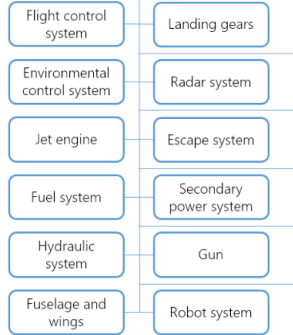
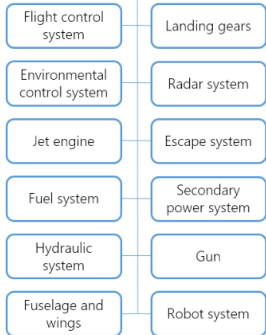
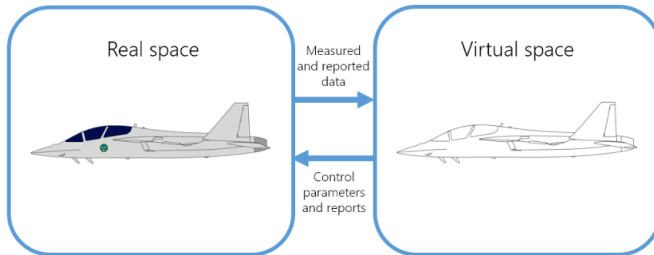


多物理數位分身 在5G研發 應用趨勢

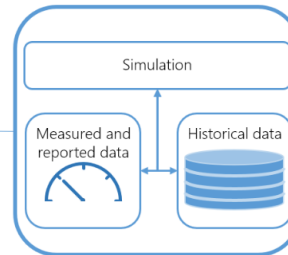
2019.12.19

Digital Twin 與 CAE

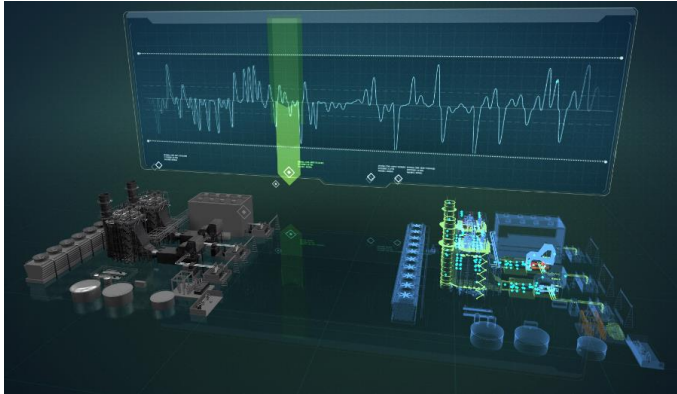


“integrated multiphysics, multiscale, probabilistic simulation of an as-built vehicle or system that uses the best available physical models, sensor updates, etc., to mirror the life of its corresponding flying twin.”

“Light-weight physics model”

