

ANSYS®



ANSYS中国技术大会
中国·上海

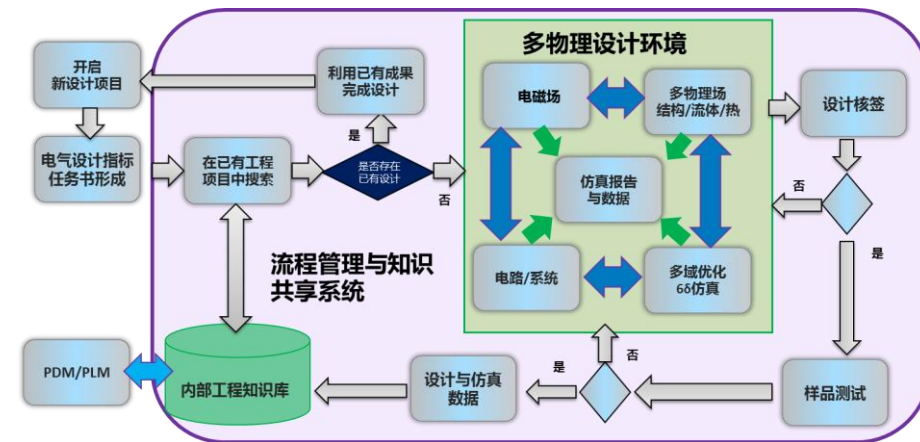
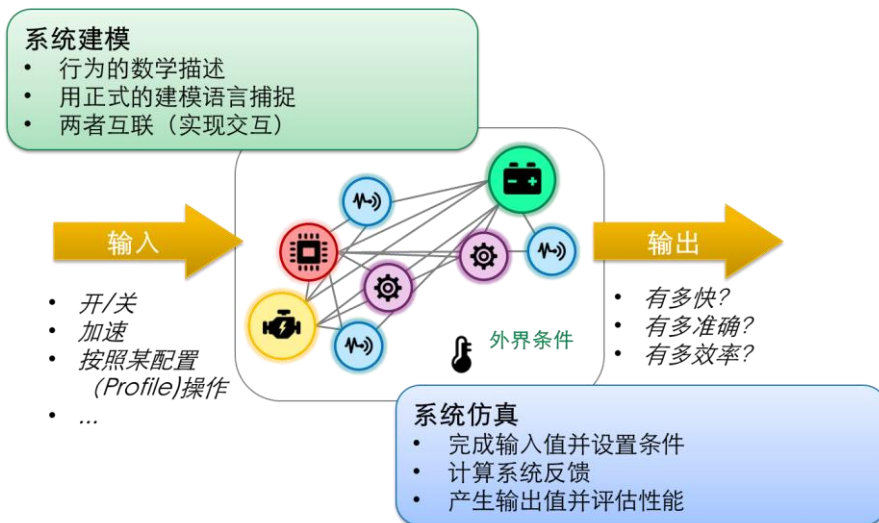
建立集成化仿真平台

丁海强 高级技术经理

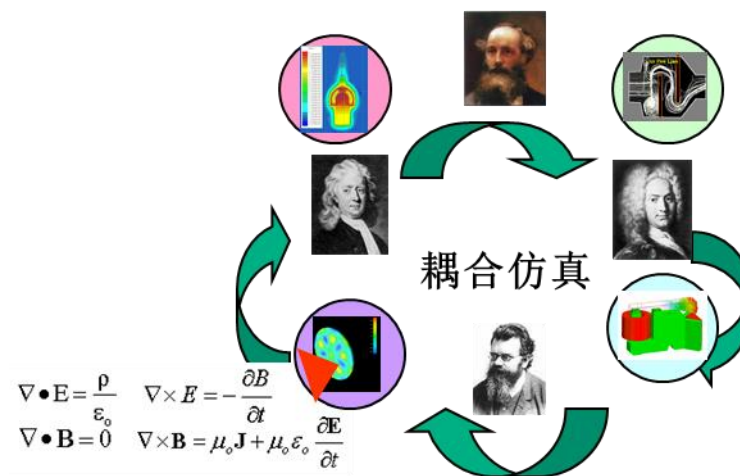
ANSYS 中国

仿真平台的主要功能特征

- 多物理，多学科，齐全完整的仿真功能
- 从系统到部件的全面仿真
- 高性能计算
- 易用、开放、集成化

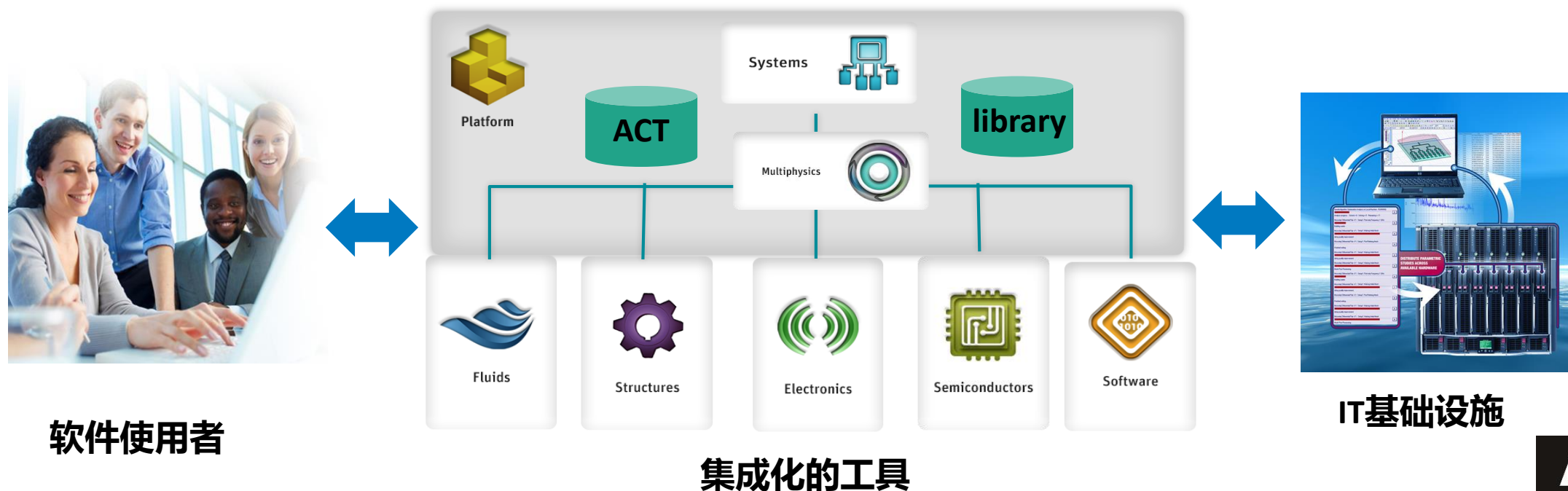


$$\rho \left(\frac{\partial \mathbf{v}}{\partial t} - \mathbf{v} \times (\nabla \times \mathbf{v}) + \frac{1}{2} \nabla q^2 \right) = \rho \mathbf{F} - \nabla p + \frac{4}{3} \nabla \mu \Theta + \nabla (\mathbf{v} \cdot \nabla \mu) - \mathbf{v} \nabla^2 \mu + \nabla \mu \times (\nabla \times \mathbf{v}) - \Theta \nabla \mu - \nabla \times \nabla \times \mu \mathbf{v}$$



仿真平台的构成要件

- **仿真工具**：覆盖多学科，实现从系统和部件的全面仿真
- **IT基础设施**：方便访问，高性能并行计算
- **模型库，流程固化与定制化**：提高仿真效率，降低使用难度
- **仿真数据管理和流程管理**：形成知识积累，减少重复工作

