



**FACULTY OF CIVIL AND MECHANICAL
ENGINEERING
AERONAUTICS, SPACE ENGINEERING AND
TRANSPORT INSTITUTE**

HPC RESEARCH AND DEVELOPMENT

**AEROSPACE AERODYNAMICS AND
COMPUTATIONAL FLUID DYNAMICS (CFD)**

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AEROSPACE AERODYNAMICS AND CFD

CONCEPT DESIGN



CFD SIMULATIONS



EXPERIMENTAL TESTING



PRODUCT DEVELOPMENT

EXPERIMENTAL WIND TUNNEL TESTING

UAV/DRONE DEVELOPMENT PROGRAM

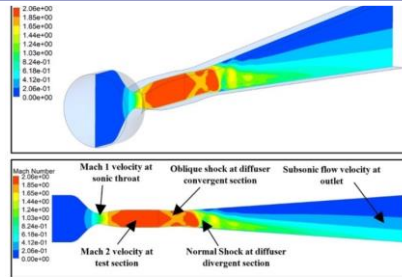
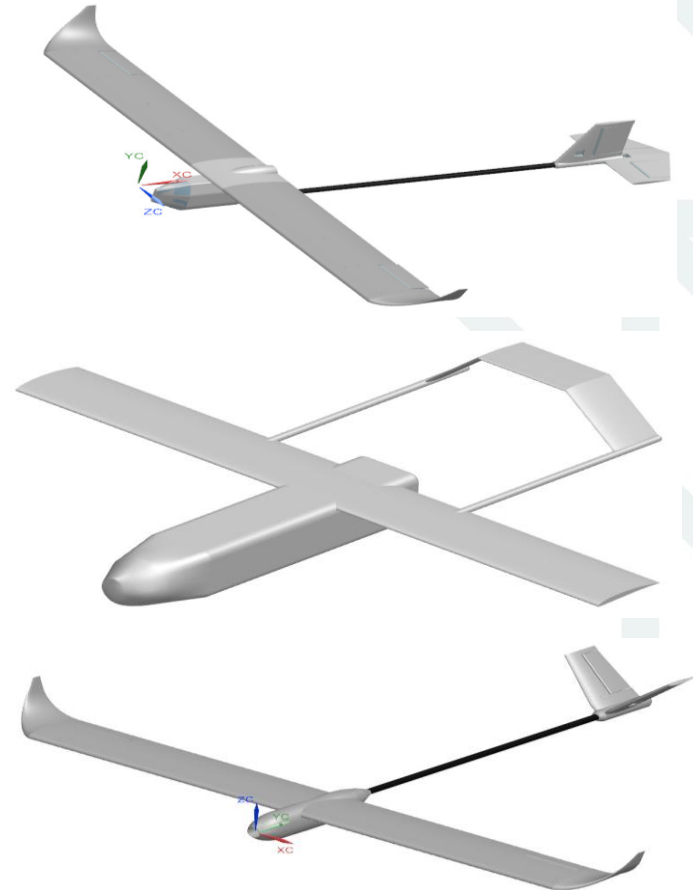
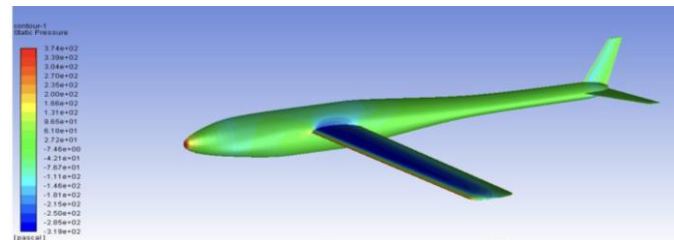
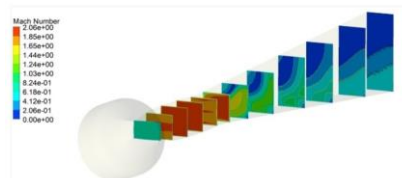
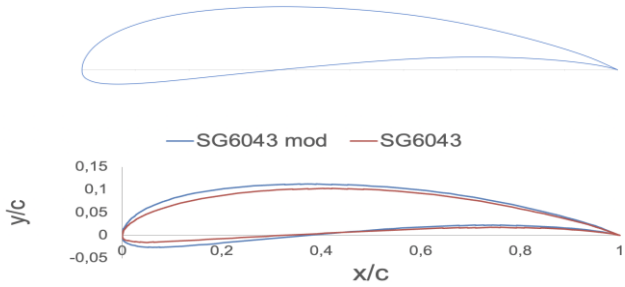


