Mechanics and Machines, CAE STR 1

Stress Analysis

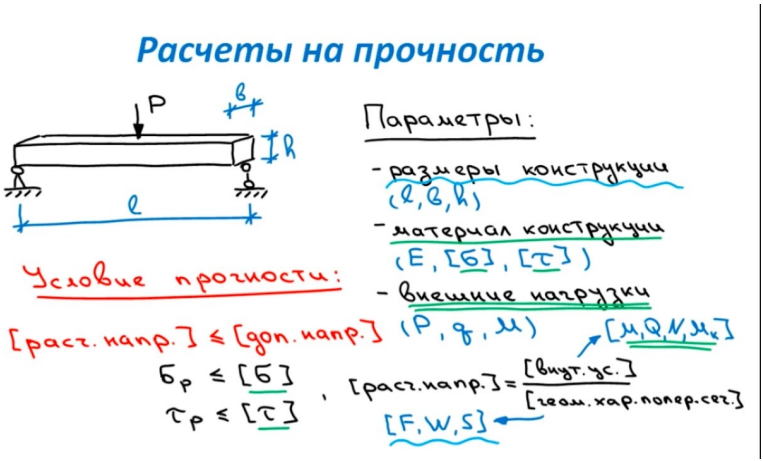
INNOPOLIS UNIVERSITY

Types of problems

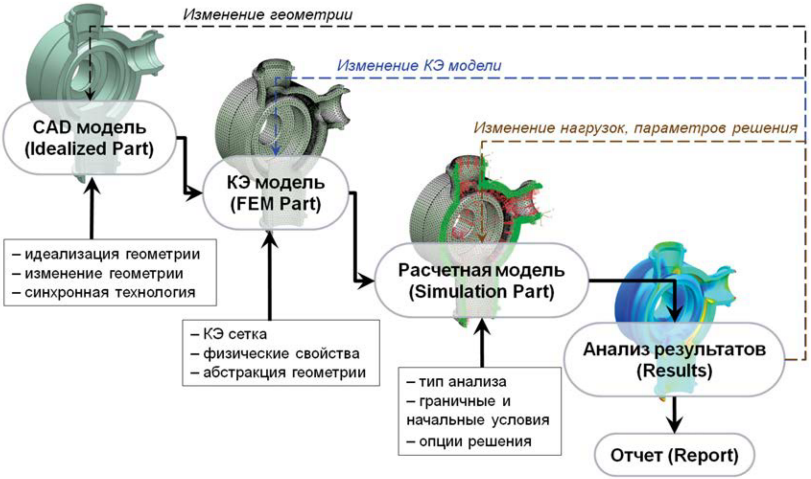
1. **Design calculations**. You know kinematics and load. You should choose material and sizes of parts.
2. **Checking calculation**. You know loads, materials, sizes. You should check the possibility to resist the such loads in current configuration
3. **Determining the maximum load limit**