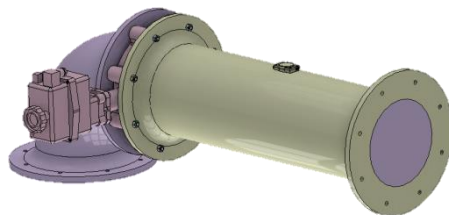


ANSYS 的产品发展策略

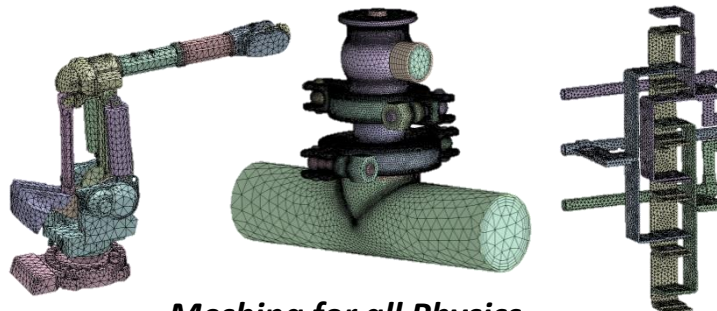
- 构建基于仿真的研发创新平台
- 仿真驱动产品研发



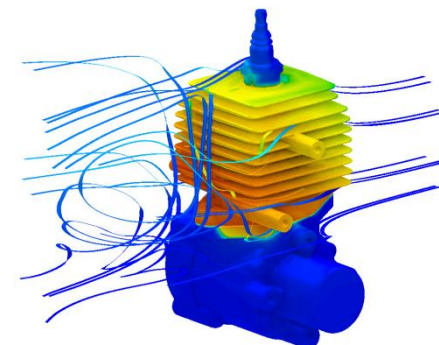
ANSYS AIM: 新一代多物理场仿真设计平台



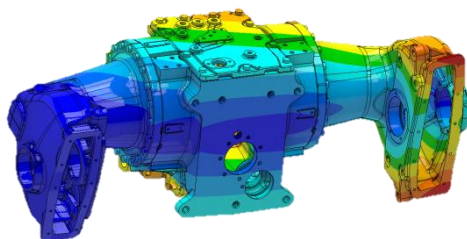
*Geometry Creation
and Preparation*



Meshing for all Physics

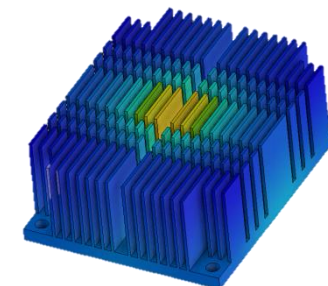


Fluid Flow

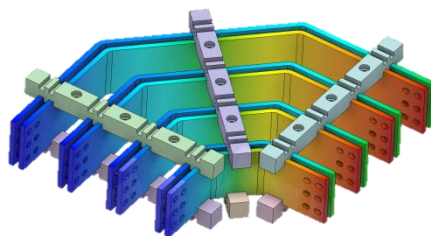


Stress Analysis

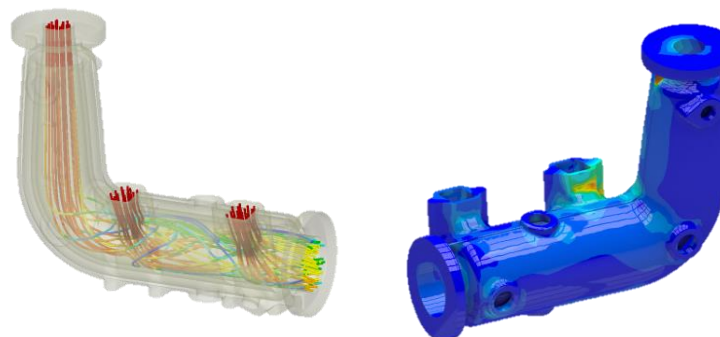
在统一、易用的环境下，利用ANSYS先进的仿真技术实现三维工程仿真，实现仿真与设计的无缝连接



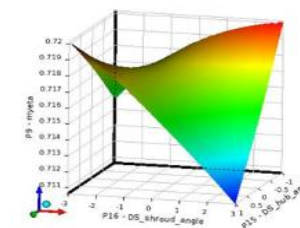
Heat Transfer



Electric Conduction



Fluid-Structure Interaction

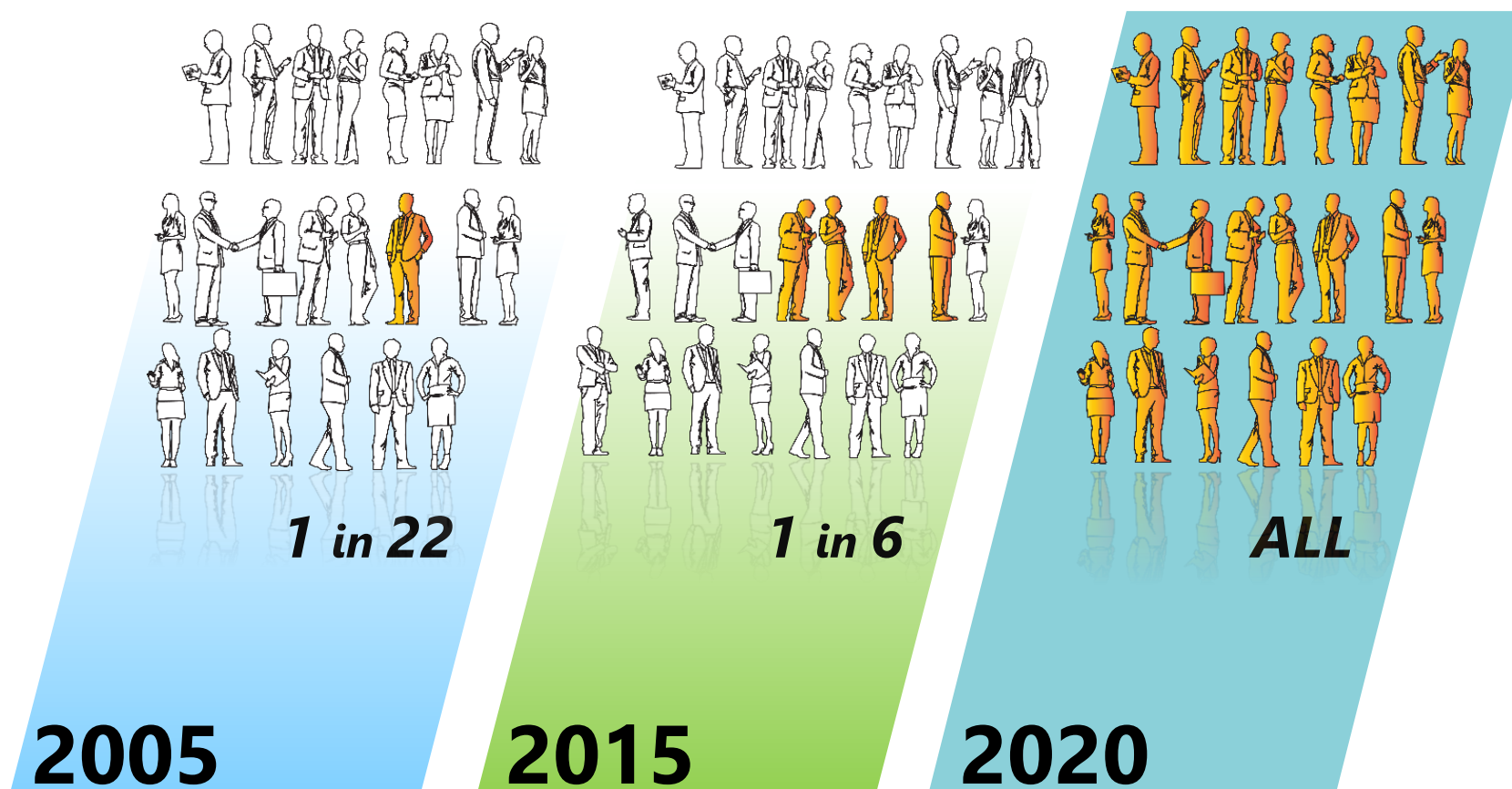


Design Exploration



每个工程师都将使用仿真工具

我们最具创新力的客户都在快速和深入地利用仿真工具
AIM推动仿真工具的普及化



AIM: 面向每一名工程师

- 复杂操作模板化，多重步骤流程化，构建仿真生态体系
- 普及CAE应用，加快设计速度，降低仿真成本，推进企业创新

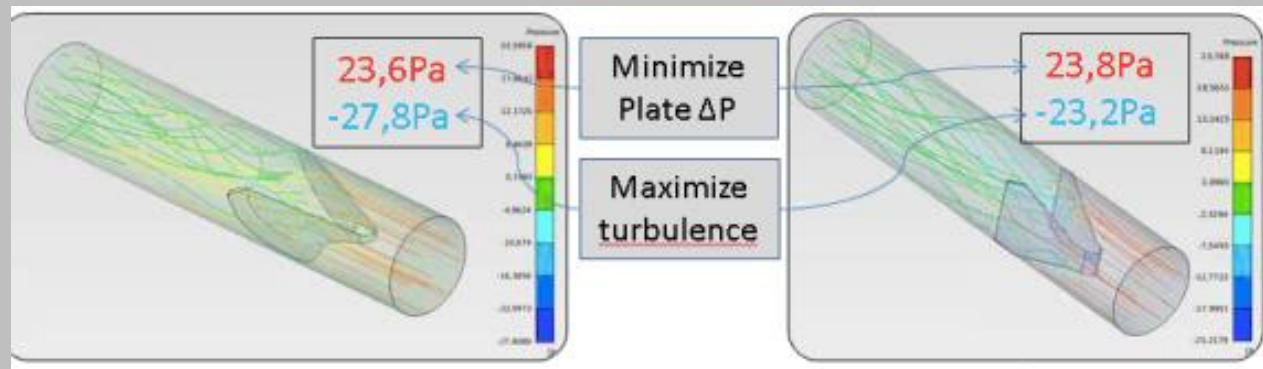
“我们引入了ANSYS AIM，现在，即使没有专业仿真知识的工程师也能够在他们的日常工作中使用多物理场仿真。”