Fig. 16. HSWT with optimized diffuser integrated (3D).



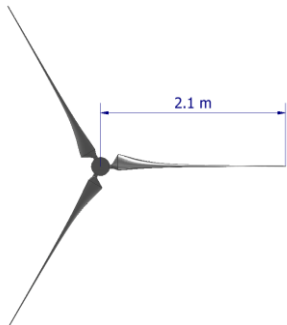
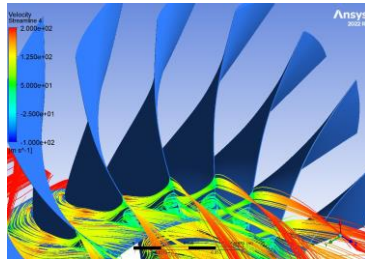
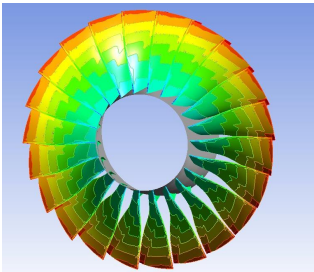
AEROSPACE ENGINEERING AERODYNAMICS RESEARCH

AI-BASED DESIGN AERODYNAMIC DESIGN OPTIMIZATION

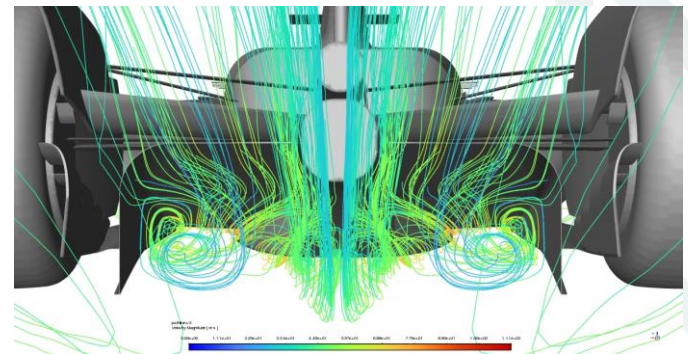
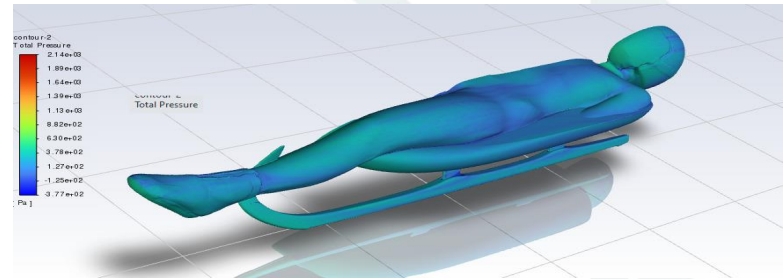
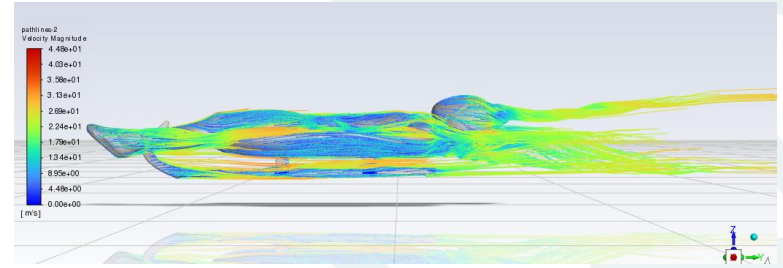


