PTC® PRODUCT & SERVICE ADVANTAGE

- Mechanism-News in PTC Creo

- 10 Mechanism- "Tips & Tricks"

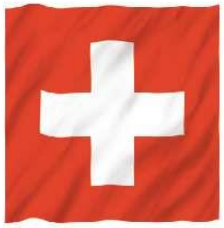
Urs Simmler
MCAD Simulation Specialist
PTC (Schweiz) AG

Presentation

Urs Simmler

MCAD-Simulation-Specialist

PTC (Schweiz) AG

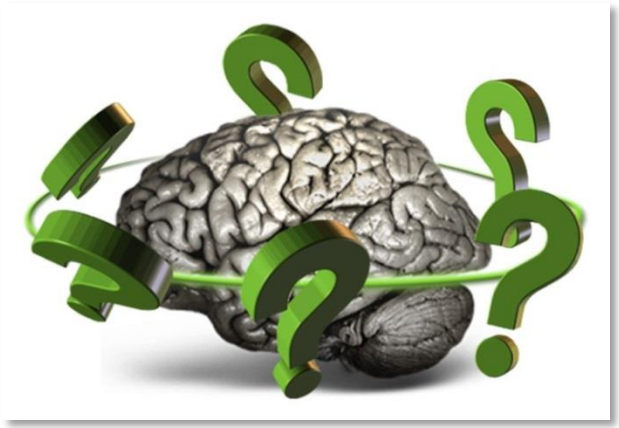


mail: **usimmler@ptc.com**
phone: **+41 44 824 34 36**

- Focused on PTC-simulation products
- Presales, Training, Consulting, …
- 26+ years simulation-experience (18 years with PTC)

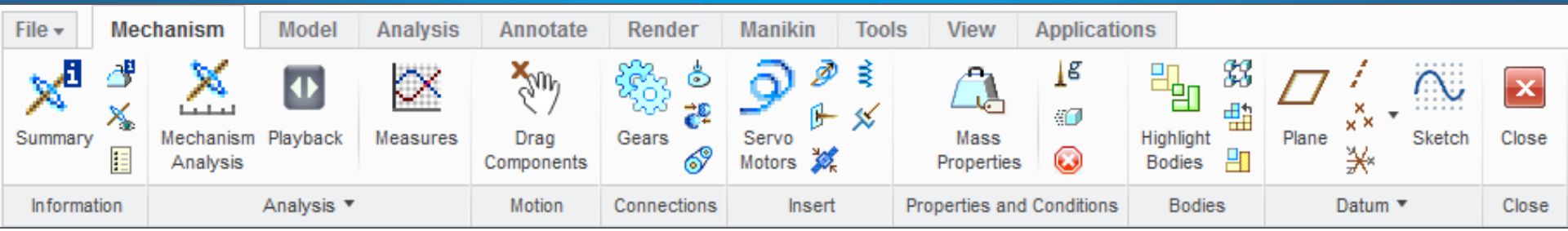
Agenda

- What's New: - PTC Creo Mechanism
- What's New: - PTC Creo Animation
- 10 Mechanism-"Tips & Tricks"
  with "Live" -Demos
- Questions

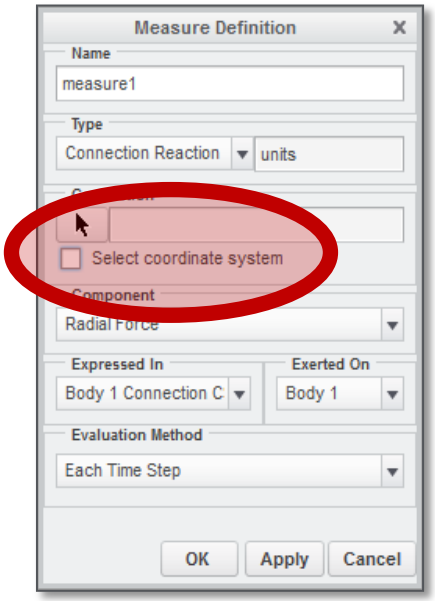


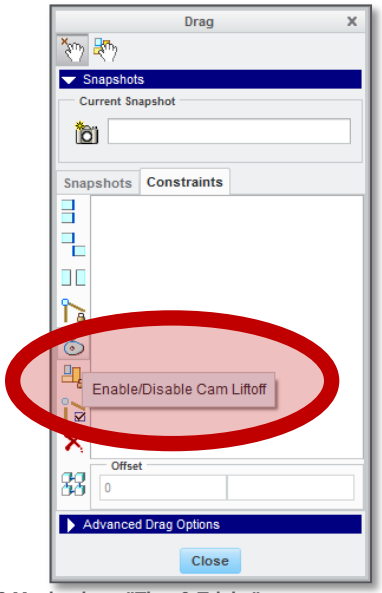
What's New: PTC Creo Mechanism

Usability

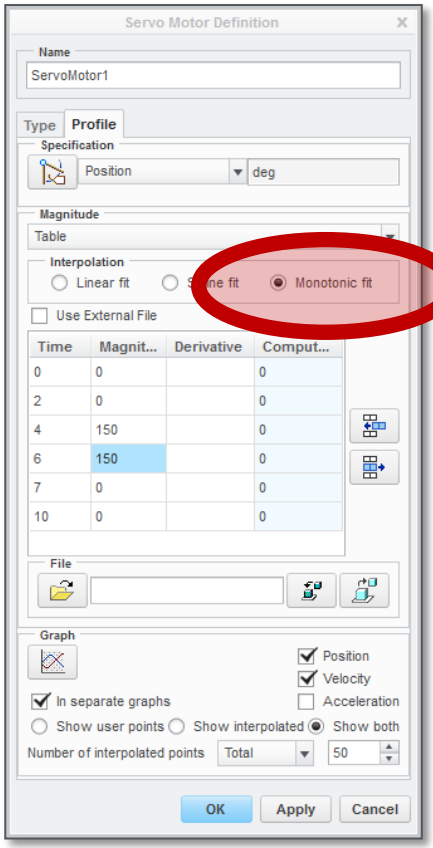


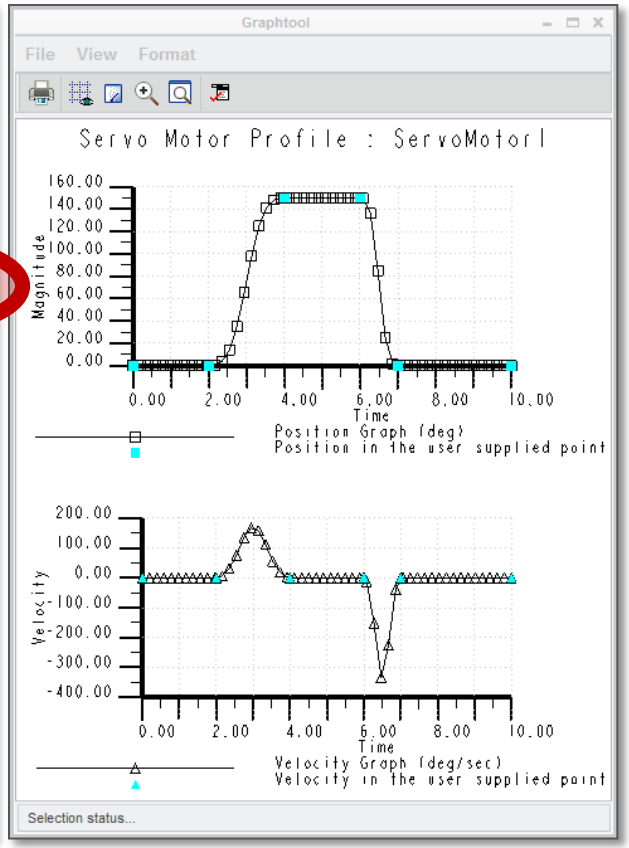
- Ribbon UI throughout
  - Common ribbon for command access
- User Selected CSYS for Measure Output
  - Measures can be extracted in a user selected csys
- Closed CAM snapshot constraints
  - Setting up initial conditions, etc…
    using snapshots easier than ever