Richard Krellner，设计部总监
Klubert + Schmidt
via CADFEM

客户排气管V型板设计

| 6项设计 | AIM | 当前工具 |
|--------|-------|------|
| 设计开发时间 | 半天 | 5 天 |
| 前处理 | 30 分钟 | 45分钟 |
| 后处理 | 10分钟 | 30分钟 |

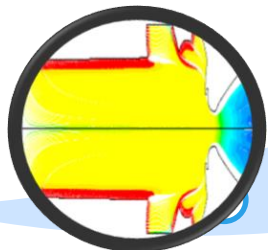


仿真帮助实现客户的关键业务需求

- 更快的创新
- 更高的质量
- 更低的成本
- 更加节能、环保
- 更好的客户体验

先进的仿真技术

Orbital ATK
CFD替代全尺寸测试，
每次可节省\$10m



先进的
仿真技术

耦合仿真

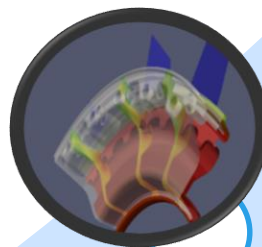
SpaceX
大幅节省载荷设备成本



完备的
虚拟原型

Cloud, HPC & ACT

Rolls Royce
仿真提速5倍



流程压缩

Digital Twin 数字孪生

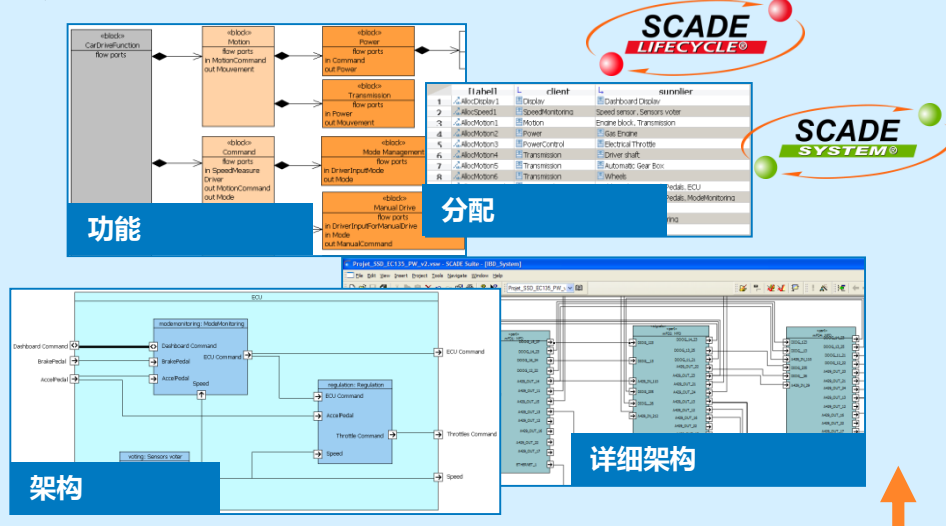
空中客车的数字化仿真，美
国国防部的数字线程计划，
基于模型企业



动态CAE协作

ANSYS 系统工程框架与仿真平台， 实现仿真驱动产品研发

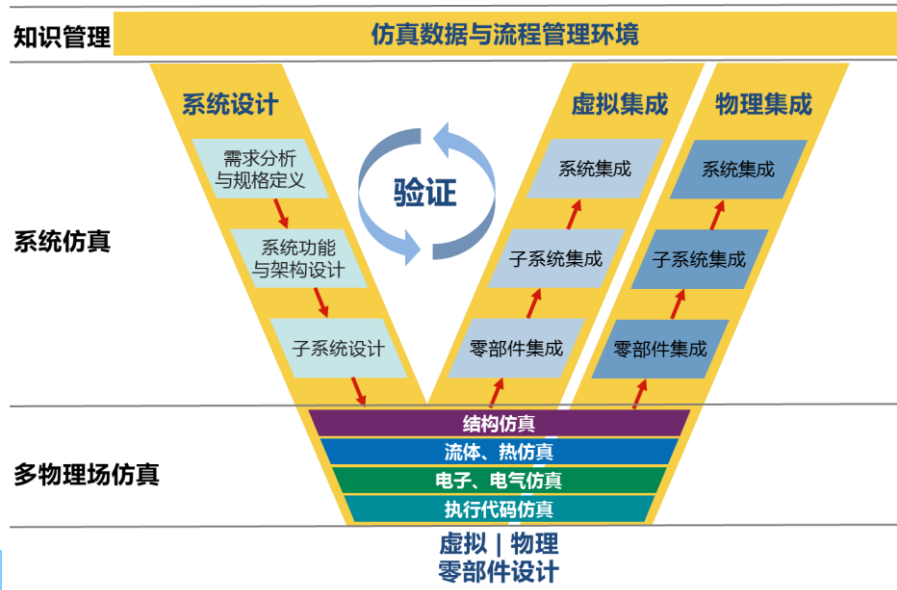
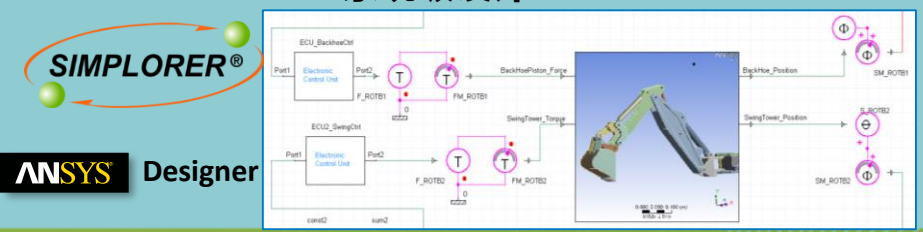
功能工程