Airfoil	Max t/c	Position of max t/c	Camber	Position of max camber	LE radius
SG6043	10.00%	32.32%	5.50%	50.50%	1.69%
SG6043 mod	11.90%	23.23%	6.00%	52.52%	2.17%

TURBOMACHINERY



SPORTS AERODYNAMICS

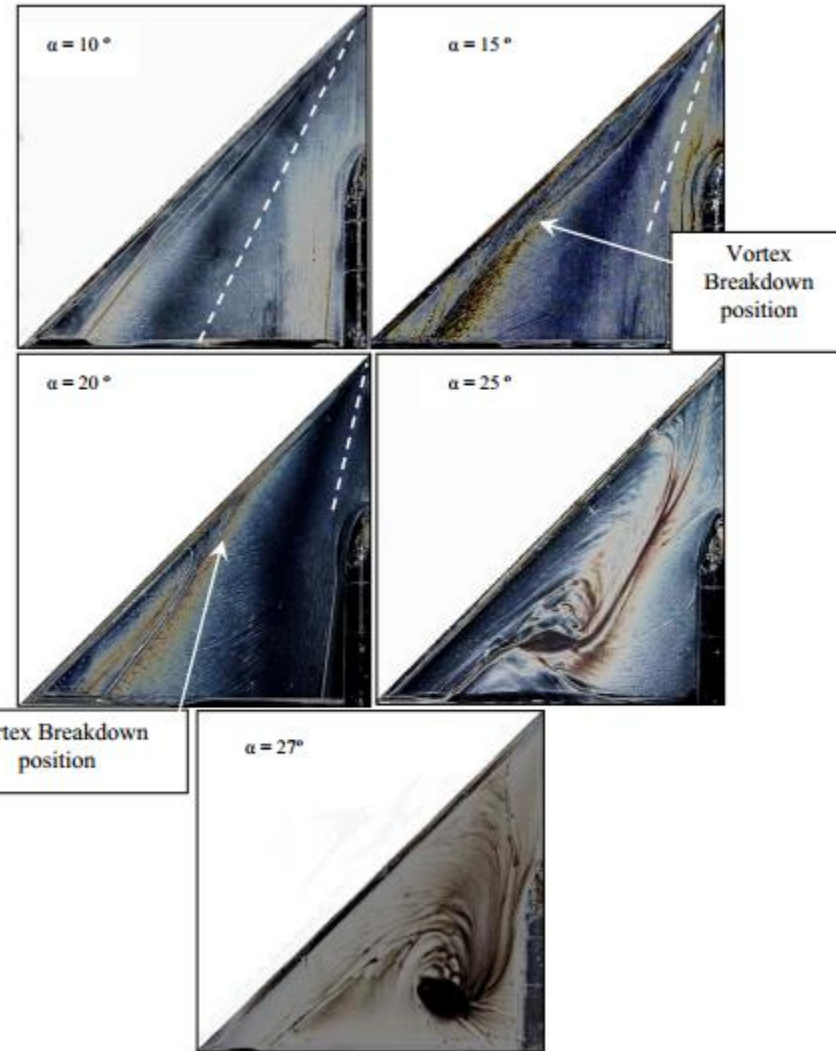
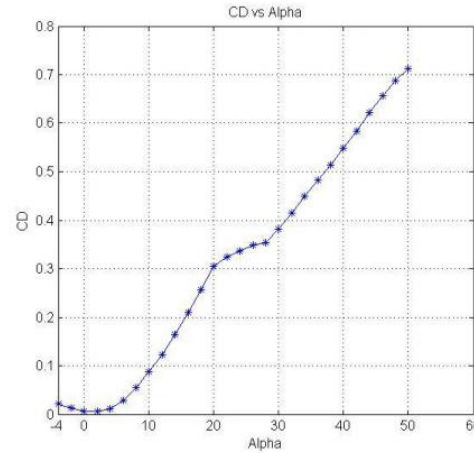
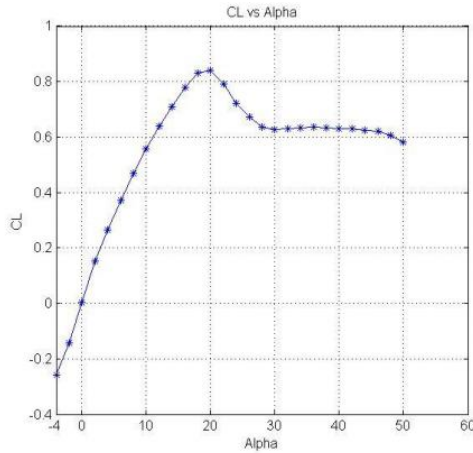