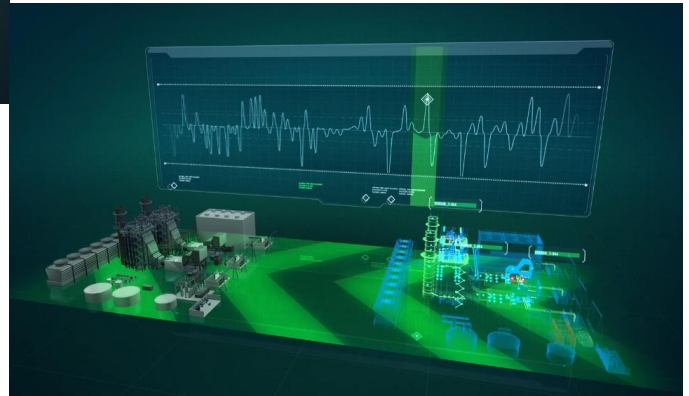


Digital Twin



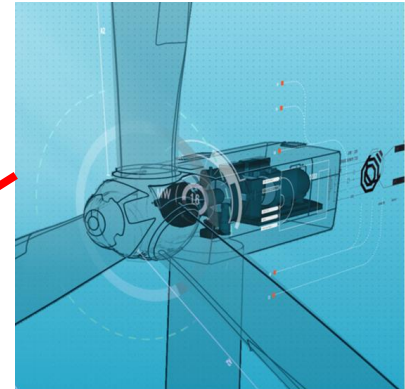
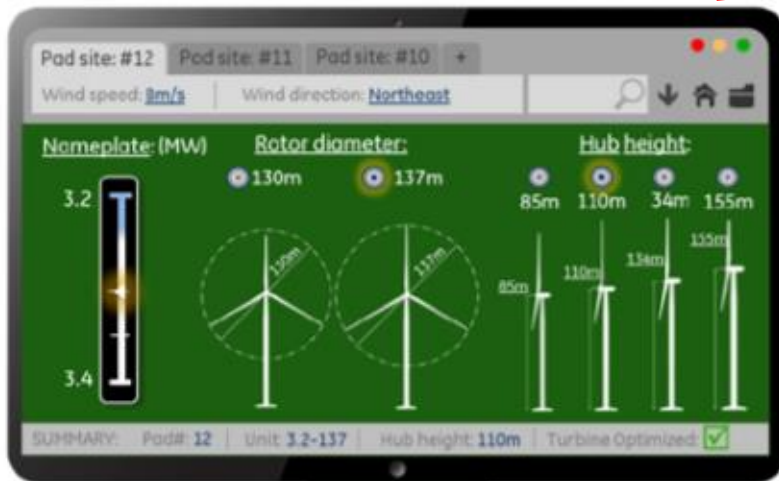
- Real data → input → Digital Twin

Decision ← Model Result



Example : GE

- Digital Twin
 - 模擬平台 + UI
 - 使用者選取不同機台

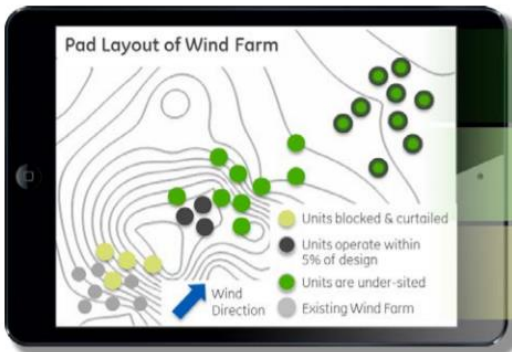


Example : GE

- 不同機台 → 放置在氣候、地形
- 虛擬環境中模擬
- 測試不同方案

Siting all GE 2.0-116s with 80m tower left output and money on the table ...

Applying the Digital Wind Farm maximized value of the wind resource ...