软件工程



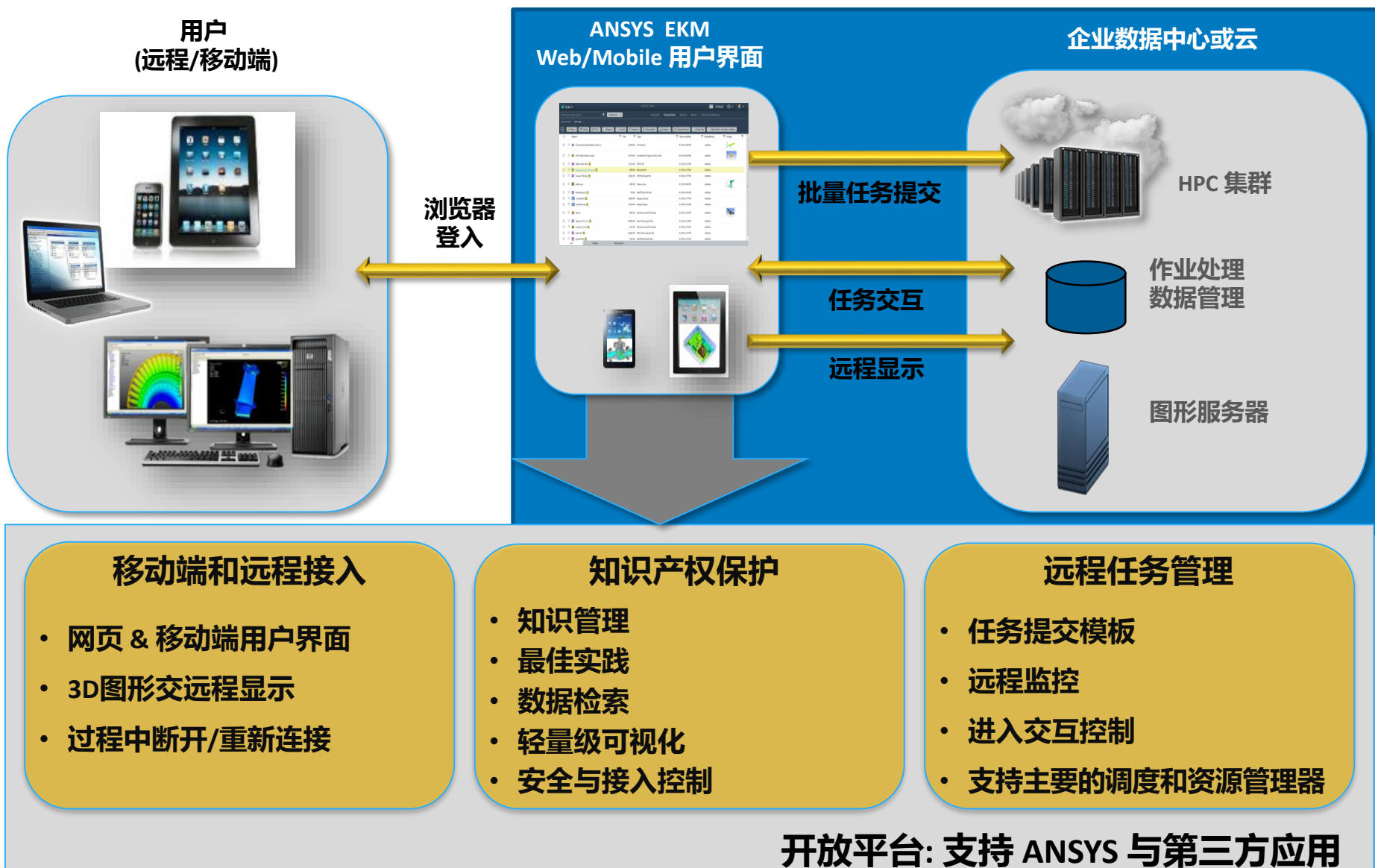
系统级设计



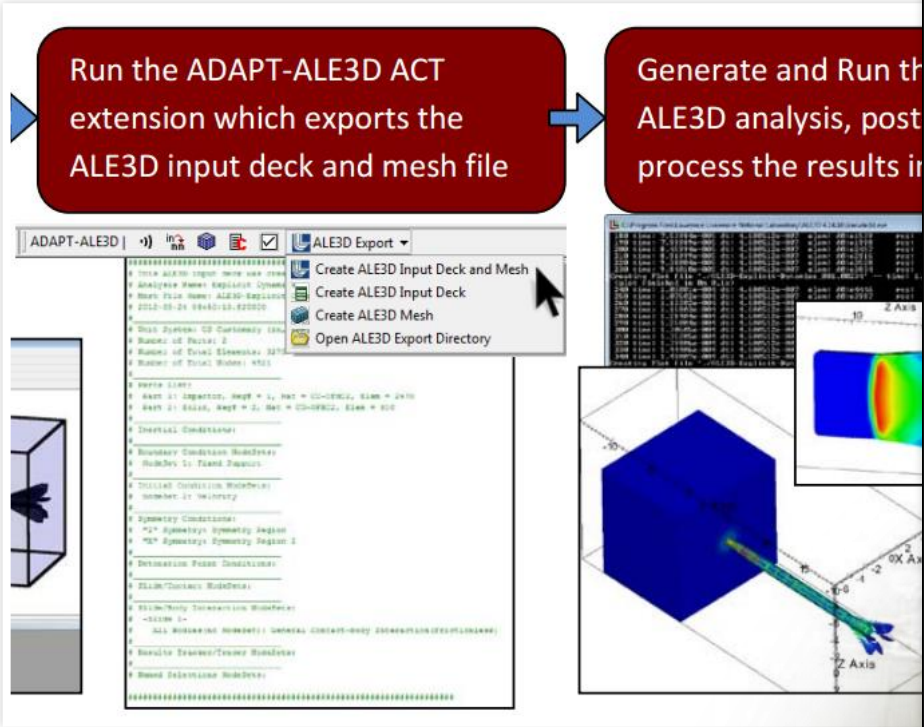
详细设计



仿真平台应用环境



开放的构架与定制化开发



ANSYS Customer Portal

Support Products Downloads Knowledge Resources Employees

Acoustics Extension

EXTENSION FOR WORKBENCH

R16.0

ACT Extensions (R15.0)

| | | |
|--|---|--|
| Acoustics Extension Version: 45.0 FREE Target Application: Workbench Mechanical Expose 3D acoustics solver capabilities | Beam End Release Version: 1.0 FREE Target Application: Workbench Mechanical Expose the end release feature for beam elements and enable advanced graphic post-processing for beam results | Beam Results Viewer Version: 1.0 FREE Target Application: Workbench Mechanical Expose advanced graphic post-processing features for beam elements |
| CMS/Superelements Version: 4.4 PAID Target Application: Workbench Mechanical Make easy to generate, use, export, import and expand superelements in ANSYS Mechanical | Convection Extension Version: 4.0 FREE Target Application: Workbench Mechanical Expose convection with pilot node capability in steady-state and transient thermal analyses | Coupled Diffusion Version: 3.0 FREE Target Application: Workbench Mechanical Introduce coupled diffusion analysis (structural diffusion, thermal diffusion, and structural/thermal diffusion) in both static and full transient analysis |
| Coupled Field Physics Extension Version: 2.0 FREE Target Application: Workbench Mechanical Expose piezoelectric, thermal/piezoelectric, and electro-structural solver capabilities | DOAM Version: 2.0 FREE Target Application: Workbench Mechanical Expose the Dynamic Design Analysis Method (DDAM) in Mechanical interface | DM Design Modeler Utility Version: 2.0 FREE Target Application: Design Modeler Expose some useful functions in DM interface |

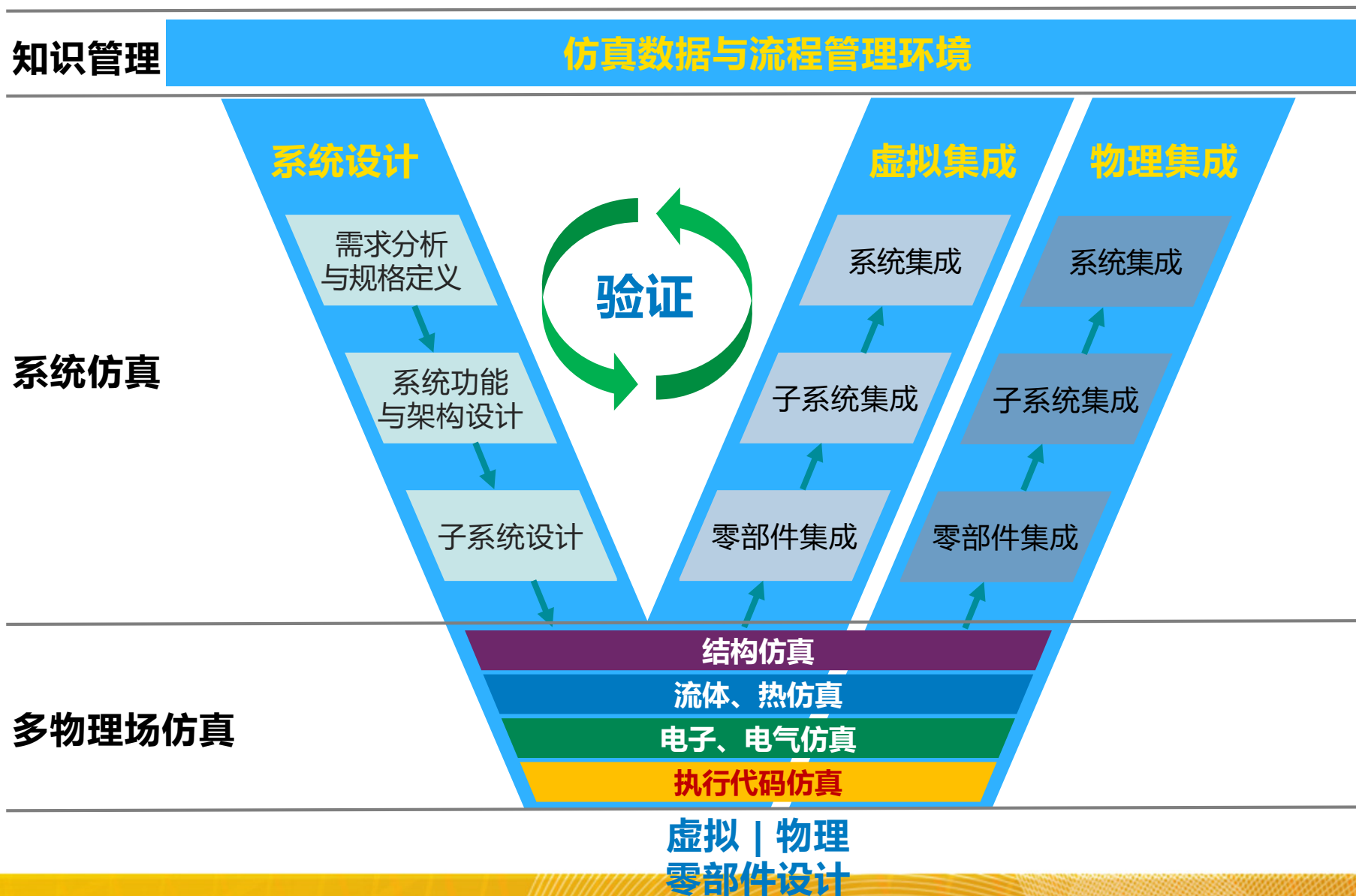
ACT Templates

- ACT templates R150
- ACT Templates for DM
- ACT Templates for DX
- ACT Advanced Template