FUTURE DIRECTION

ARTIFICIAL INTELLIGENCE IN AEROSPACE PRODUCT DEVELOPMENT

HPC IN AEROSPACE AERODYNAMICS AND CFD?

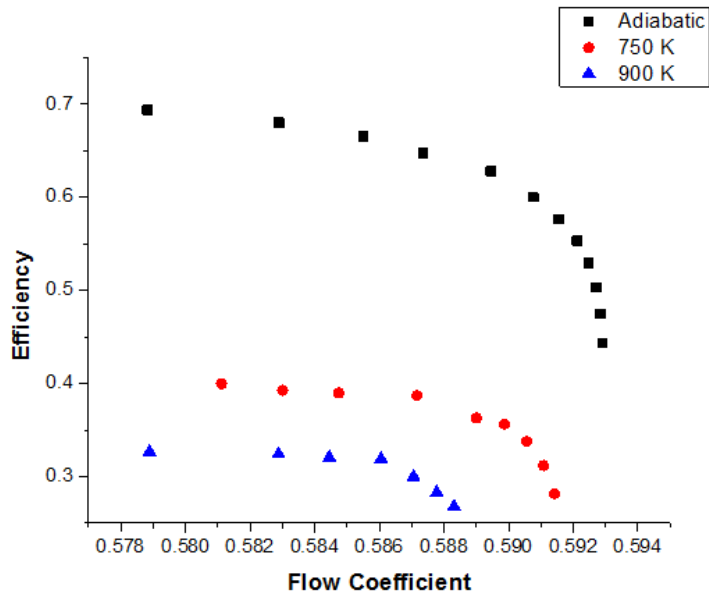
COMPUTATIONAL REQUIREMENT: A LAPTOP



- Non-slender delta wing (45°).
- $\alpha = 10^\circ, 15^\circ, 20^\circ, 25^\circ, 27^\circ$
- Re-attachment and development of secondary vortex at the trailing edge provides additional lift at low speed flights.

HPC IN AEROSPACE AERODYNAMICS AND CFD?