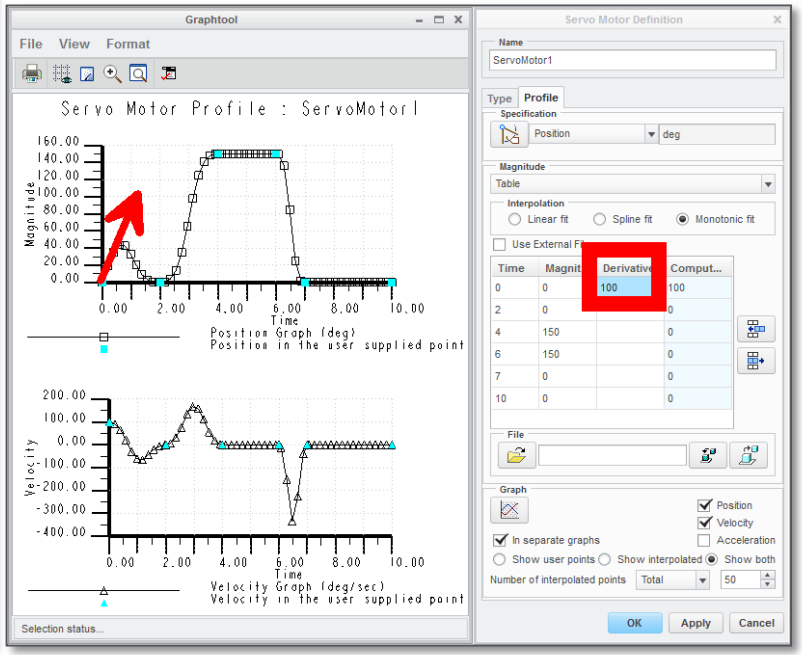




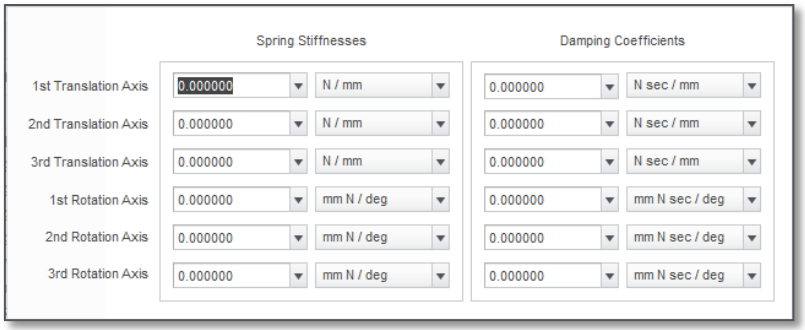
- Transitions for Table Driven Motors
  - New Continuous fit preserves profile segment behaviour
  - Many servo motor graph enhancements
  - Great for Mechatronic and Production cases
  - Pre-analysis for PLC programming





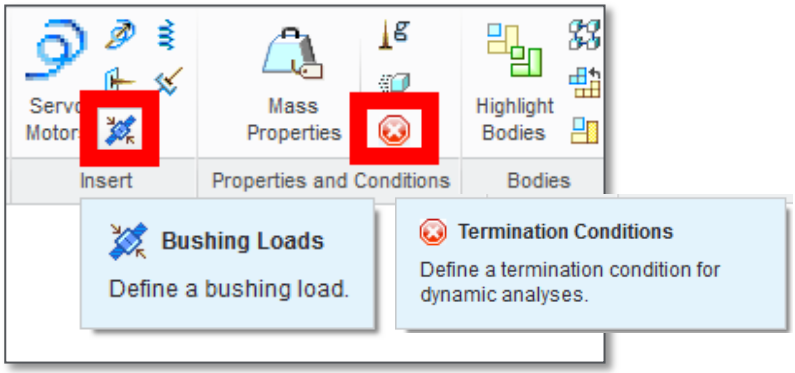


- Gimbal Joints
  - 3 rotations DOF, but axes are available for servos, forces, measures etc

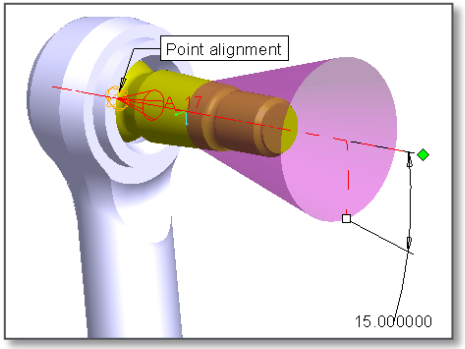


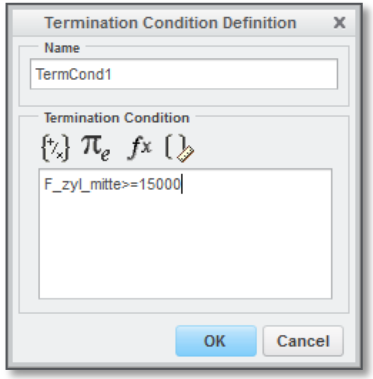
- Bushing Loads
  - Grouped springs and dampers
  - Single load for 6 objects

- Conditional Termination of Analyses
  - Termination based on values of measures, etc
  - ”Stop Analysis1 when distance3 >= 20mm”
  - No longer purely time based termination



- Ball and Bearing Connection Limits
  - ”Cone angle” limit

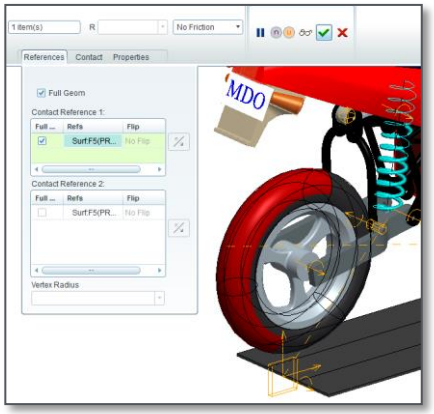




Mechanisms 3D contact – Phase 2

- Additional Bounded Surface Support
  - Segment of Cylinder, segment of Sphere
    - (In Wildfire 5.0 full cylinder/sphere is used)
  - Additional options include the ability to
    - Automatically close surface if desired
    - Check if the contact is internal/external
  - Multiple surfaces (of the same type) may be included in the contact
- Enhanced friction performance
  - Transitions between Bouncing and Continous contact
    - Stick/slip analysis is power hungry
    - Proposed solution will remove normal DOF until the contact is broken
    - The following behaviors will be supported
      - Ball on surface rolling/sliding
      - Cylinder on surfcae rolling/sliding
      - Ball on Ball rolling
      - Cylinder on cylinder rolling

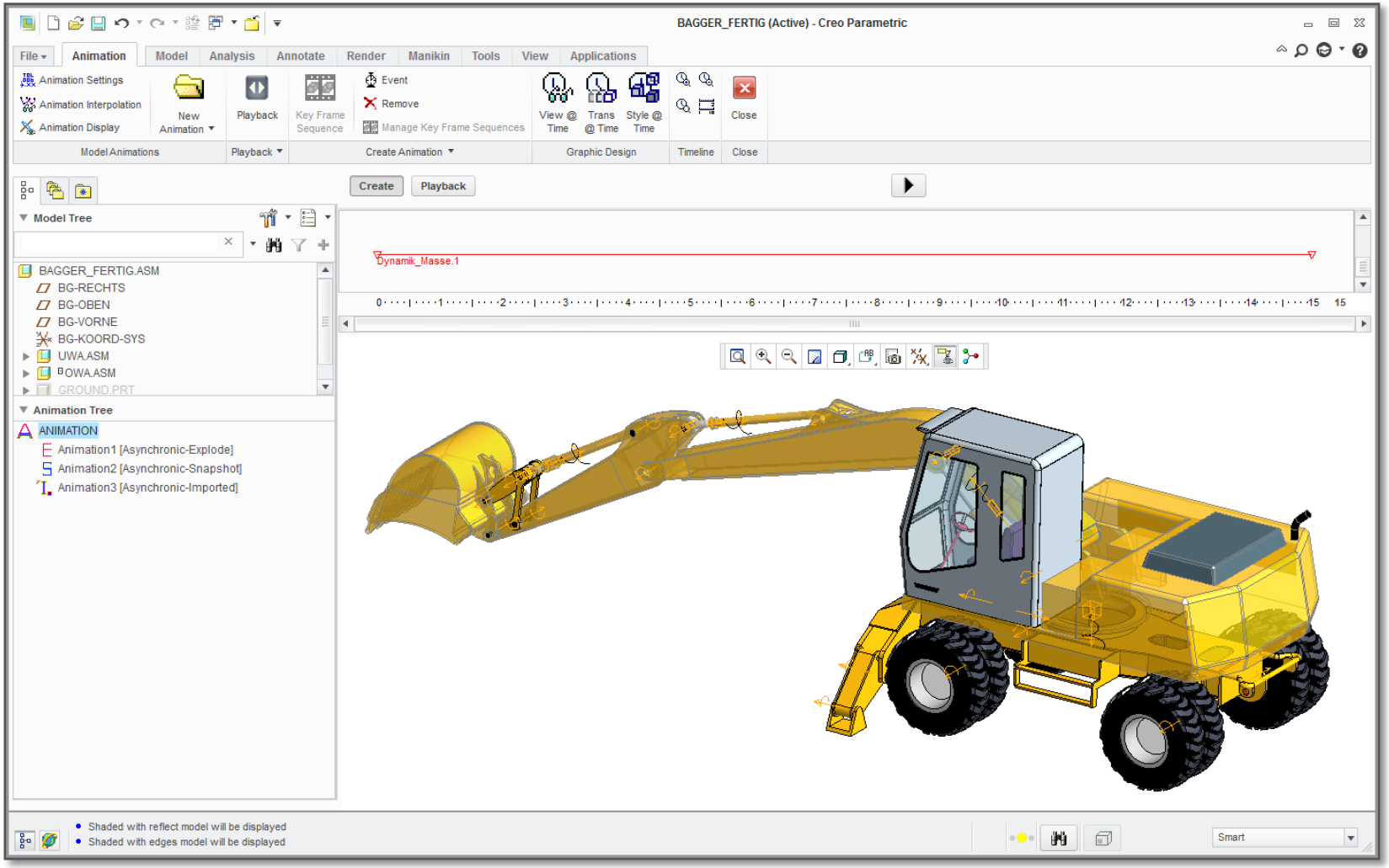
- Support for internal contact
  - Sphere-sphere
  - Cylinder-cylinder
  - Sphere-cylinder
- Newly supported geometry cases
  - Sphere-cylinder
  - Toroid-plane
  - Toroid-cylinder
  - Toroid-sphere
  - Cone-cone