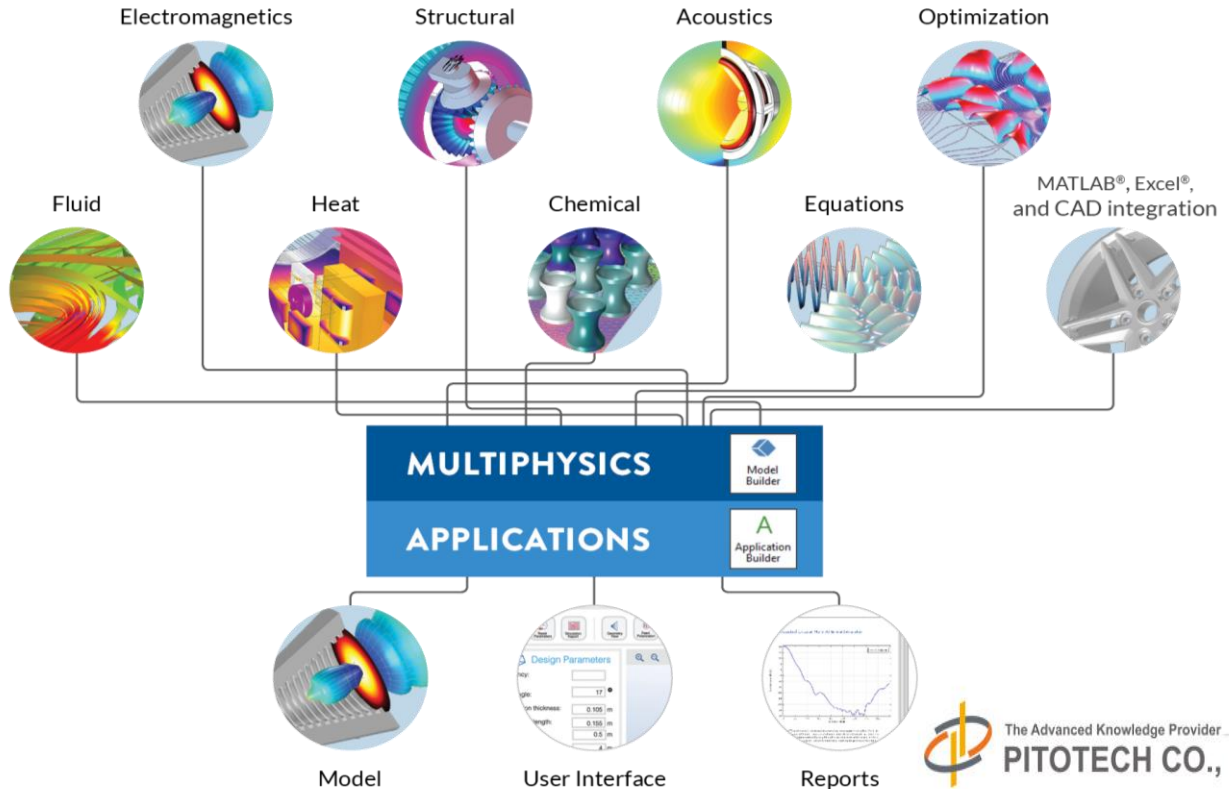


Adjusted nameplate & tower height to capture sheer (2.3-116, 94m tower) **+5.5%**