Basics of calculations

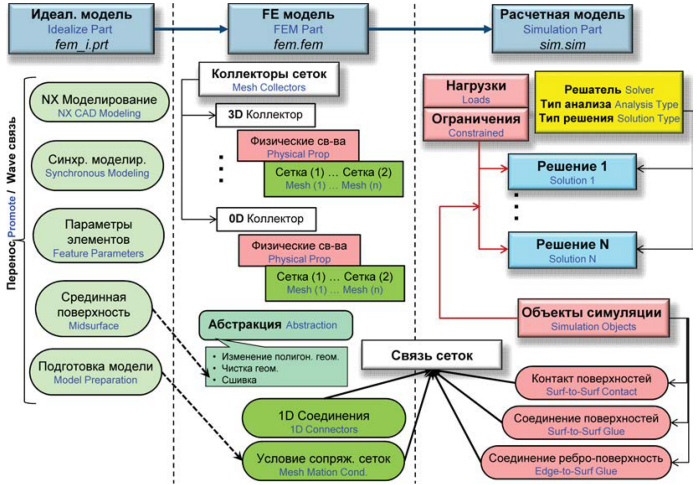
Video



CAE worflow

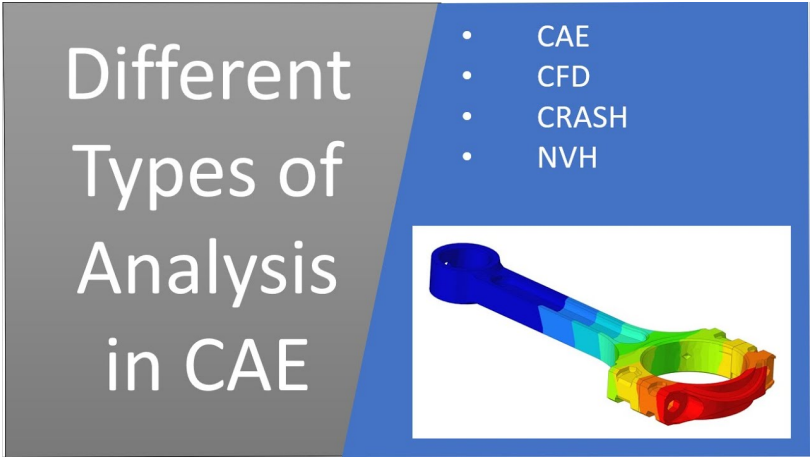

Изменение геометрии
Изменение КЭ модели
Изменение нагрузок, параметров решения
CAD модель (Idealized Part)
КЭ модель (FEM Part)
Расчетная модель (Simulation Part)
Анализ результатов (Results)
Отчет (Report)
– идеализация геометрии
– изменение геометрии
– синхронная технология
– КЭ сетка
– физические свойства
– абстракция геометрии
– тип анализа
– граничные и начальные условия
– опции решения

CAE designing scheme



Types of Analysis in CAE

Video



Some real life case studies

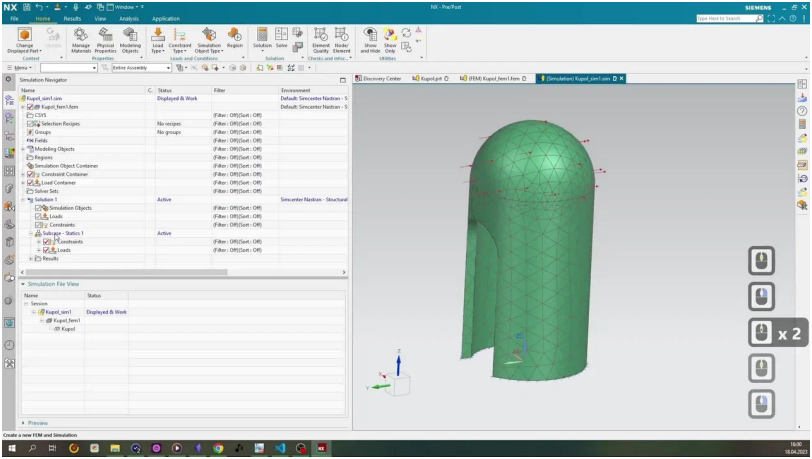
Video

Recomendations for creating meshes

- Analyze beams, cables — 1D mesh
- Sheet or shell component — 2D mesh
- You should have more vertices in stress concentrator and large changes
- Try to eliminate chamfers, bendings, small holes