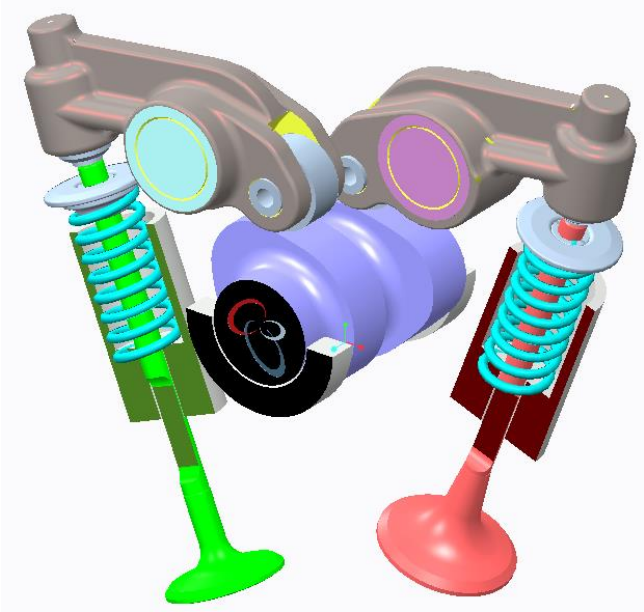
What's New: PTC Creo Animation

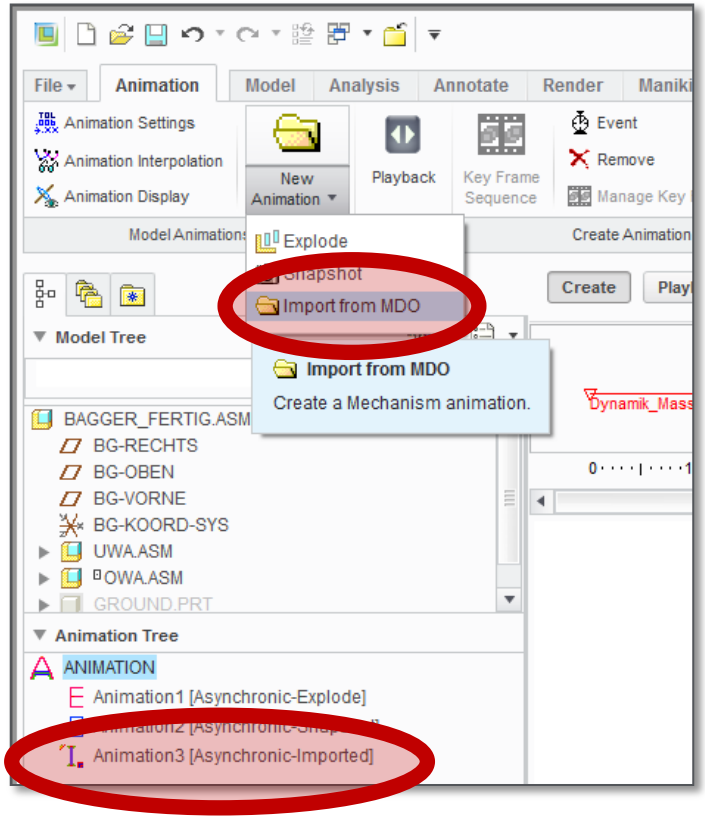
Usability

- Ribbon UI throughout for command access



- New Design Animation workflow
  - A complete overhaul of the DAO interface
  - “Filmstrip” based animations
- MDO results in Design Animation
  - Create ”kinematic” presentations of Dynamic analyses
  - Change views, blank components etc



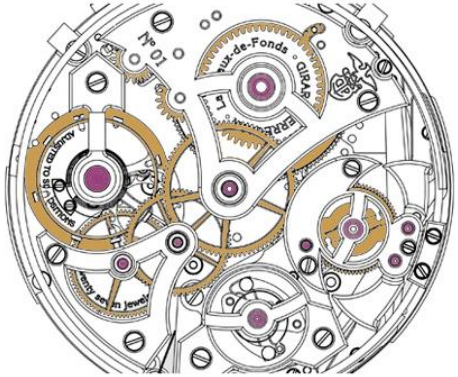


10 Mechanism-"Tips & Tricks"

10 Mechanism-"Tips & Tricks"

1. Mechanism Accuracy
2. Measure “Distance between 2 Components”
3. Graphical Display during Run
4. Mechanisms with Motion Skeletons
5. Using Snapshots (for Drawings)
6. Connect Mechanism with BMX
7. Chain Mechanism easily assembled with the “Repeat”-Command
8. Forces with “Dummy Sub-Mechanism”
9. Mechanism Playback in PTC Creo View / PTC Creo Illustrate
10. Using dynamic Results for an Animation

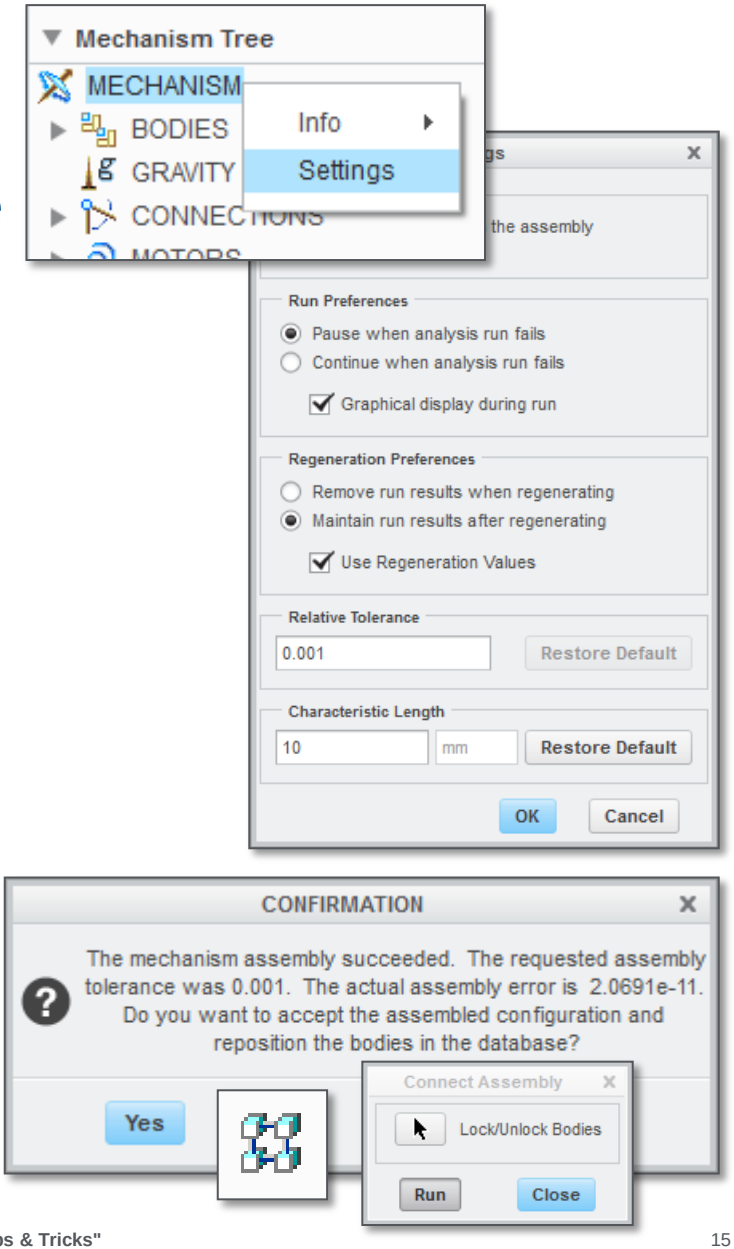
1: Mechanism Accuracy



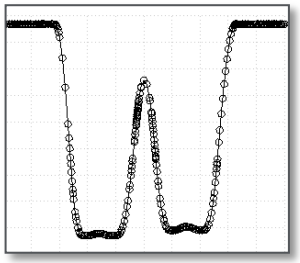
1: Mechanism Accuracy

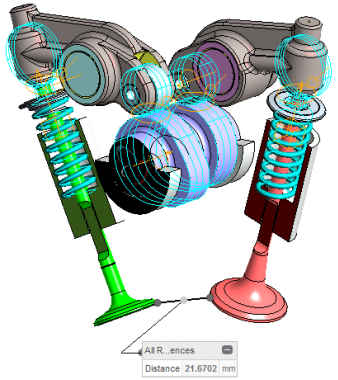
Understanding Mechanism Tolerances

- MDX is a based on a numerical solver and allows for certain tolerances to assemble the mechanism.
- The default Mechanism tolerances settings can be changed with RMB on Mechanism-Symbol in the Mechanism Tree
- 2 tolerance settings can be adjusted:
  - Relative Tolerance
  - Characteristic Length
- The user can think of the effective tolerance used in the model as "characteristic length multiplied by user supplied relative tolerance"