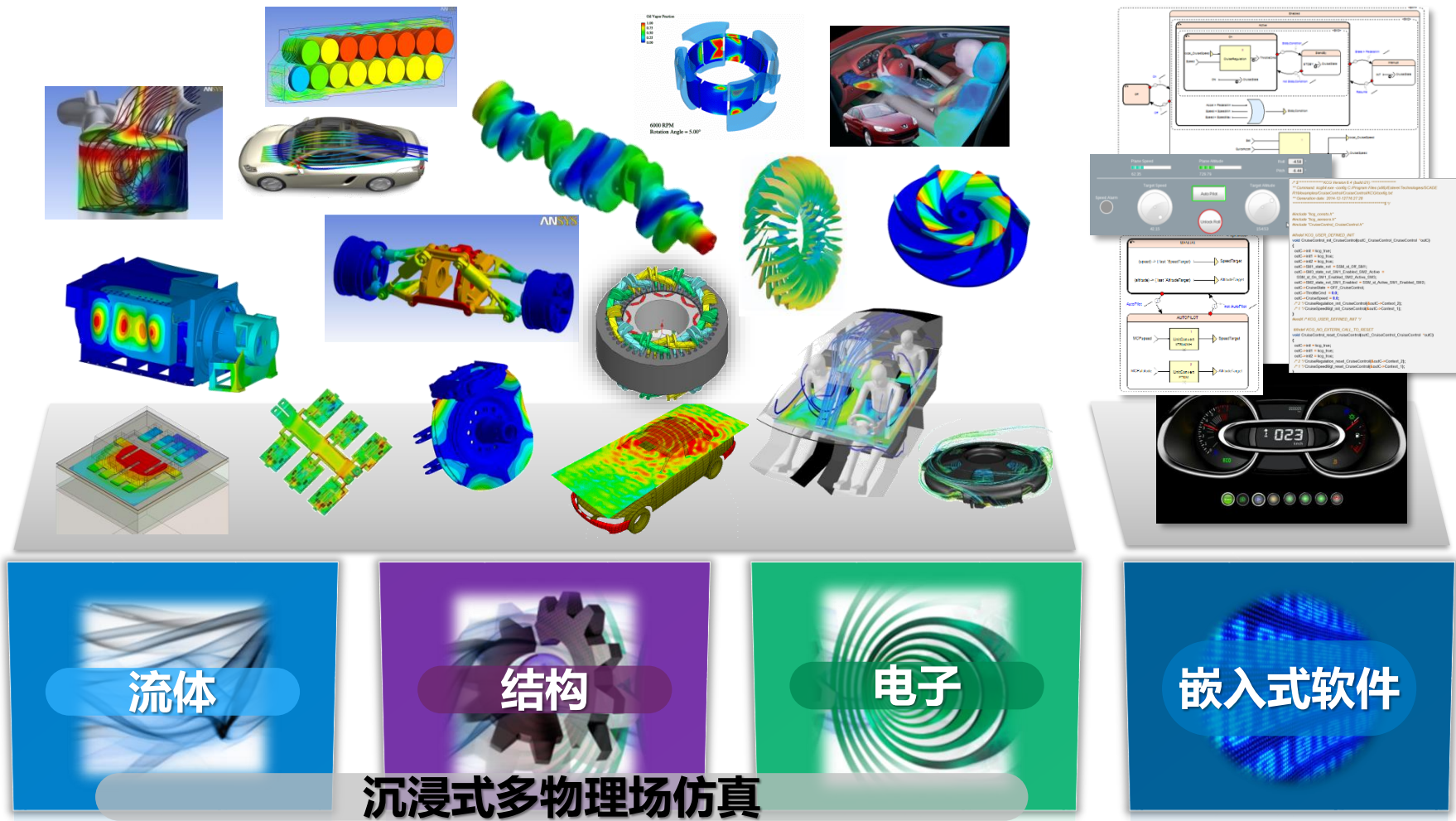
Help & Support

- Contact Local Support
- ACT Module Doc
- Online Reference Guide
- Download Reference Guide
- ACT Overview Video
- ACT Intro Training
- Installation Procedure
- ACT R145 to R15 Migration Notes