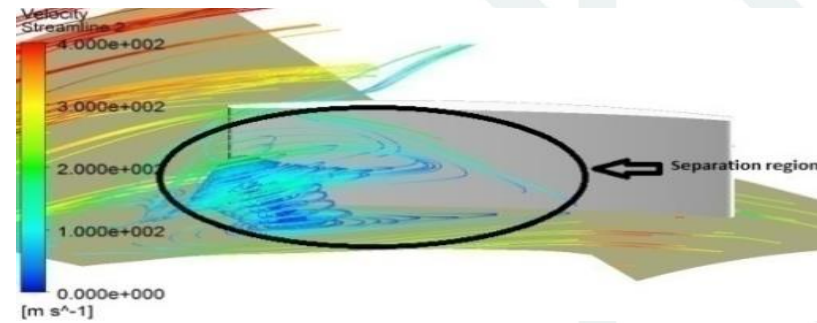
COMPUTATIONAL REQUIREMENT: **POWERFUL DESKTOP COMPUTER**



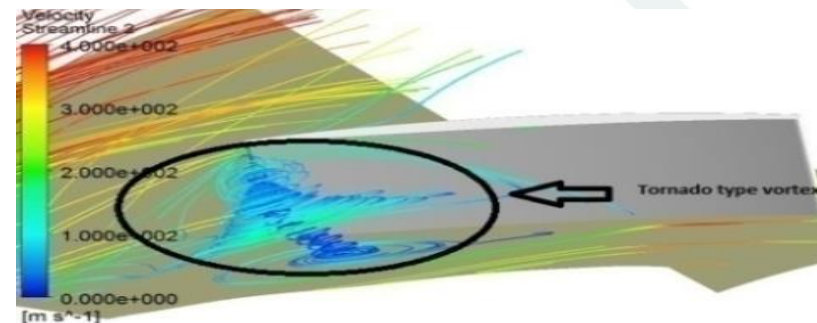
Efficiency Drop



Adiabatic Flow Condition