2: Measure “Distance between 2 Components”

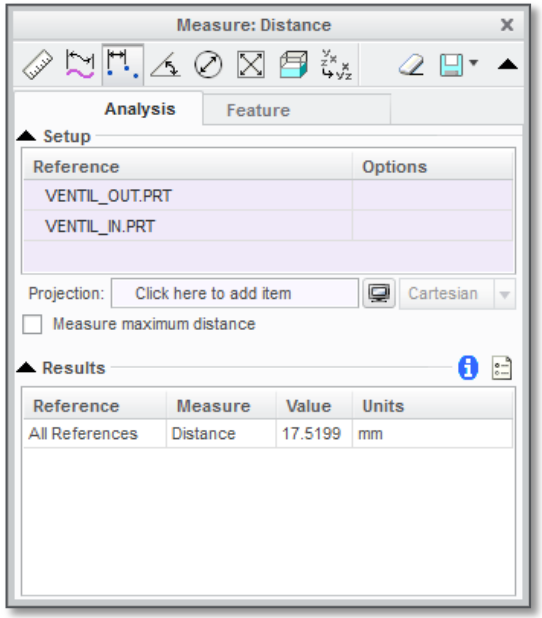


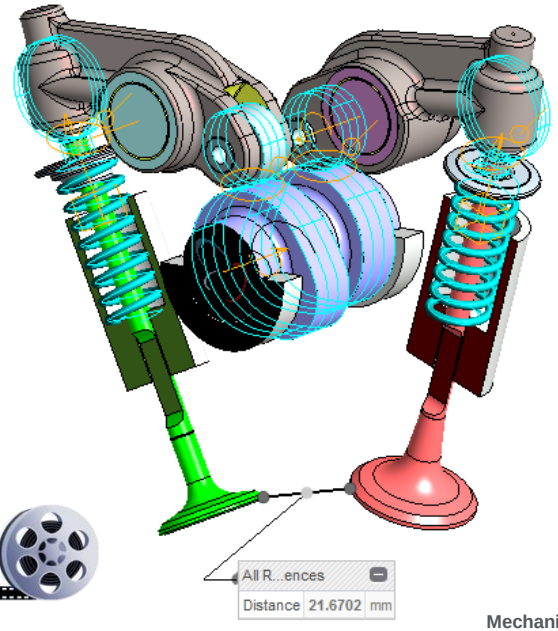


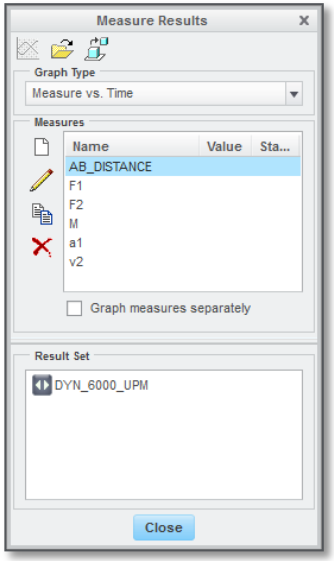
2: Measure “Distance between 2 Components”

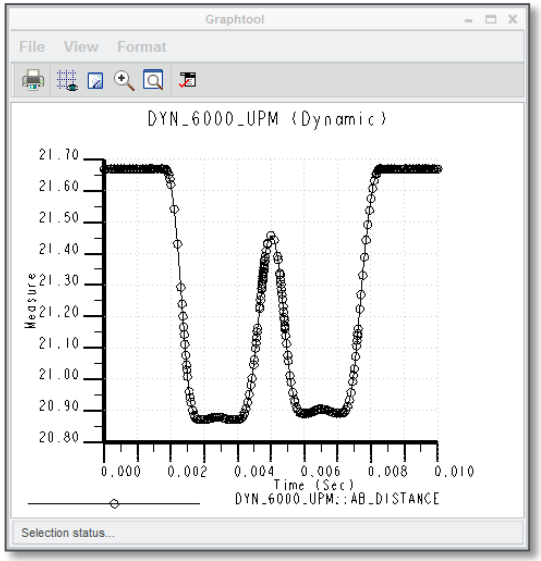
Easy Clearance-Control with "Measure-Distance"-Feature

- Create Distance-Feature in Assembly-Mode
- Distance-Feature can be dispayed as a Measure in Mechanism







