NIKITA GUROV

STATIC LINEAR, STATIC NON-LINEAR OR EXPLICIT FEA
what and when?

BENEFITS

LIMITATIONS

STATIC LINEAR
IS THE DESIGN STRONG ENOUGH?
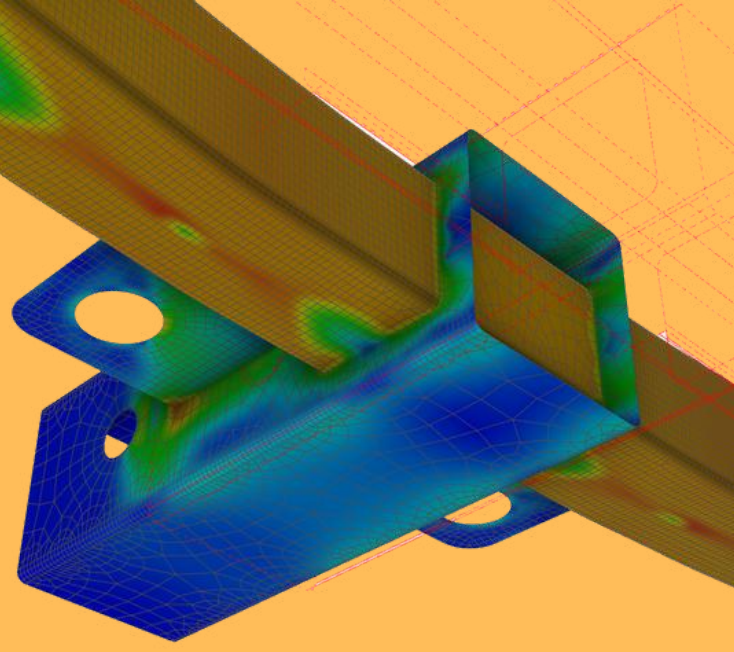
BENEFITS

Easy way to determine the maximum load before plastic deformations occur

Simple to setup

Simple requirements for finite element model

Quick to solve

No need for super computational power

LIMITATIONS

Works only for small deformations

Does not simulate materials plasticity

Results are relevant only when stress doesn't exceed material yield value

	NON-LINEAR ULTIMATE LOAD TO BREAK THE STRUCTURE	EXPLICIT ULTIMATE LOAD TO BREAK THE STRUCTURE & FAILURE MODE
BENEFITS		
Works for large deformations	✓	✓
Simulates material plasticity	✓	✓
Allows to identify ultimate load to break the structure	✓	✓
Allows to identify failure mode		✓
Simple enough to setup	✓	✓
Simulates dynamics & inertia		✓
Requires less troublseshooting		✓
Good for complex contact models		✓
LIMITATIONS		
Significant time to solve (hours or even days)	✓	✓
Extra care in model preparation: - keep number of elements as low as possible - avoid contacts where possible - use more accurate approach to model loads and constraints	✓	✓
Processor hungry		✓

FEA benefits

- **no guessing design strength anymore**
- **no expensive and time-consuming crash tests**
- **less conservative than empirical methods of hand calculations**