750 K

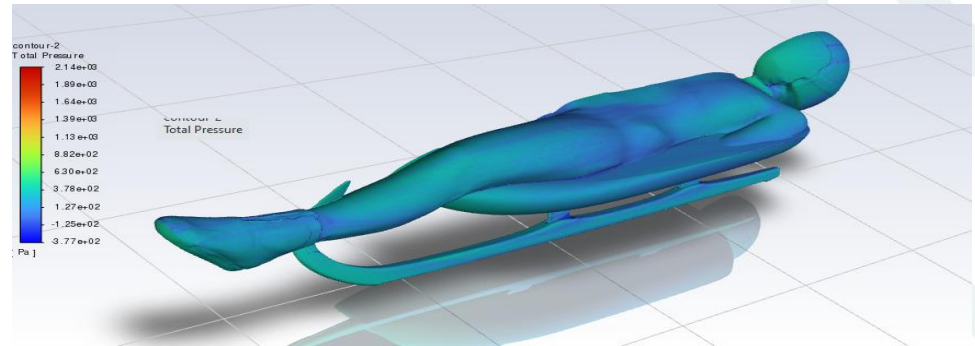
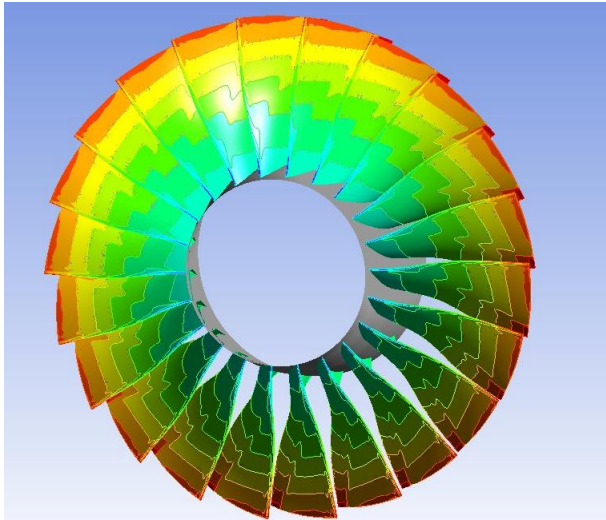
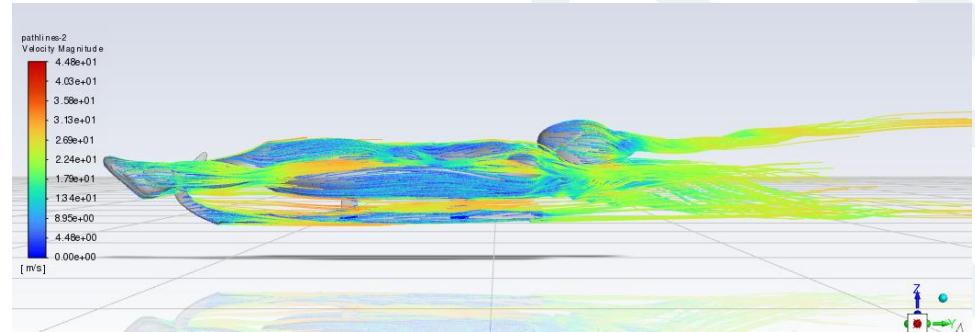
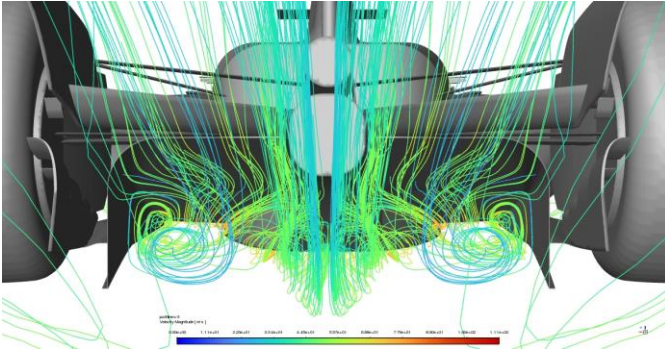