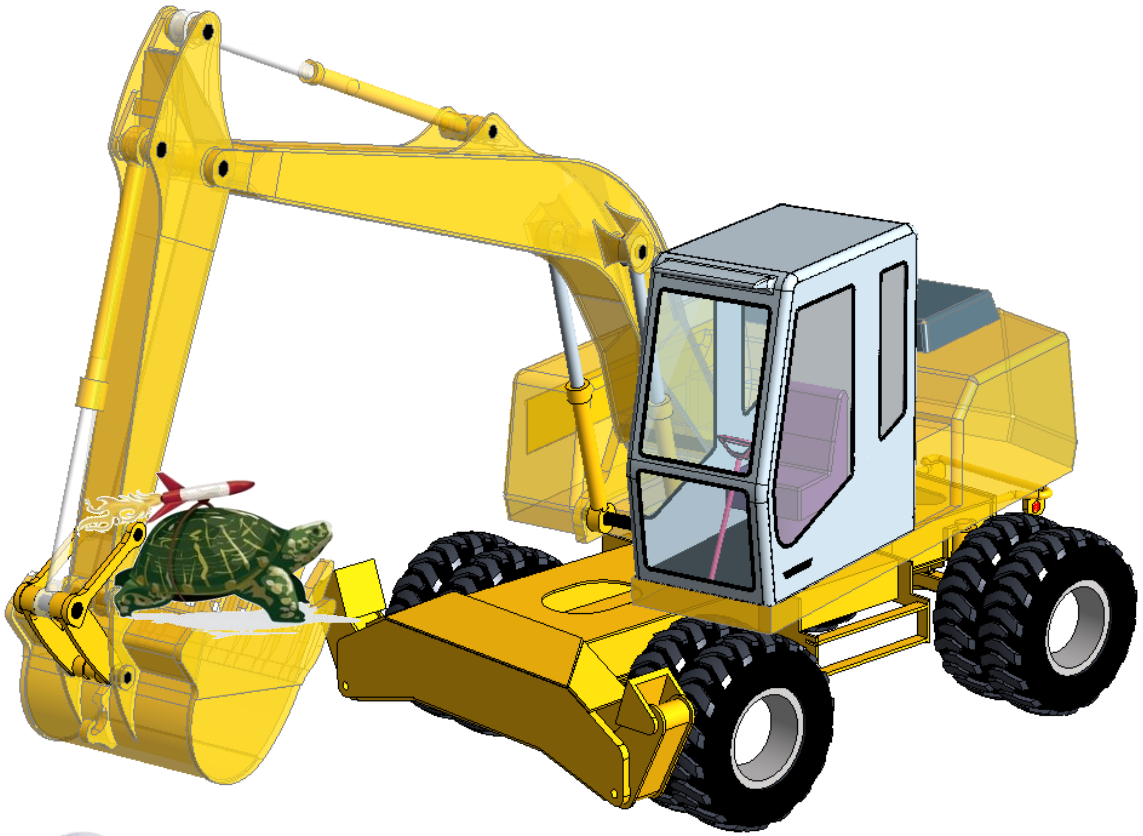


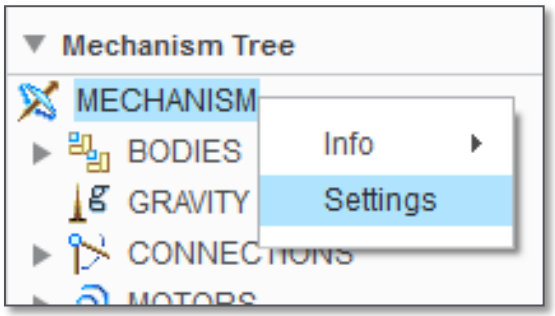
3: Graphical Display during Run

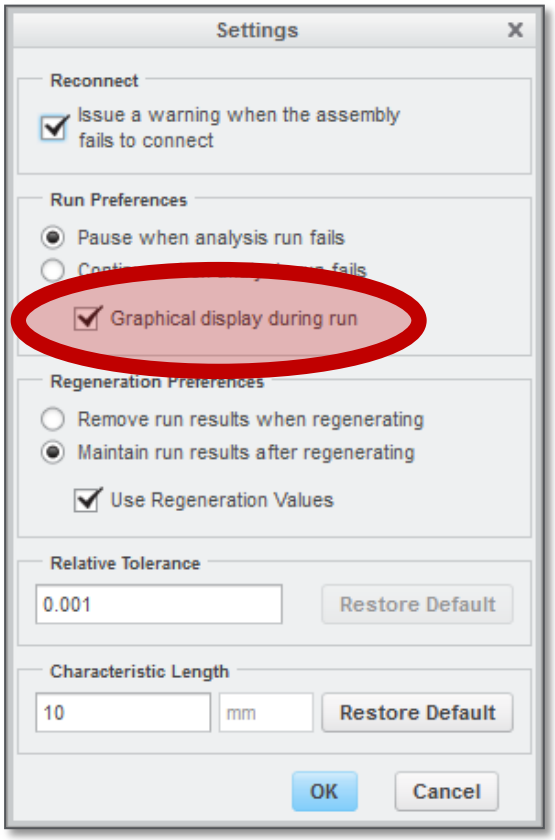
3: Graphical Display during Run

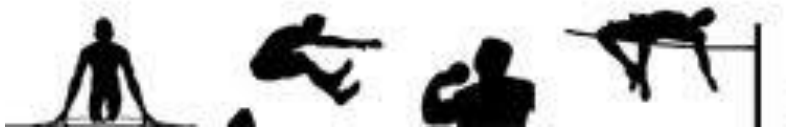
Shortening the Analysis Time

- Unchecking the "Graphical Display during Run"-Option is speeding up the Analysis-Runtime







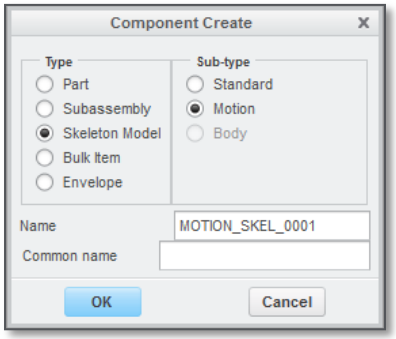


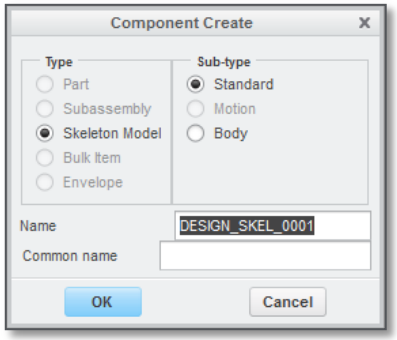
4: Mechanisms with Motion Skeletons

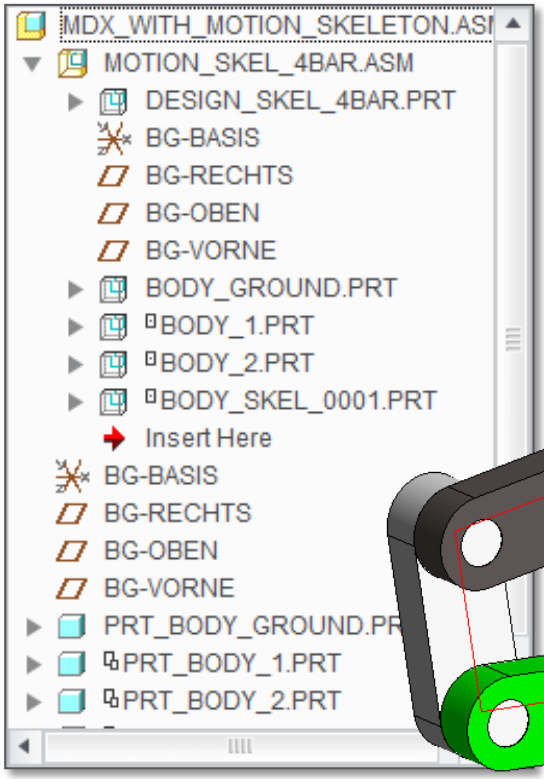
4: Mechanisms with Motion Skeletons

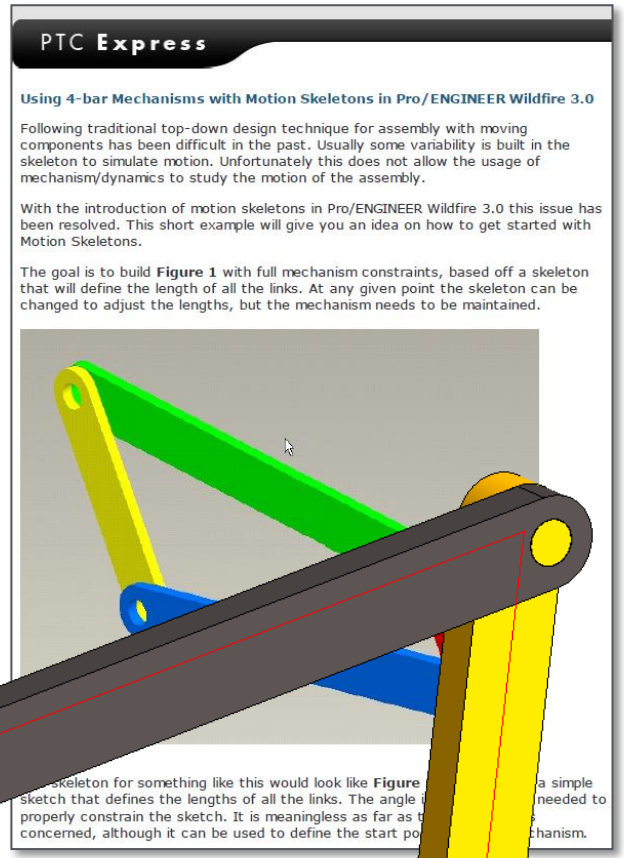
Top-Down-Design for Assemblies with moving Components

- Create Skeleton Models
  - Motion
  - Standard
  - Body

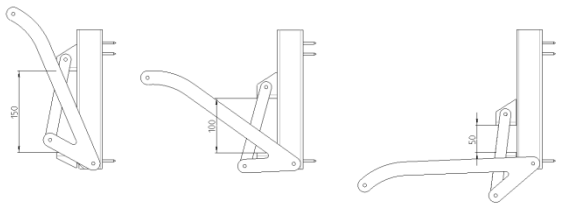








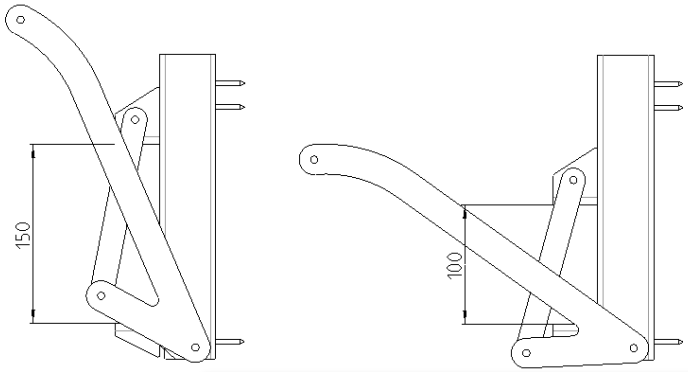
5: Using Snapshots (for Drawings)

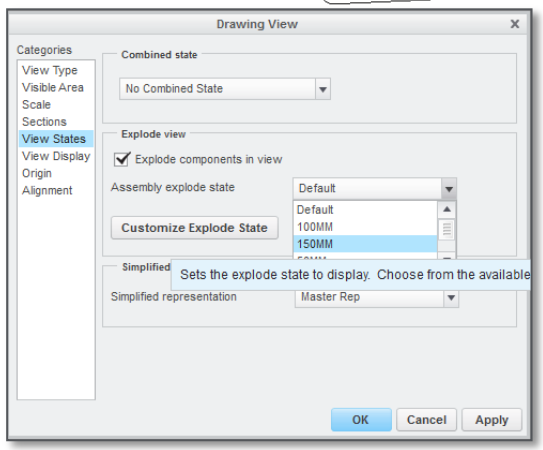


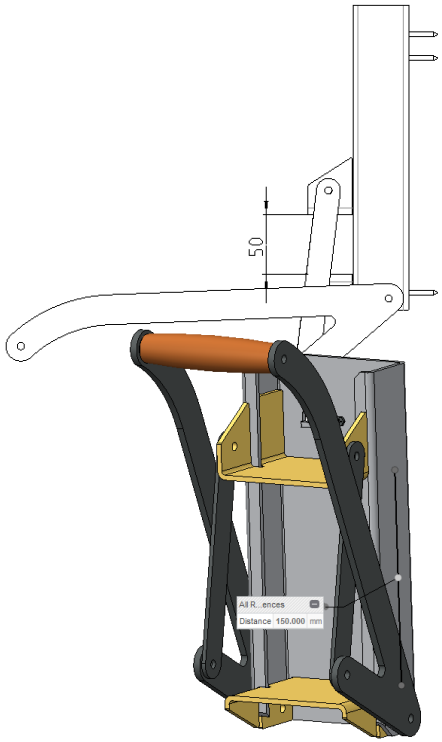
5: Using Snapshots (for Drawings)