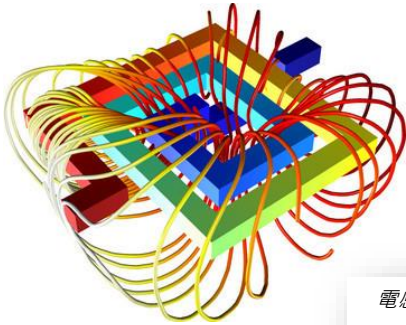
Adjusted nameplate (2.3-116) **+2.4%**

Adjusted nameplate & rotor (2.3-107) **+8.4%**

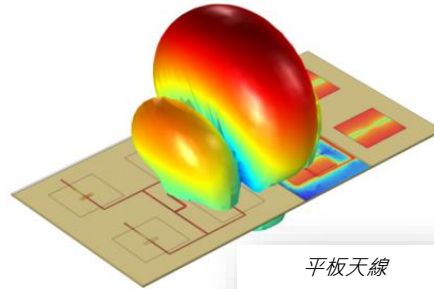
COMSOL Multiphysics



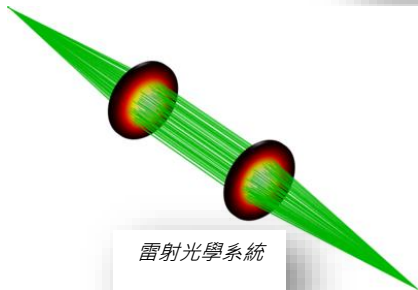
電磁相關



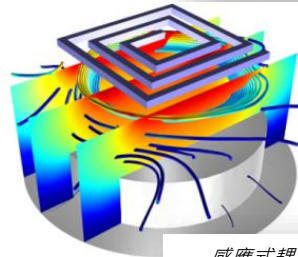
電感



平板天線



雷射光學系統

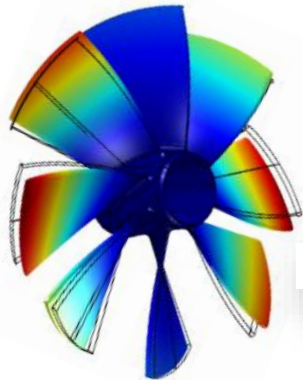


感應式耦合電漿

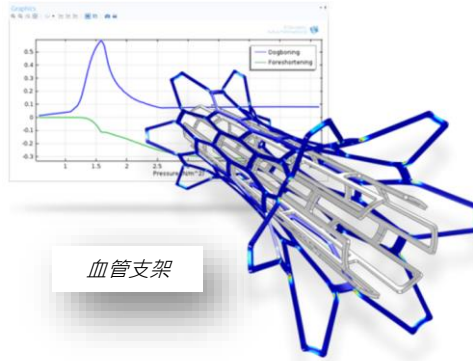
ELECTROMAGNETICS MODULES

- AC/DC
- RF
- Wave Optics
- Ray Optics
- Plasma
- Semiconductor

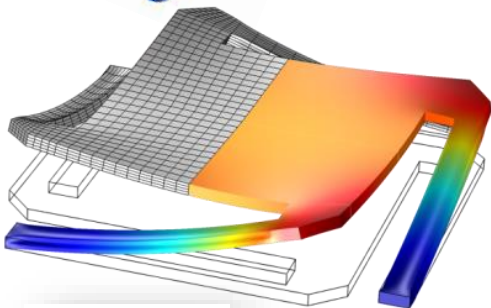
結構、聲場相關



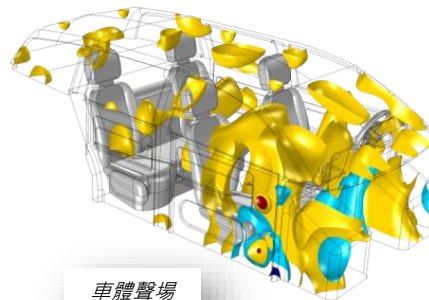
葉片振動



血管支架



MEMS 微面鏡

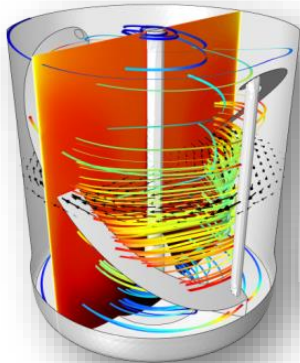


車體聲場

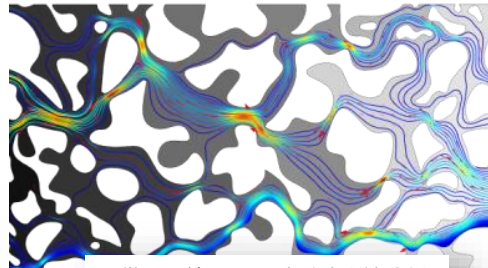
STRUCTURAL MECHANICS & ACOUSTICS MODULES

- Structural Mechanics
 - Nonlinear Structural Materials
 - Composite Materials
 - Geomechanics
 - Fatigue
 - Rotordynamics
- Multibody Dynamics
- MEMS
- Acoustics