950 K

	750 K	900 K
Flow Coefficient	3.05% ↓	7.03% ↓
Efficiency	28.1% ↓	35.7% ↓
Pressure Ratio	18.3% ↓	24.3% ↓

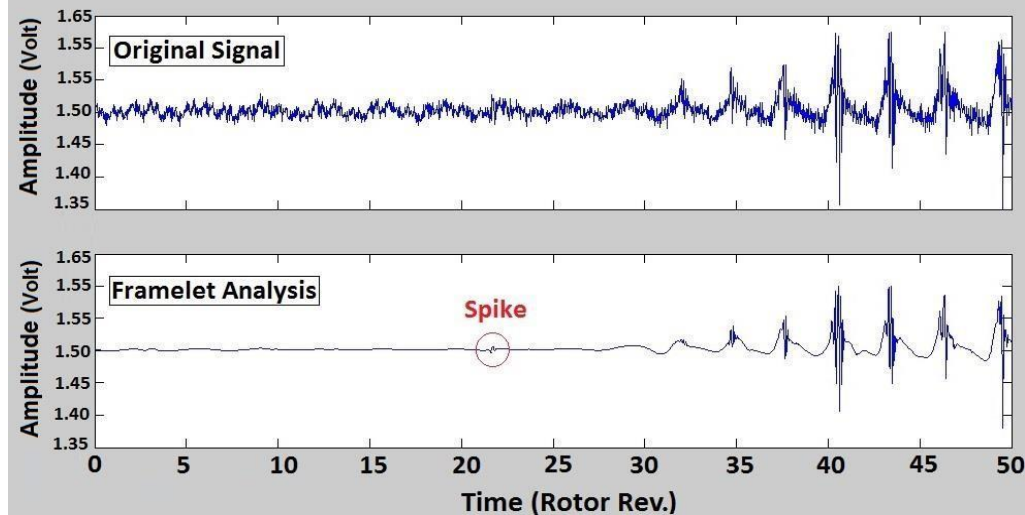
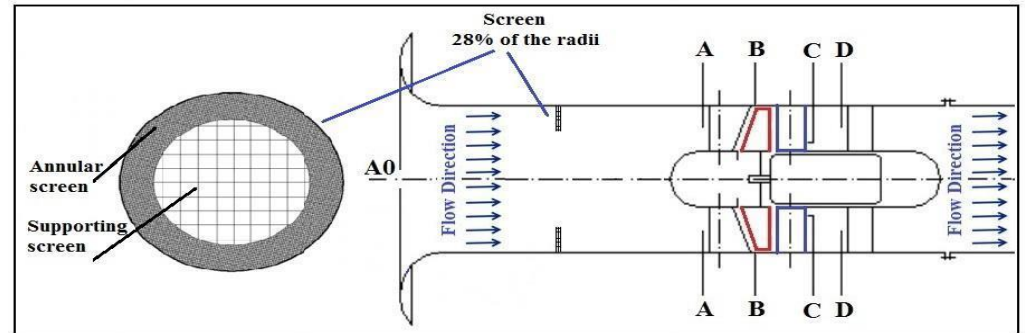
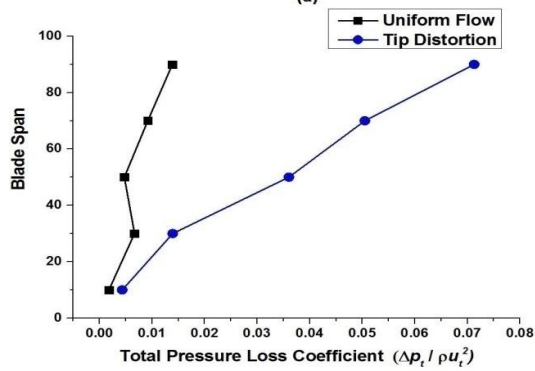
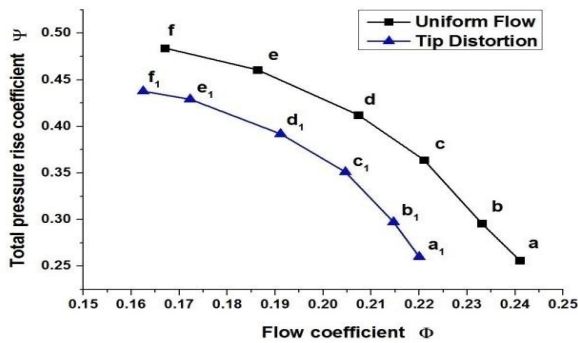
HPC IN AEROSPACE AERODYNAMICS AND CFD?

