- Aircraft maintenance, repair and overhaul ?

Aircraft integrator

- Can be anybody with engineering back ground and has willingness to learn from all aspects
- Aircraft structures
- Aircraft propulsion systems
- Aircraft hydraulics and control systems
- Aircraft avionics and electronics systems

What is the role of aeronautical engineer ?

- Feasibility maker
- Conceptual thinker
- Preliminary designer
- Aircraft designer
- Aerodynamics analyst
- Wind tunnel aerodynamics
- Flight testing engineer

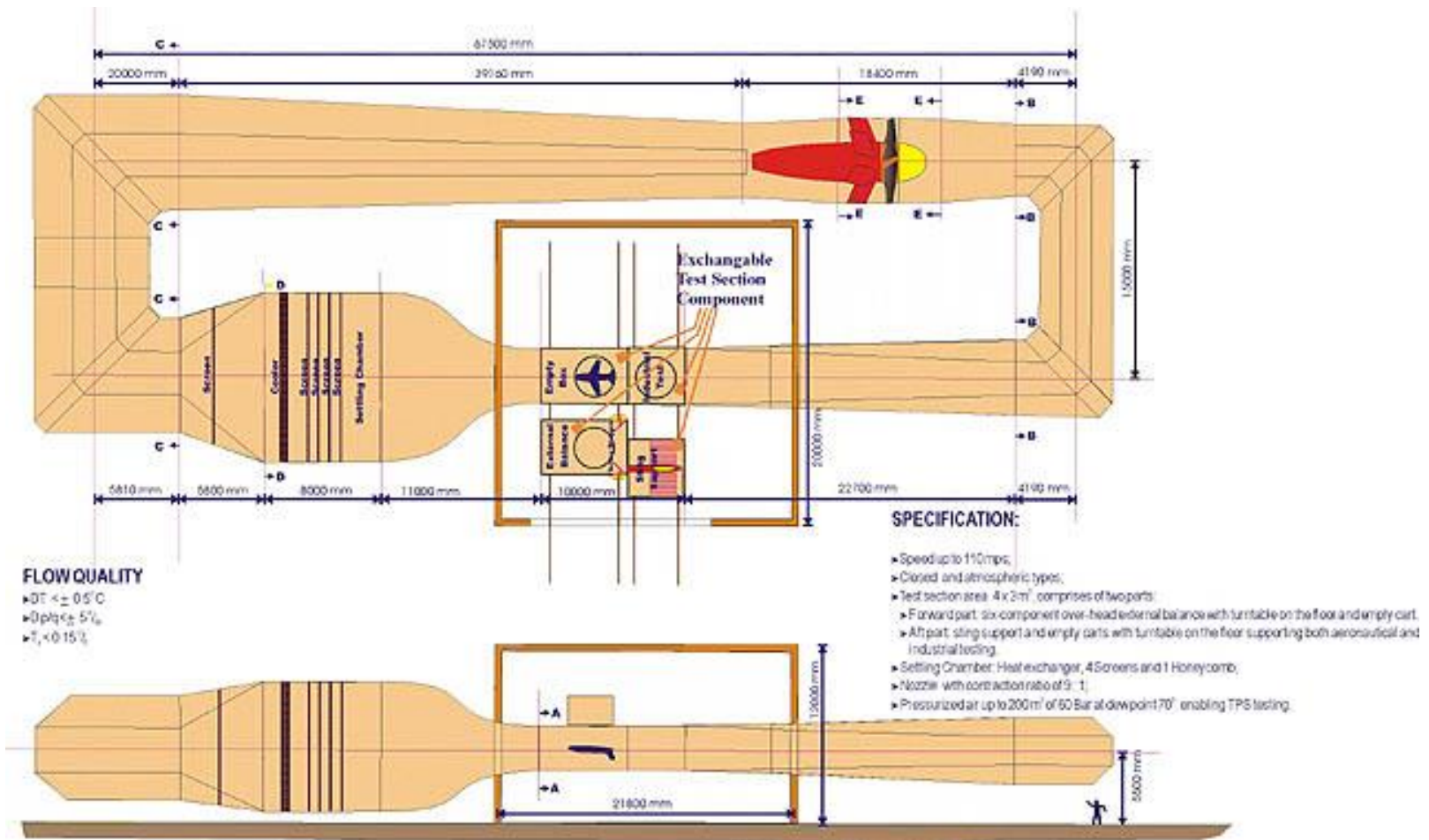
Who is the aerodynamicist ?