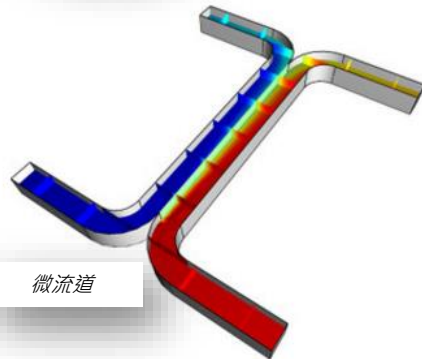
流體相關



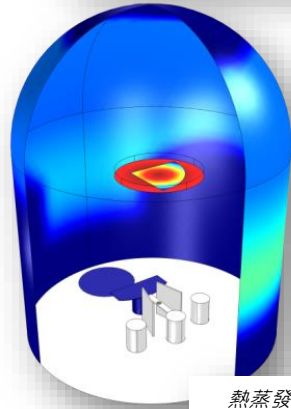
批式反應器



從SEM輸入jpg→多孔介質流分析



微流道

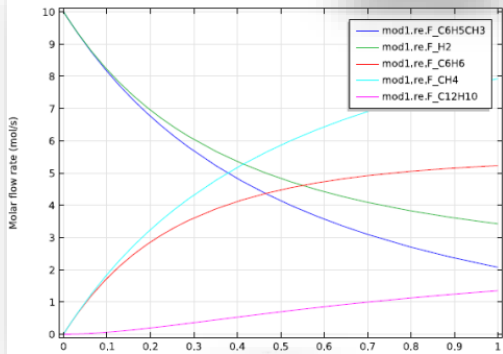
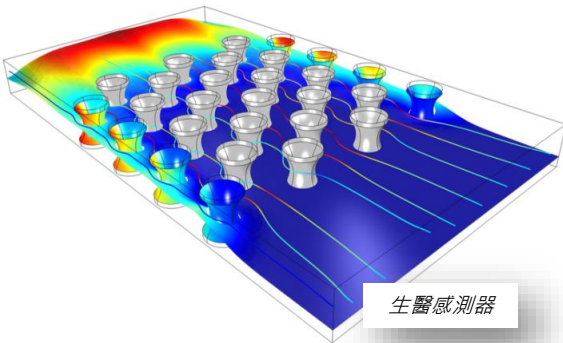


熱蒸發式薄膜沉積

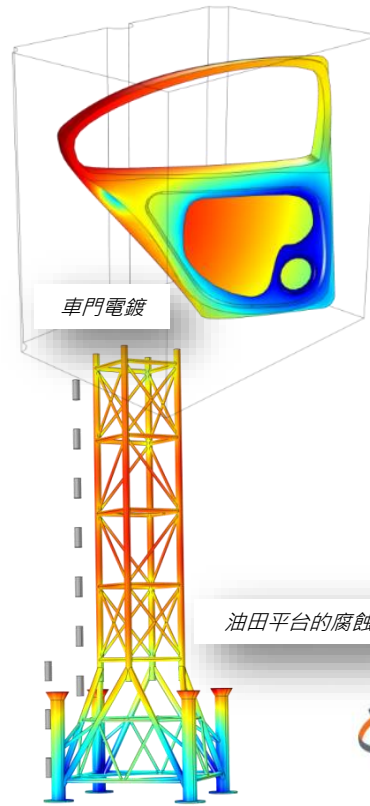
FLUID FLOW & HEAT TRANSFER MODULES

- CFD
 - Mixer
- Microfluidics
- Porous Media Flow
- Subsurface Flow
- Pipe Flow
- Molecular Flow
- Metal Processing
- Heat Transfer

化工類



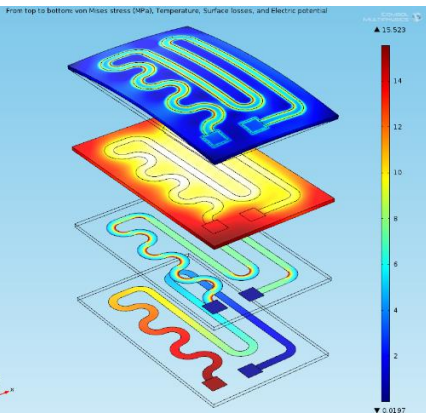
催化反應



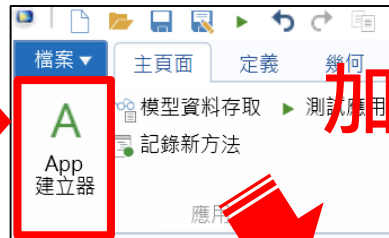
CHEMICAL ENGINEERING MODULES

- Chemical Reaction Engineering
- Batteries & Fuel Cells
- Electrodeposition
- Corrosion
- Electrochemistry

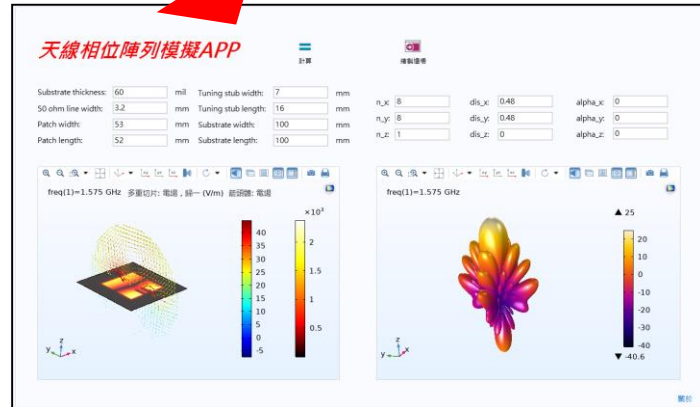
現實世界 → 多物理耦合



Digital Twin 與 我們的連結?