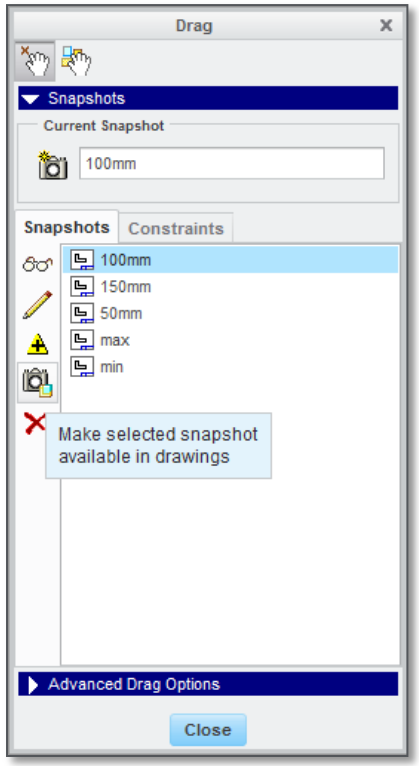
Different Mechanism-Positions can be dispayed on the Drawing

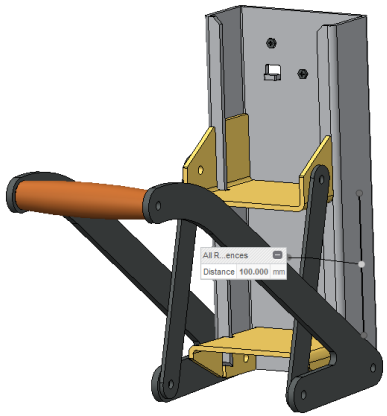
- Create Snapshot with the Help of Constraints
- Make Snapshot Available for Drawing
- Use Exploded States in Drawing



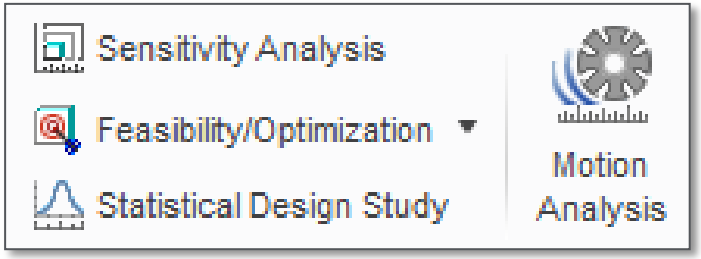








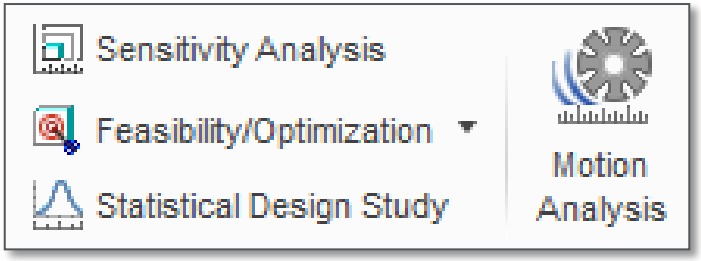
6: Connect Mechanism with BMX

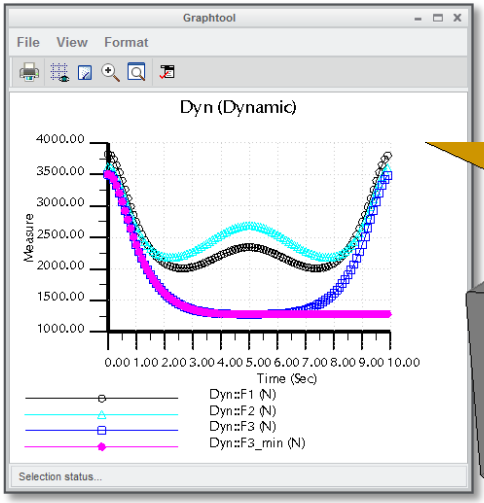


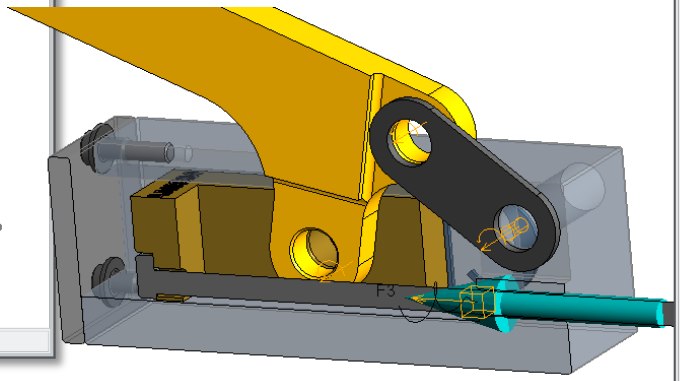
6: Connect Mechanism with BMX

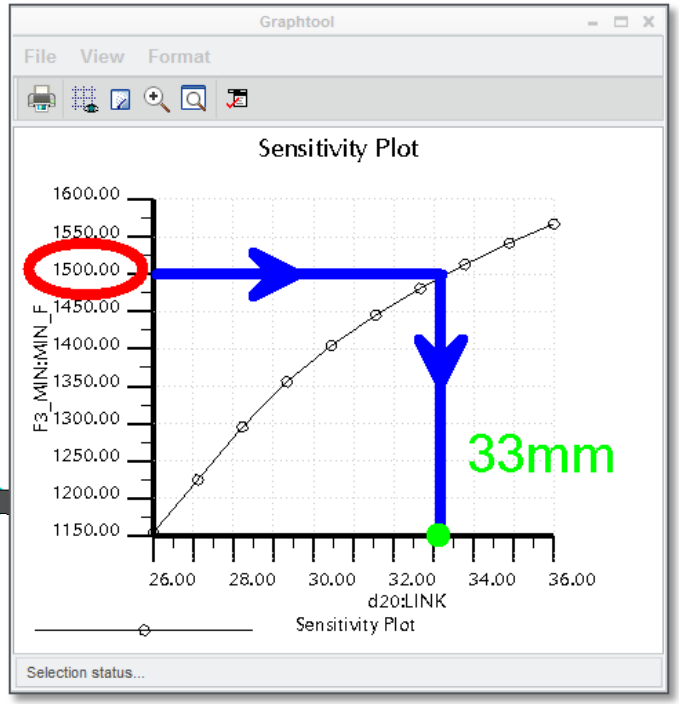
Mechanism-Performance can be improved with BMX-Features

- Optimizing the min. Force in a Toggle-Mechanism
- Perform a Motion Analysis in BMX
  - Sensitivity-Studies
  - Optimization
  - Multi-Design-Studies

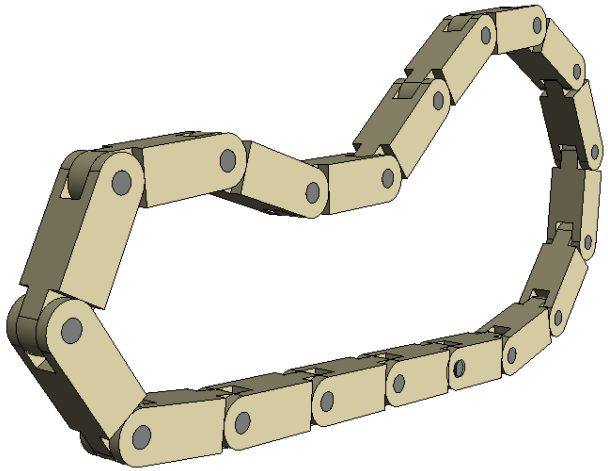








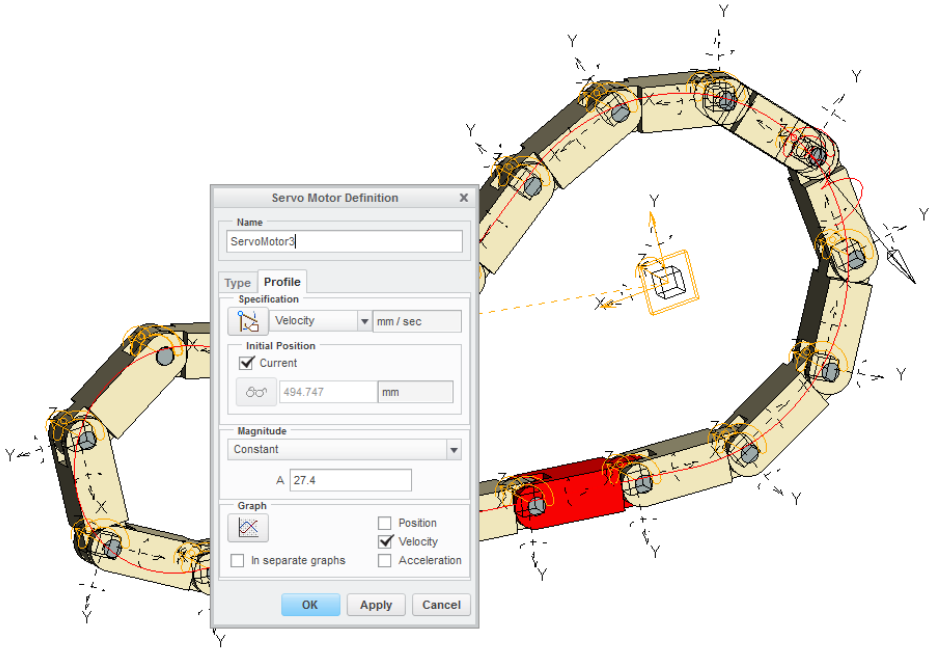
7: Chain Mechanism easily assembled with the “Repeat”-Command