- Can be anybody with fluid dynamics background and willingness to learn aerodynamics
- Low speed aerodynamics
- High speed aerodynamics
- Transonic aerodynamics
- Supersonic aerodynamics
- Hypersonic aerodynamics

Aerodynamic Speed Region

- Low speed aerodynamics :
 - $0 < V < 500$ km/hour
- High speed aerodynamics :
 - $500 < V < 1000$ km/hour
- Transonic aerodynamics
 - $1000 < V < 1400$ km/hour around Mach = 1
- Supersonic aerodynamics
 - Mach 1,1 $< V <$ Mach 3,0
- Hypersonic aerodynamics
 - $V >$ Mach 3,1

Indonesian Low Speed Tunnel



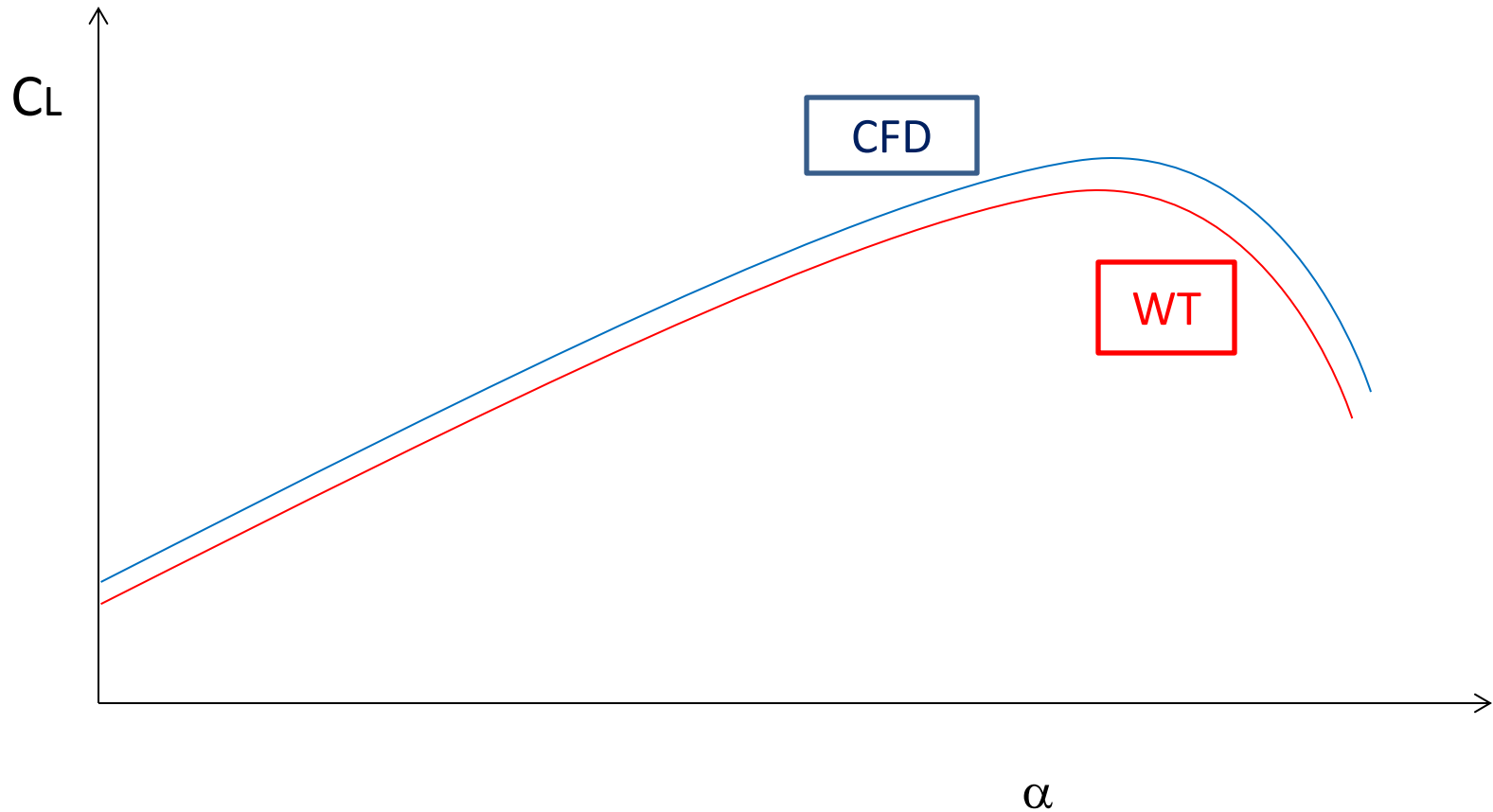
Techno economics of an aircraft design

- Cost
 - Fuel efficient
- Quality
 - Better design
- Delivery
 - Time to market
- Flexibility
 - Adaptive to changes