加入UI

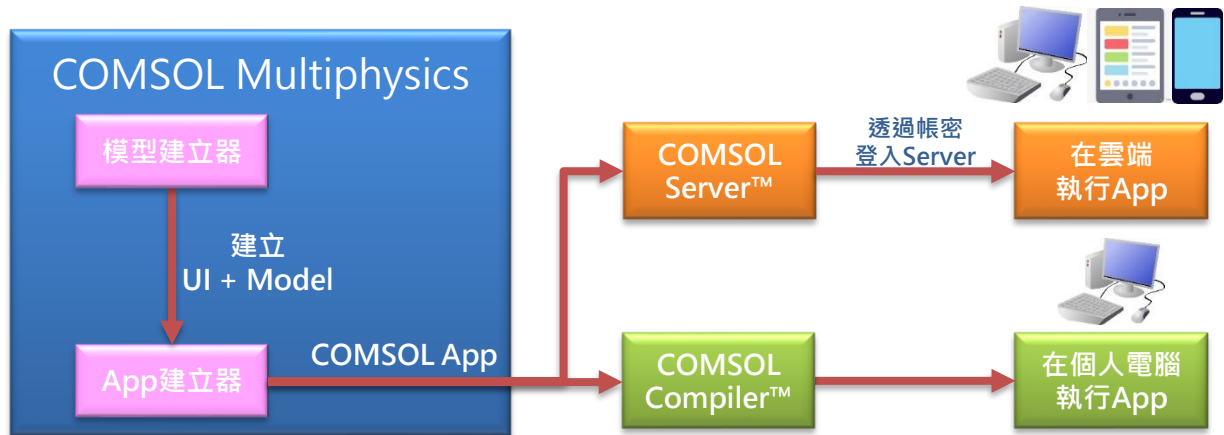


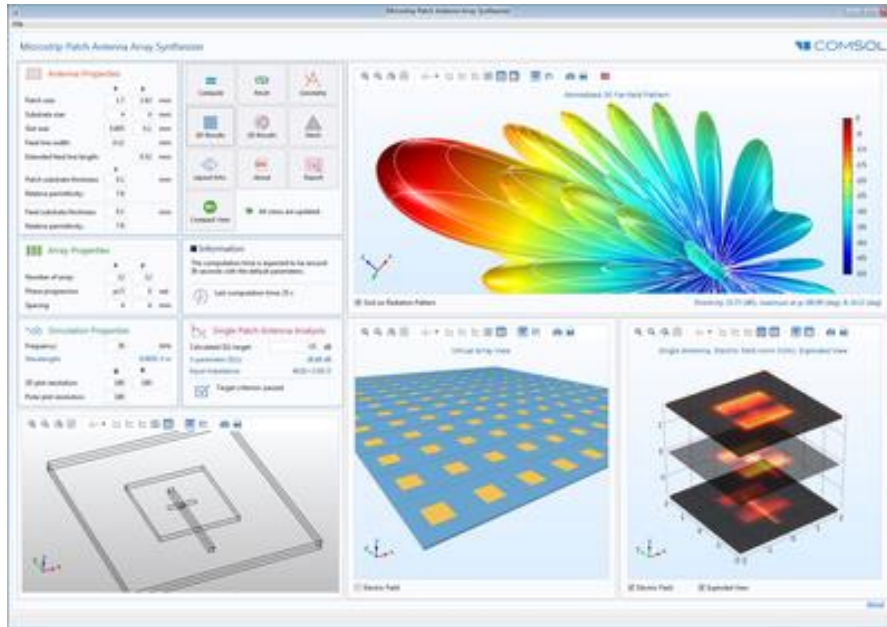
CAE Model+UI
多物理數位分身

多物理數位分身



多物理數位分身





5G Antenna Phased Array 模擬設計數位分身