COMPUTATIONAL REQUIREMENT: **POWERFUL DESKTOP COMPUTER**



HPC IN AEROSPACE AERODYNAMICS AND CFD?

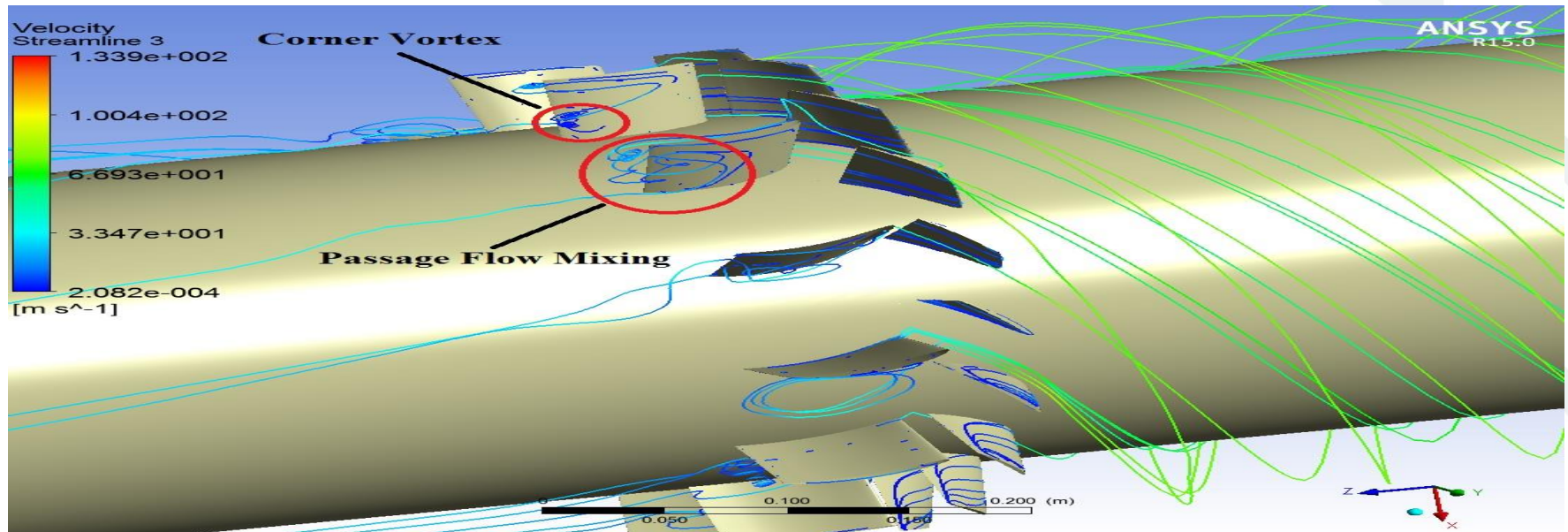
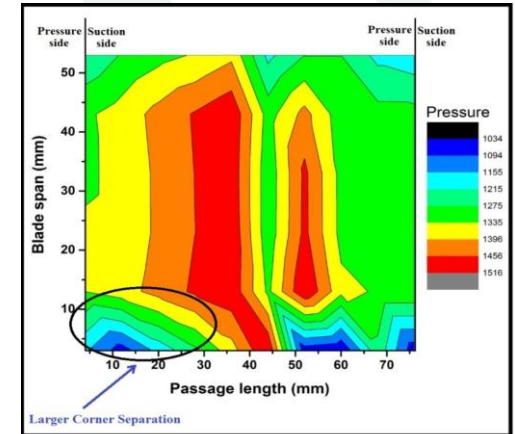
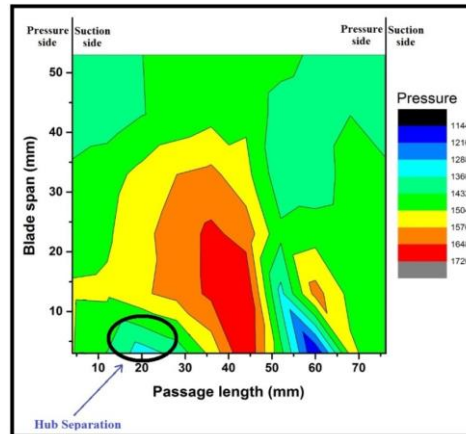
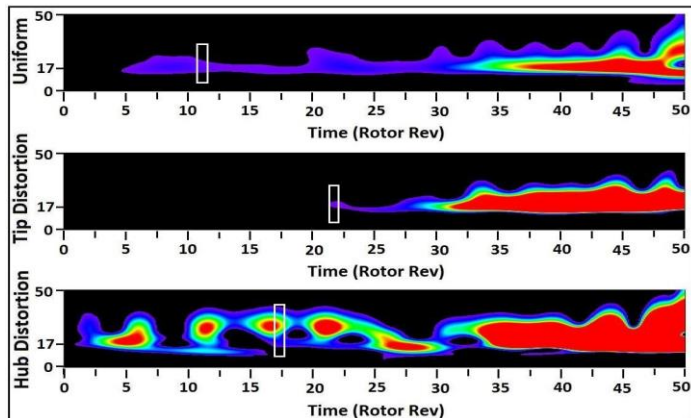
COMPUTATIONAL REQUIREMENT: HPC



HPC IN AEROSPACE AERODYNAMICS AND CFD?

COMPUTATIONAL REQUIREMENT:

HPC



FUTURE DIRECTION

**ARTIFICIAL INTELLIGENCE IN AEROSPACE DATA
PROCESSING AND PRODUCT DEVELOPMENT**