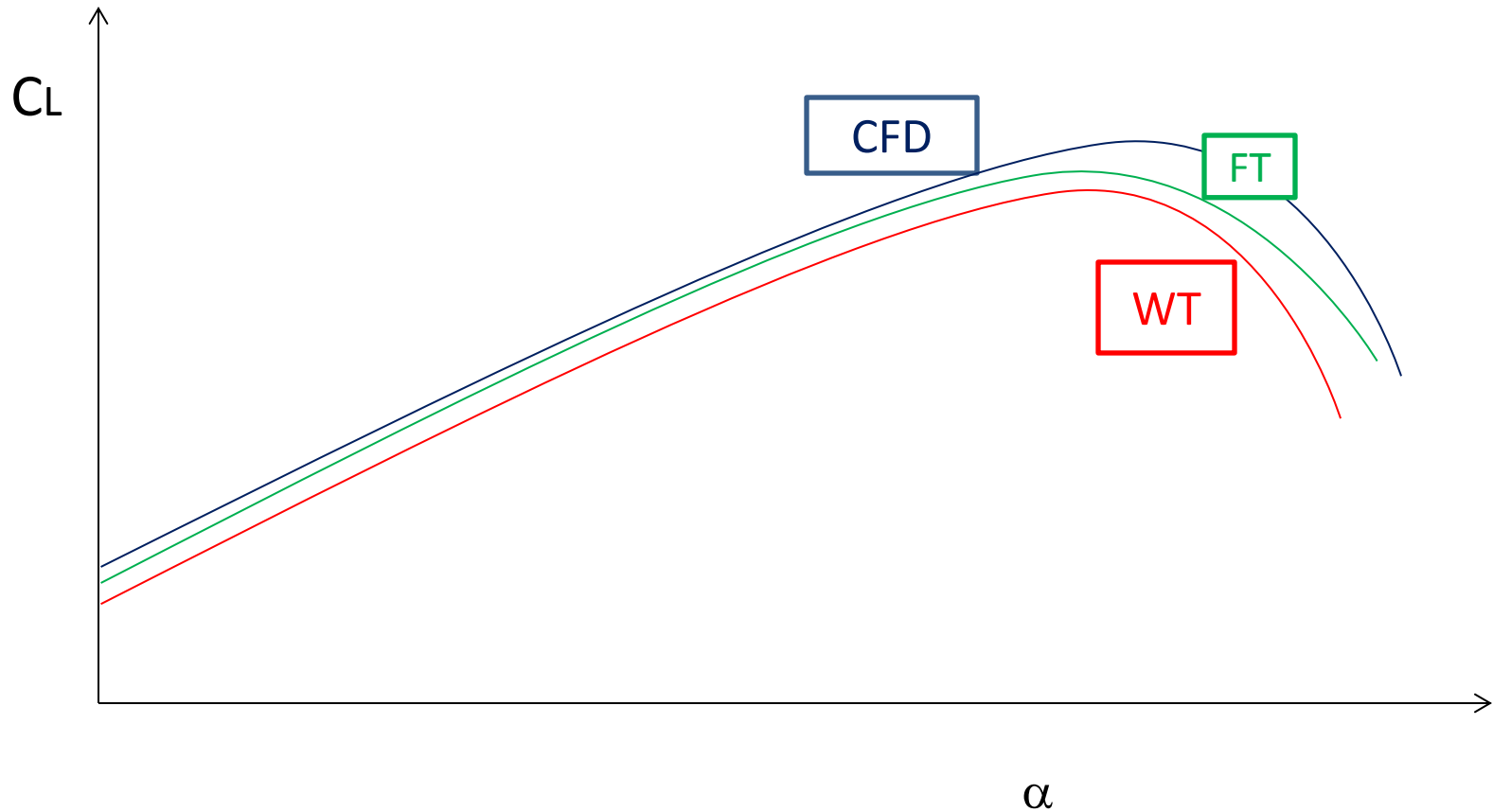
Aeronautical Engineer concerns

- Efficient and effective design of an aircraft
- Better quality and easy to maintain
- Trends in avionics and control
- Light and flexible material
- Faster calculation time
- Modular thinking
- Integration

Result of CFD vs Wind Tunnel



Where are the Flight Test results ?



Investment Comparison

CFD

- US \$ 1,000,000,-

WT

- US \$ 10,000,000,-

FT

- US \$ 100,000,000,-

N-250 Power On Test



Propeller Slipstream Test



Antonov Iran



Ship Test



Bus Test



BPPT Building Test



Bridge Test



Madinah Umbrella Test



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THANK YOU