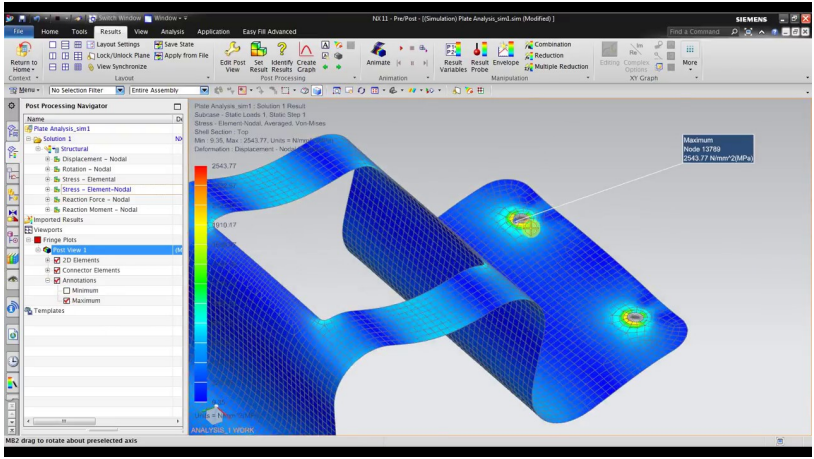
First steps in CAE (Task 1, 2)

Video



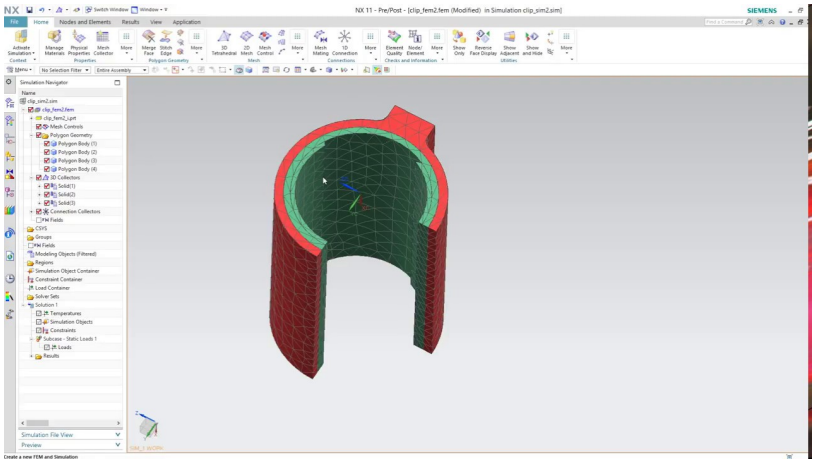
2D mesh for sheet material + 1D for bolts (Task 1)

Video



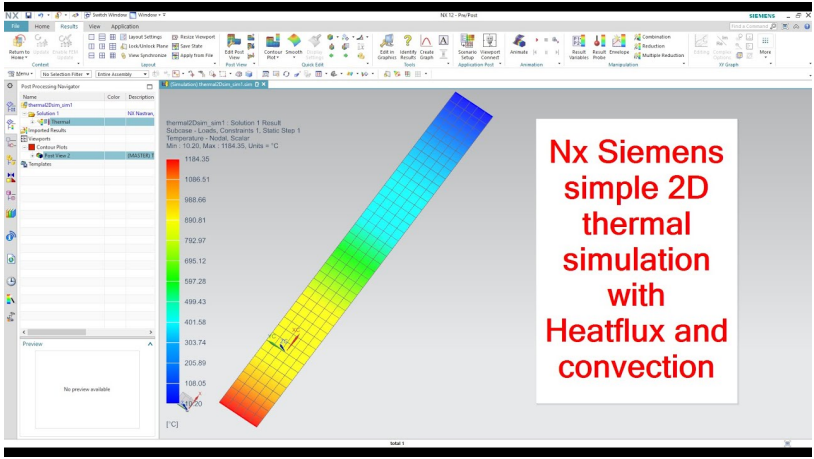
Mesh Mating (optional)