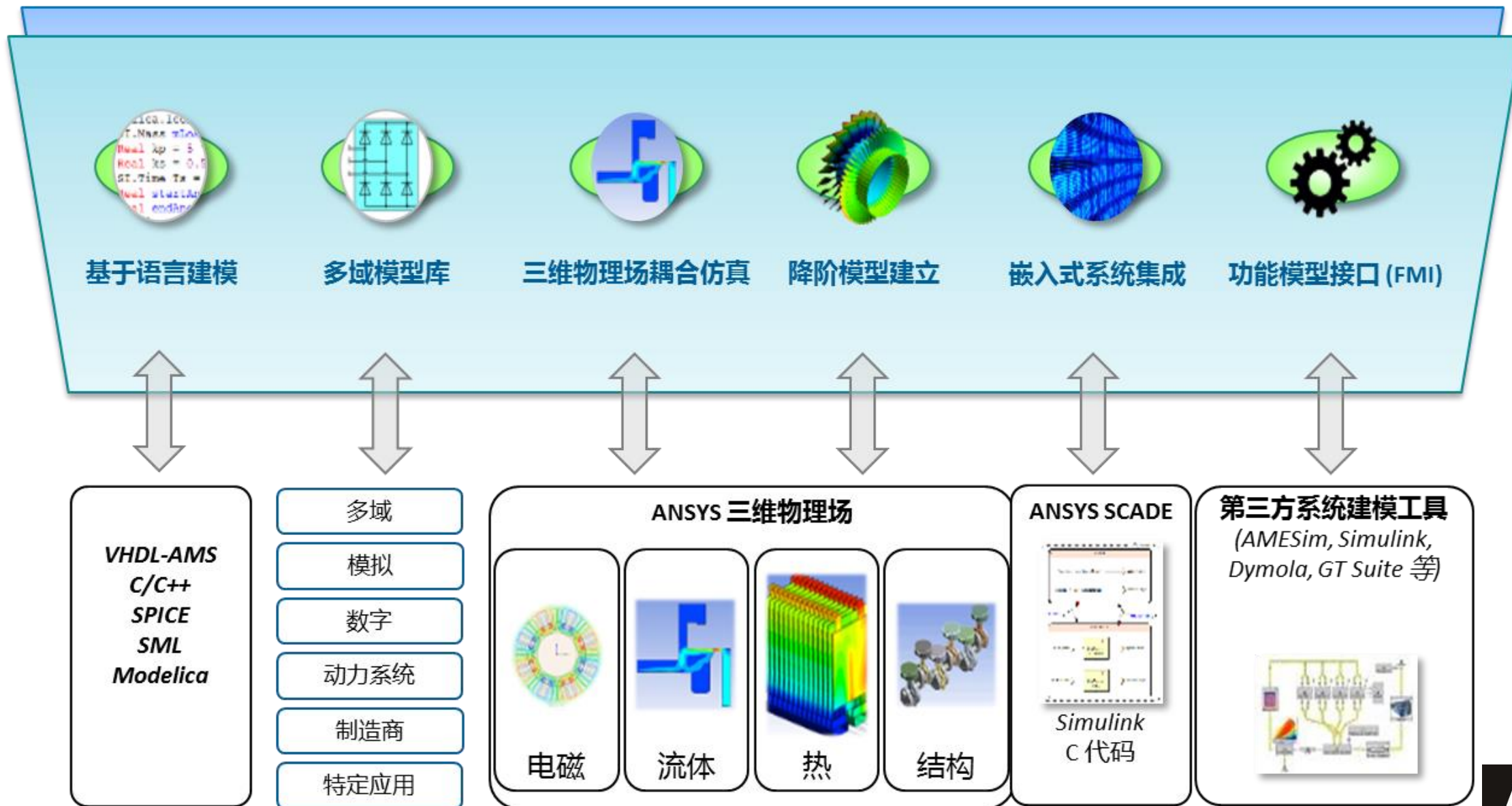
ANSYS 基于仿真的研发创新平台框架



全面的部件级设计



全系统建模与仿真

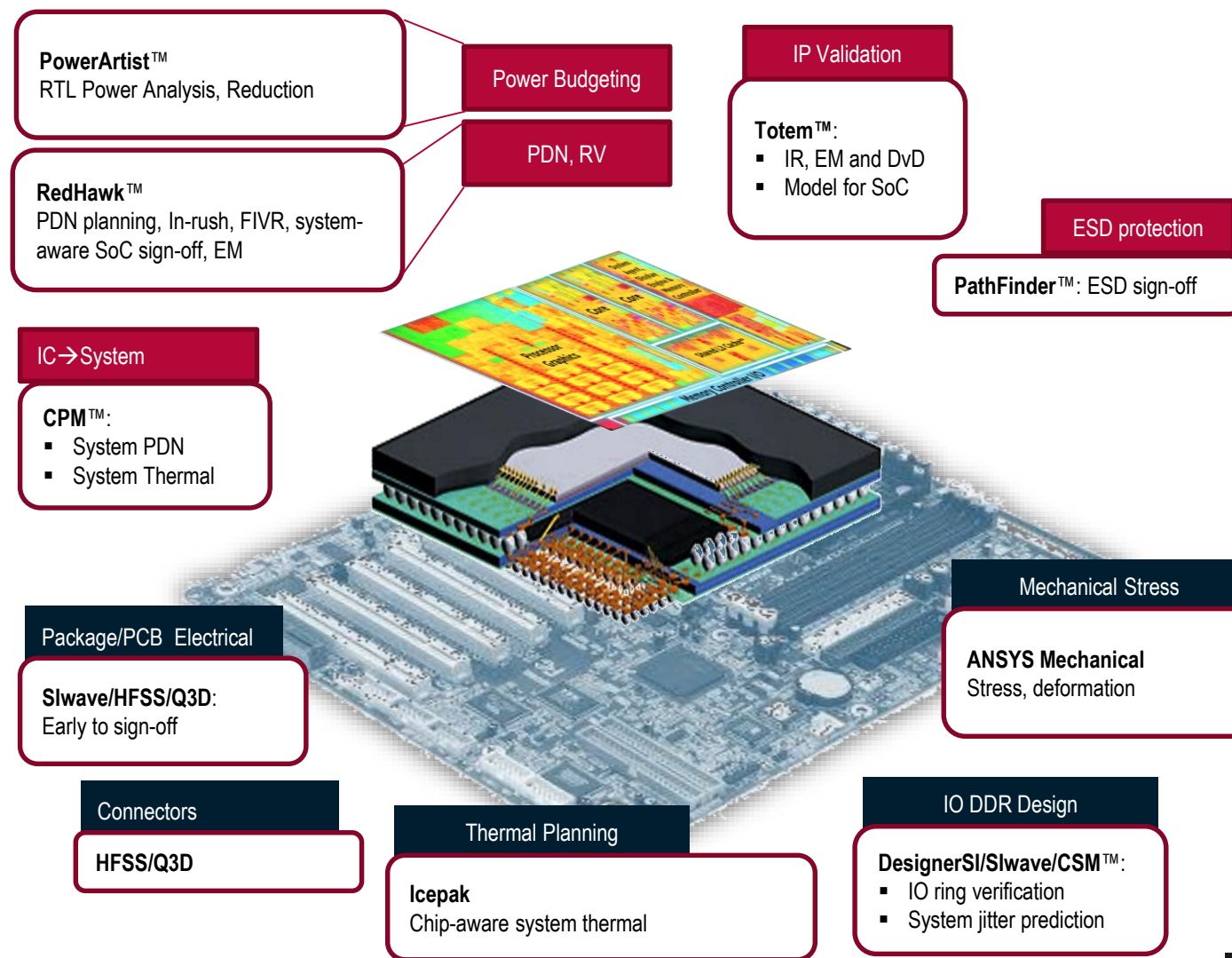


- **电机和电磁部件本体设计和多物理场仿真**
- **嵌入式代码/驱动电路/执行机构和整体仿真**
- **多层次系统模型**



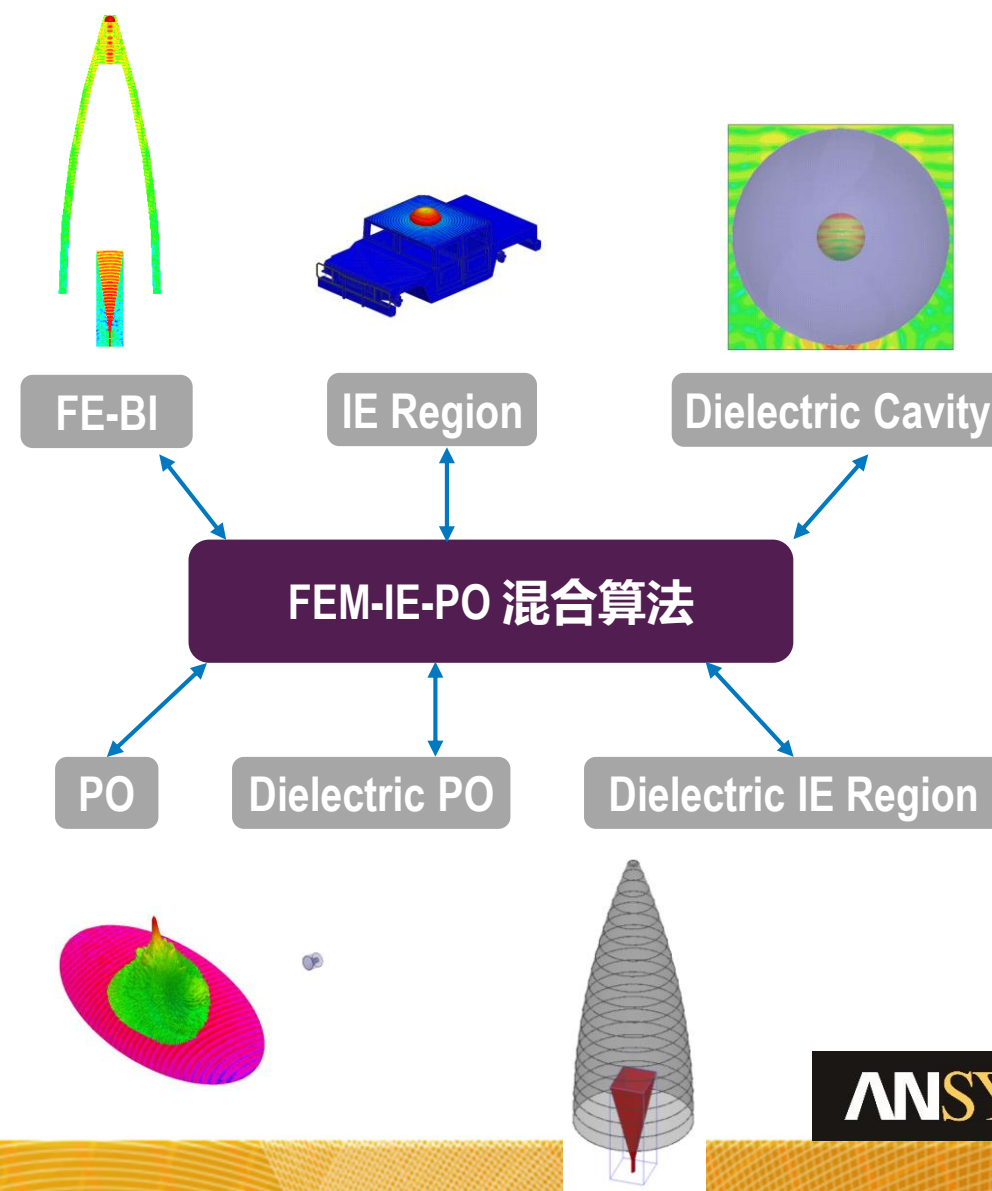
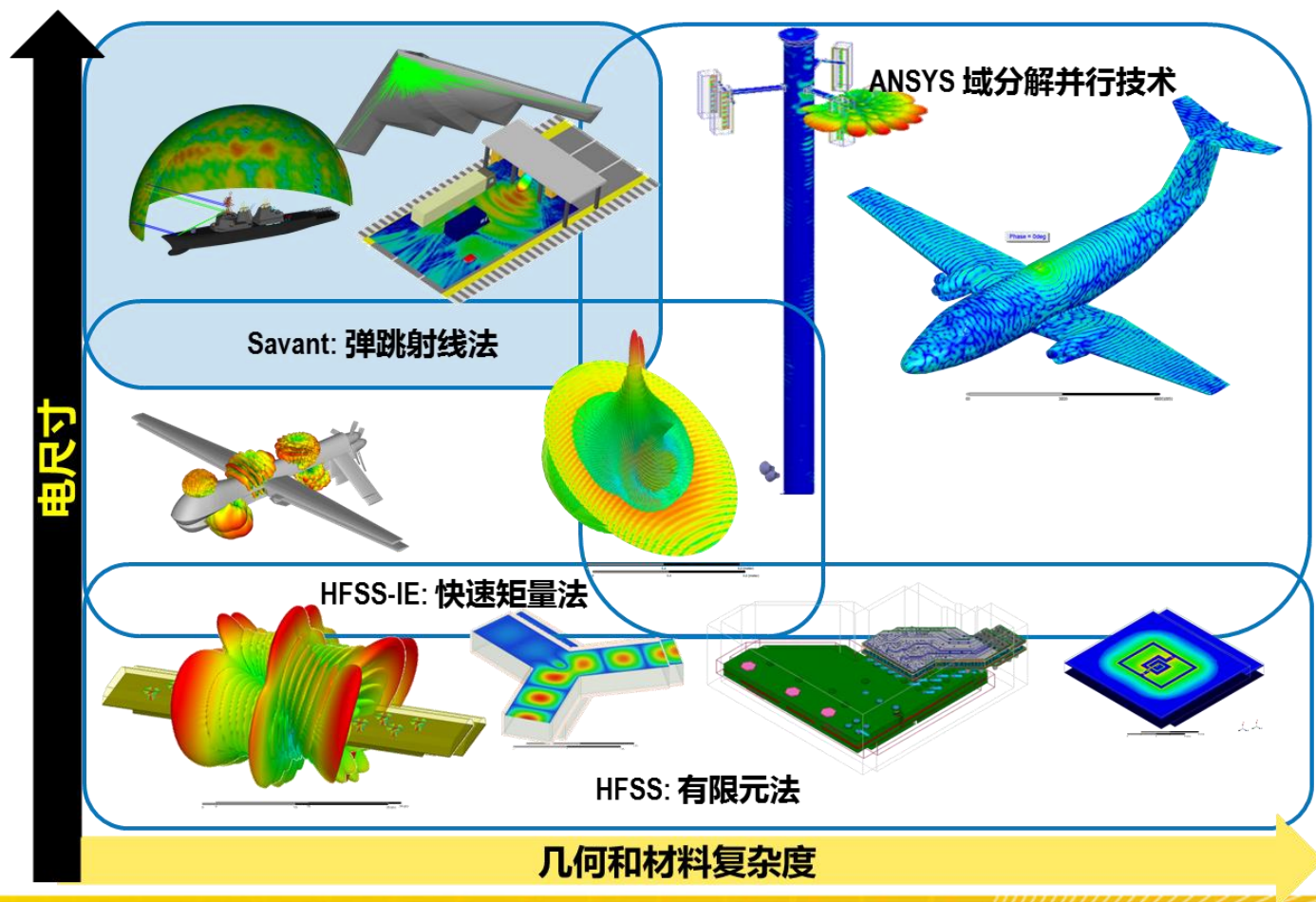
ANSYS仿真平台: 芯片-封装-系统(CPS)平台