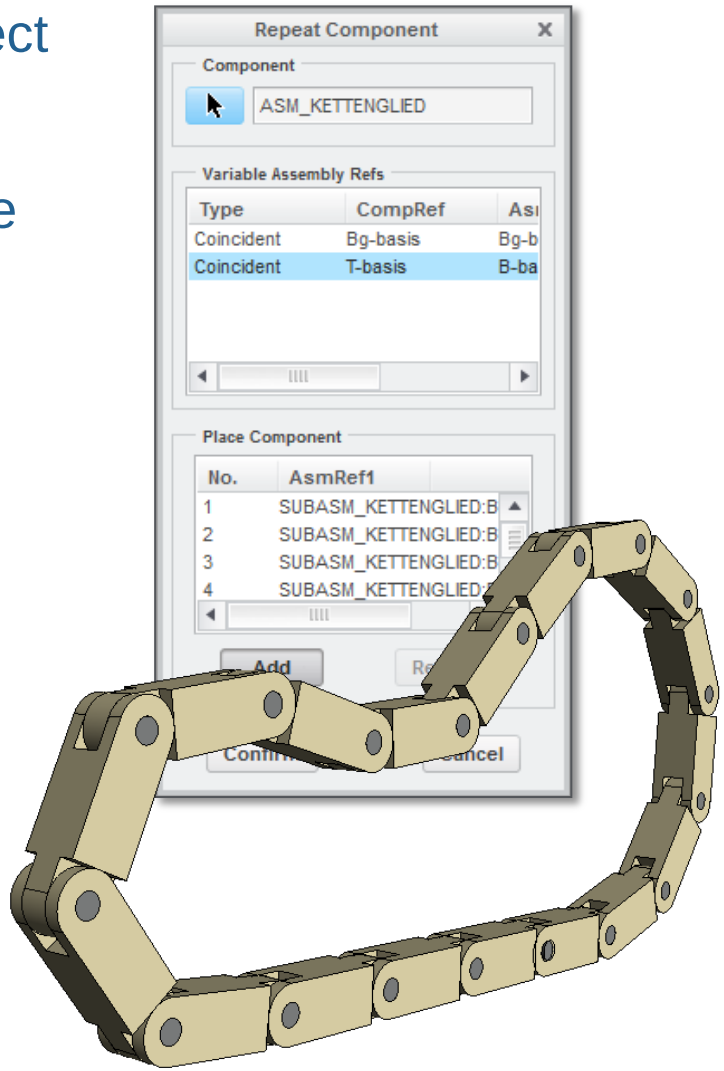


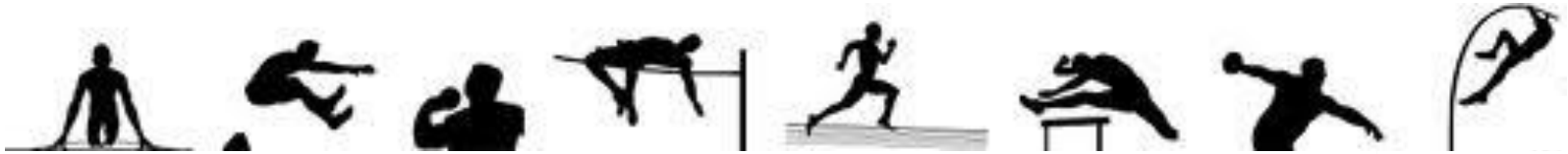
7: Chain Mechanism easily assembled with the “Repeat”-Command

The “Repeat”-Command (for Mechanism-Constraints) helps when Building Chain-Mechanism

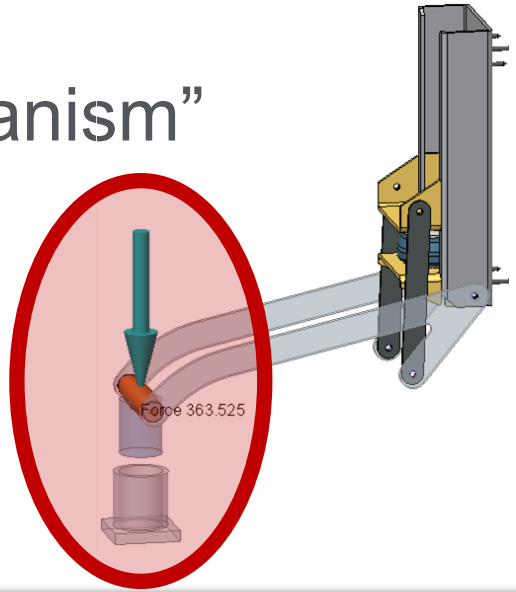
- Build repeatable Sub-Mechanism and connect them with Weld-Joints
- Use the “Repeat”-Command to assemble the Chain







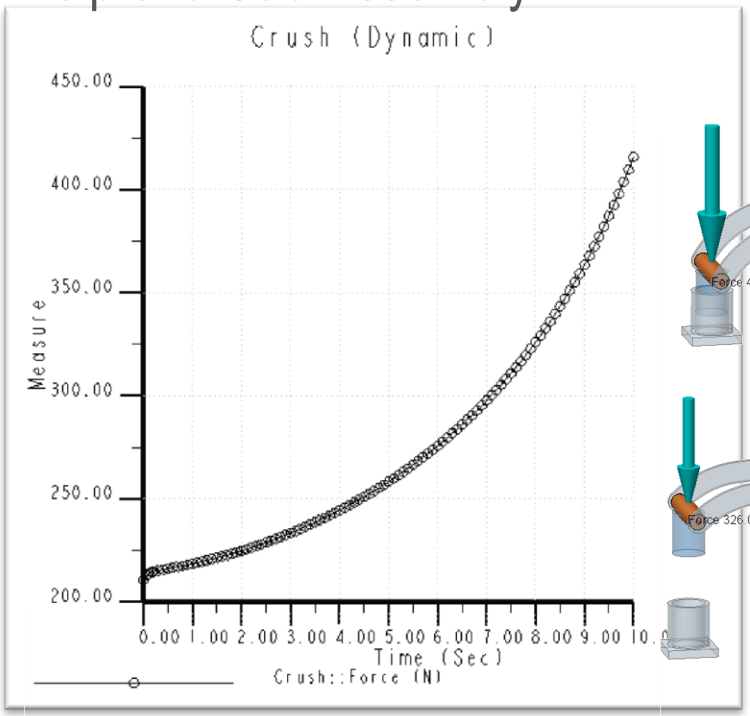
8: Forces with “Dummy Sub-Mechanism”



8: Forces with “Dummy Sub-Mechanism”

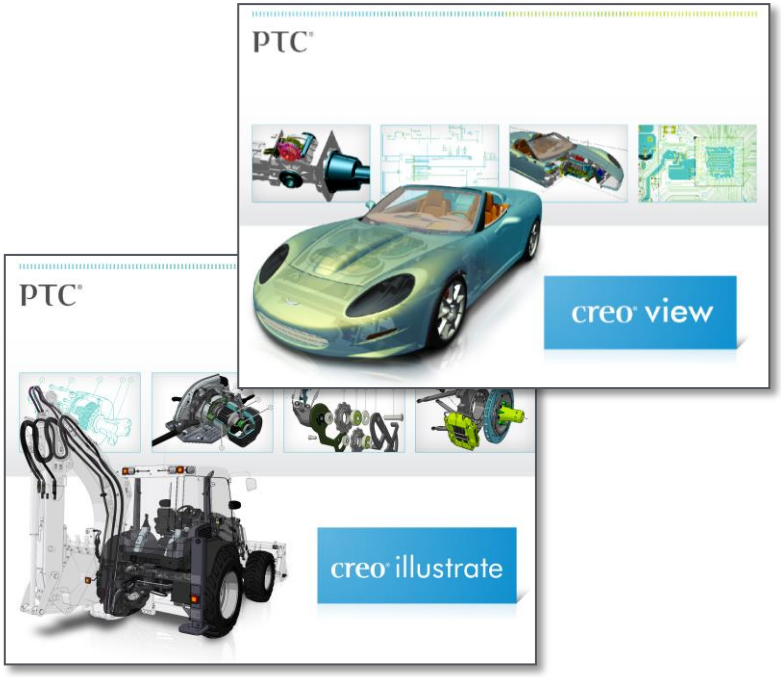
Analyse the Can-Crasher Forces with the Help of a Sub-Assembly