Video



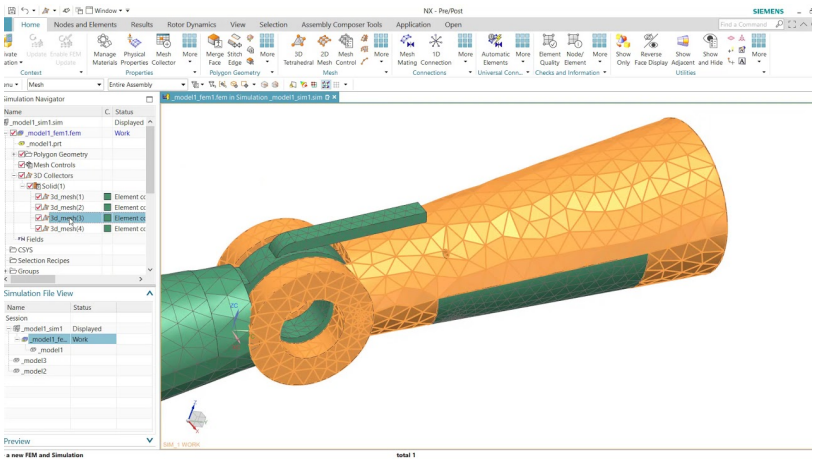
Thermal simulation (Task 2)

Video



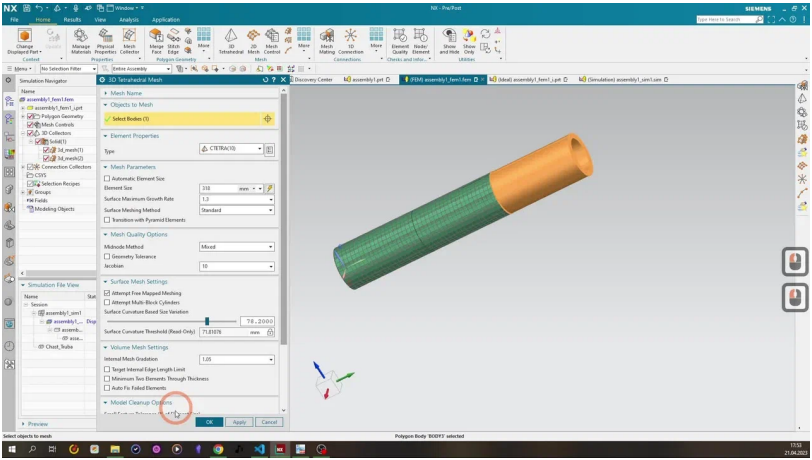
Contact (Task 3)

Video



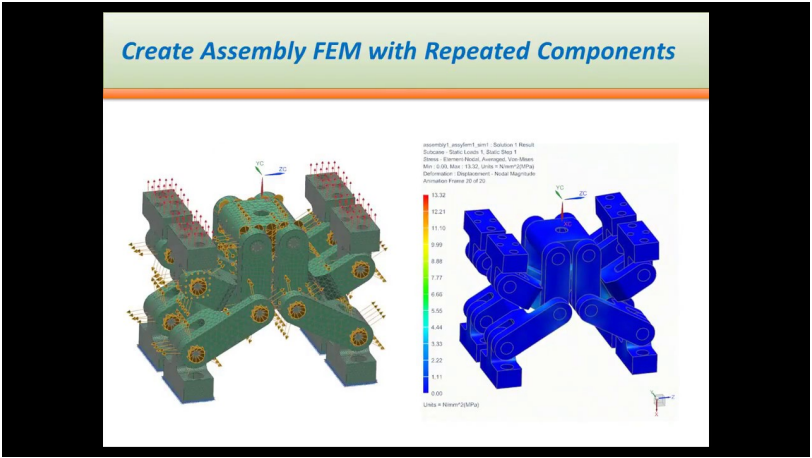
Contact, Assembly (Task 3, 4)

Video



Assembly Meshing (Multiple repeated parts) (Task 4)

Video



Reference Material

1. Link to all needed books (IMPORTANT)
2. 1D Bolt Simulation Double Plate Bolted Together
3. Introduction of Basic Simulation in NX CAE
4. How to add new material (rus)
5. NX CAE. Основы расчетов на прочность в NX
6. CAE Durability, PART-1

Deserve “A” grade!

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Room 105 (Underground robotics lab)