- 考虑芯片效应的封装/PCB和系统设计
- 考虑封装/PCB的芯片设计
- 高速电路的SI/PI, EMI 和ESD
- 芯片低功耗设计与散热设计
- 焊点可靠性与疲劳设计
- 结构发热/翘曲仿真



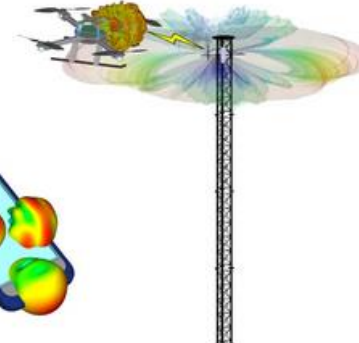
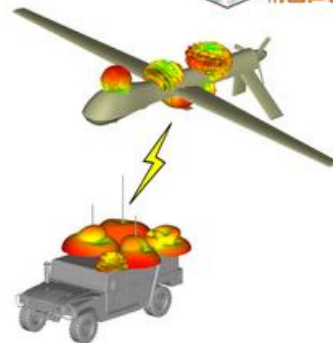
ANSYS仿真平台：天线设计与仿真

- 最全面的算法体系、最强大的算法技术
- 并行计算和多算法混合



ANSYS仿真平台：系统级射频干扰仿真

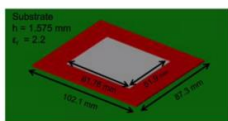
- 系统/电路/电磁场的集成化仿真环境
- 精确快速的 超大电尺寸电磁仿真
- 快速评价系统性能，避免潜在风险



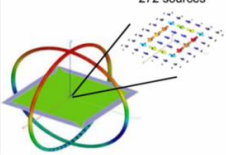
ANSYS HFSS Integration with Delcross Savant

HFSS/Savant Integration Example

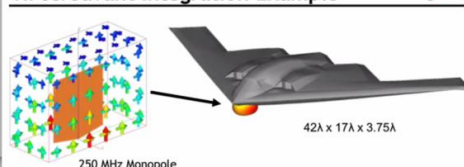
- Run HFSS to obtain,
 - Near-field data
 - Far-field data
- Run Savant with HFSS current source model
- Compare far-field results



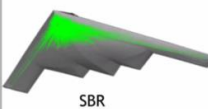
HFSS CSRC Model
272 sources



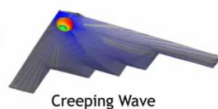
HFSS/Savant Integration Example



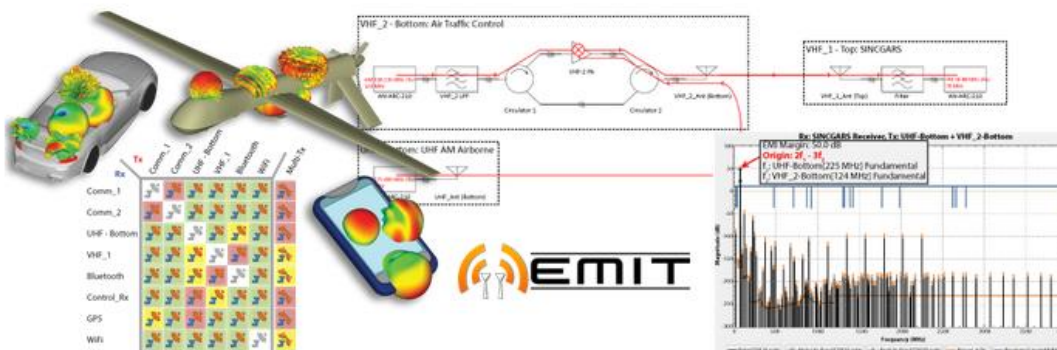
250 MHz Monopole



SBR



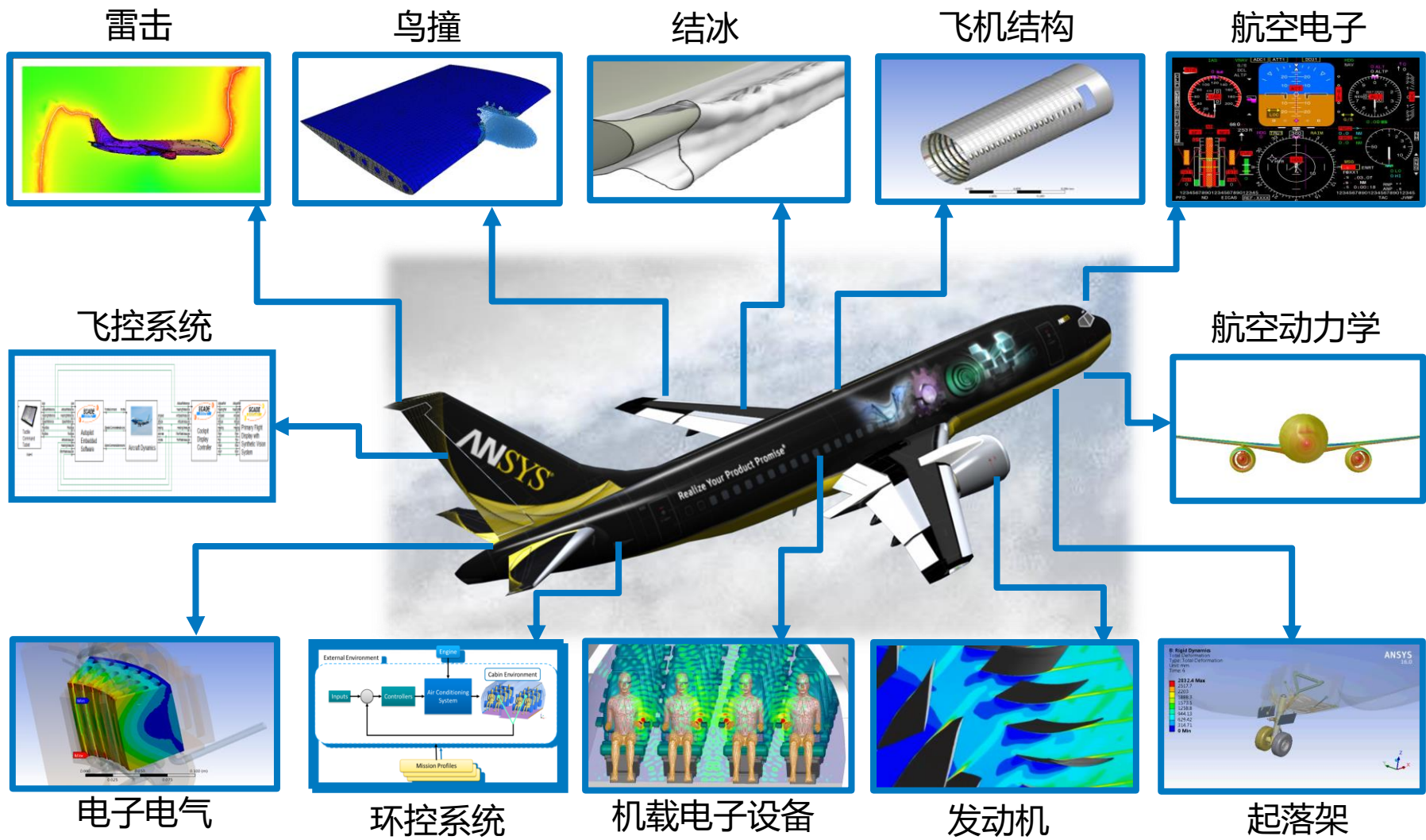
Creeping Wave



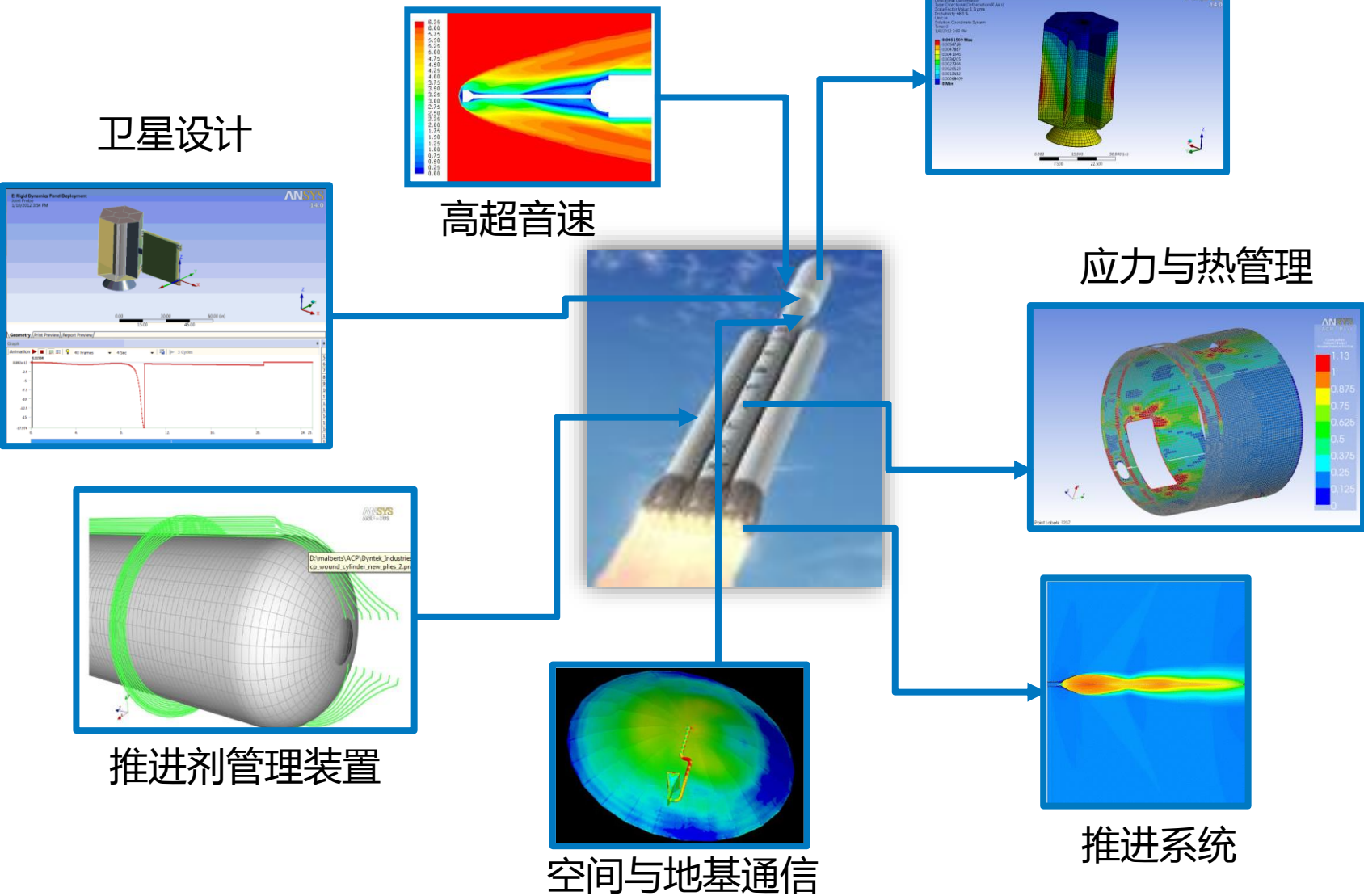
New! EMIT V4.0: Over 100x faster, traces RF cosite EMI "root source" signals schematically to their sources

Powering RF Cosite interference modeling, simulation and mitigation

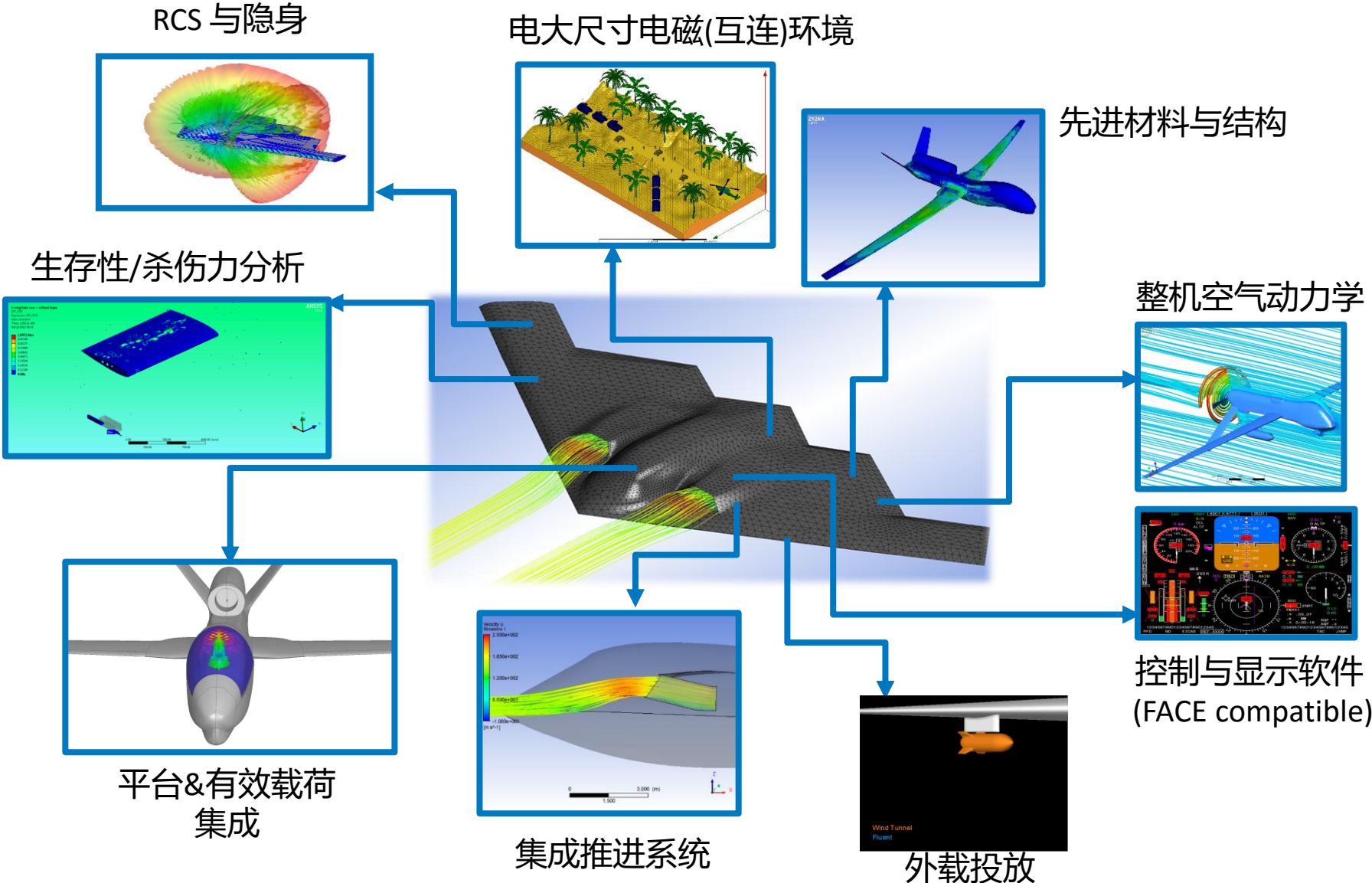
ANSYS仿真平台:航空行业



ANSYS仿真平台:航天行业



ANSYS仿真平台:国防行业



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感谢聆听