- The Dummy Sub-Mechanism measures the Force on a Joint-Axis where a Servo-Motor is applied



9: Mechanism Playback in

- Creo View
- Creo Illustrate

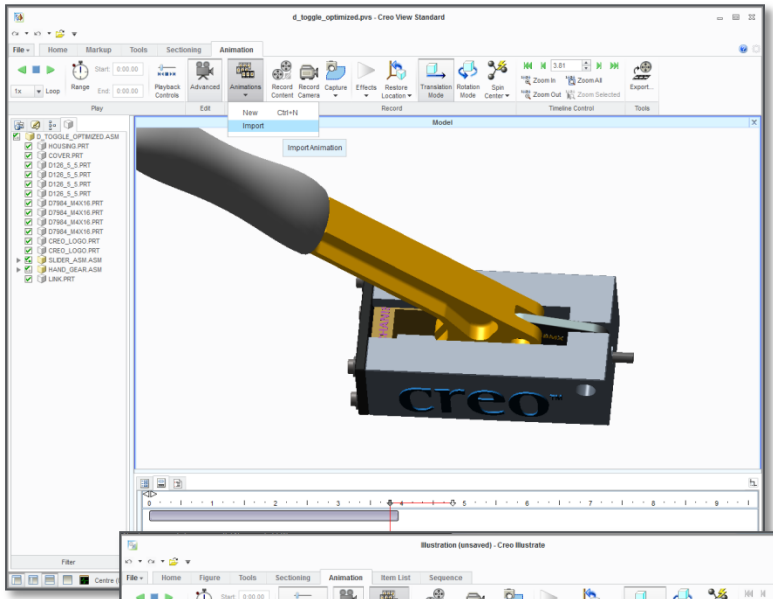


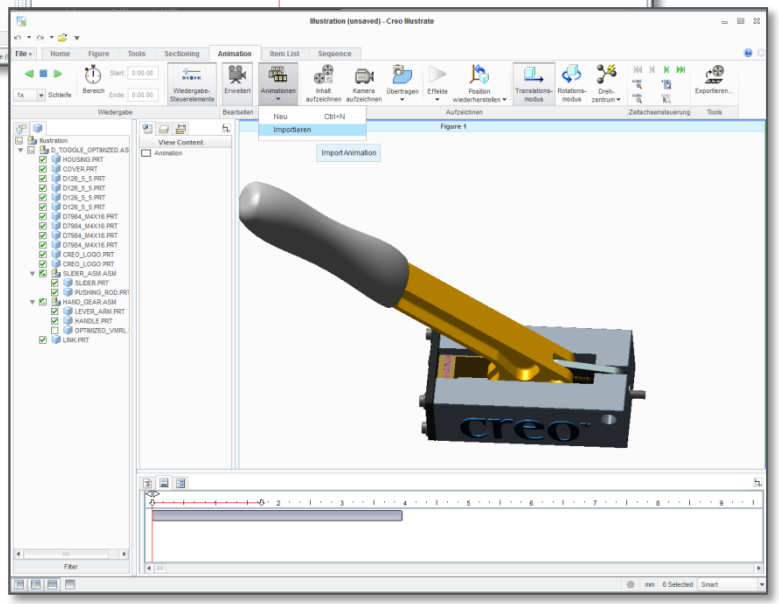
9: Mechanism Playback in - PTC Creo View - PTC Creo Illustrate

PTC

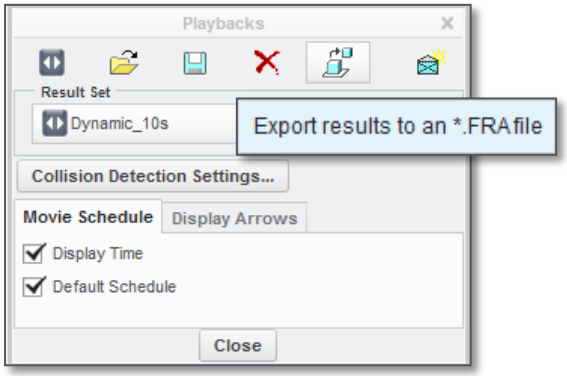
Re-Use of Mechanism behaviour in PTC Creo View / PTC Creo Illustrate

- **Save Model as "PTC Creo View " File**
- Export Results as a *.FRA-File
- Import Animation in PTC Creo View / PTC Creo Illustrate

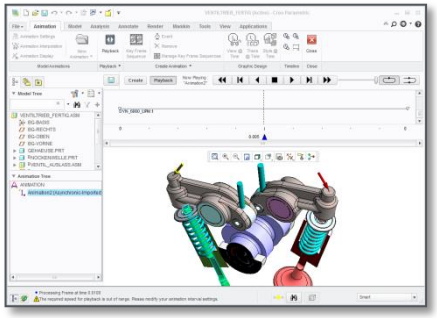




Creo View (*.ed)
Creo View (*.edz)
Creo View (*.pvs)
Creo View (*.pvz)



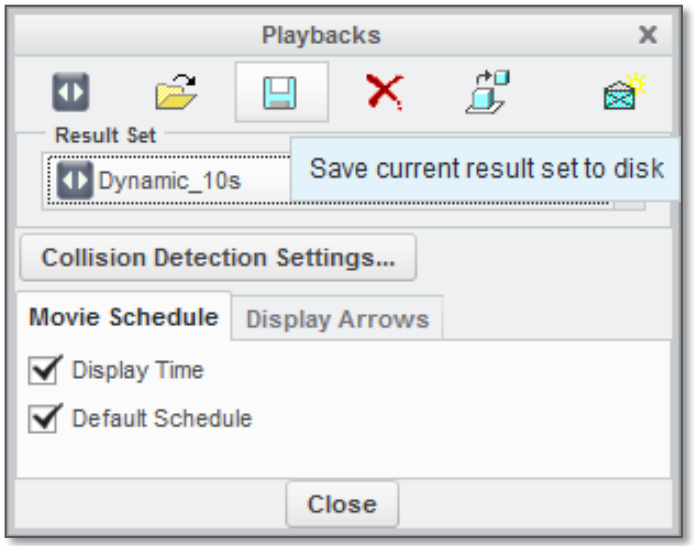
10: Using dynamic Results for an Animation

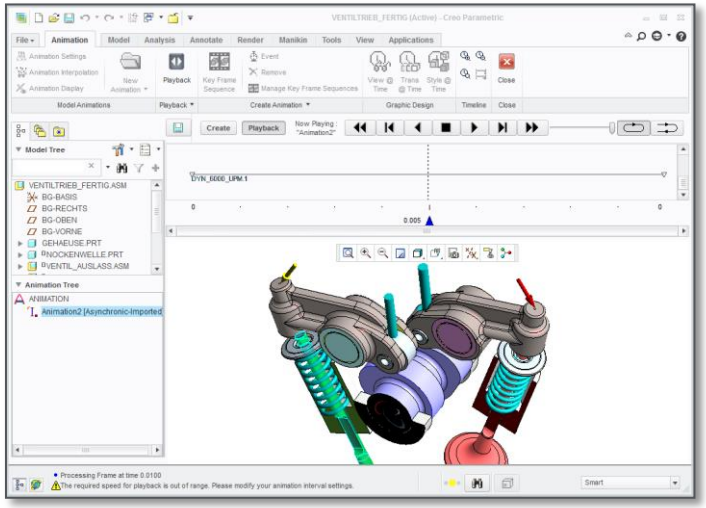


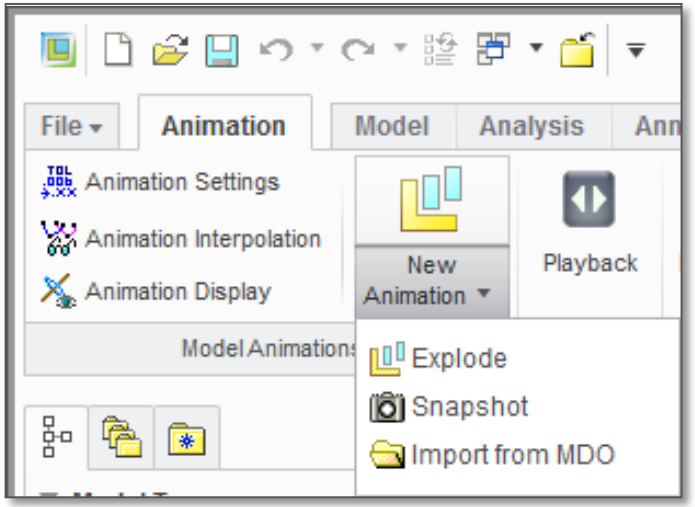
10 : Using dynamic Results for an PTC Creo Animation

Re-Use of Mechanism behaviour in PTC Creo Animation

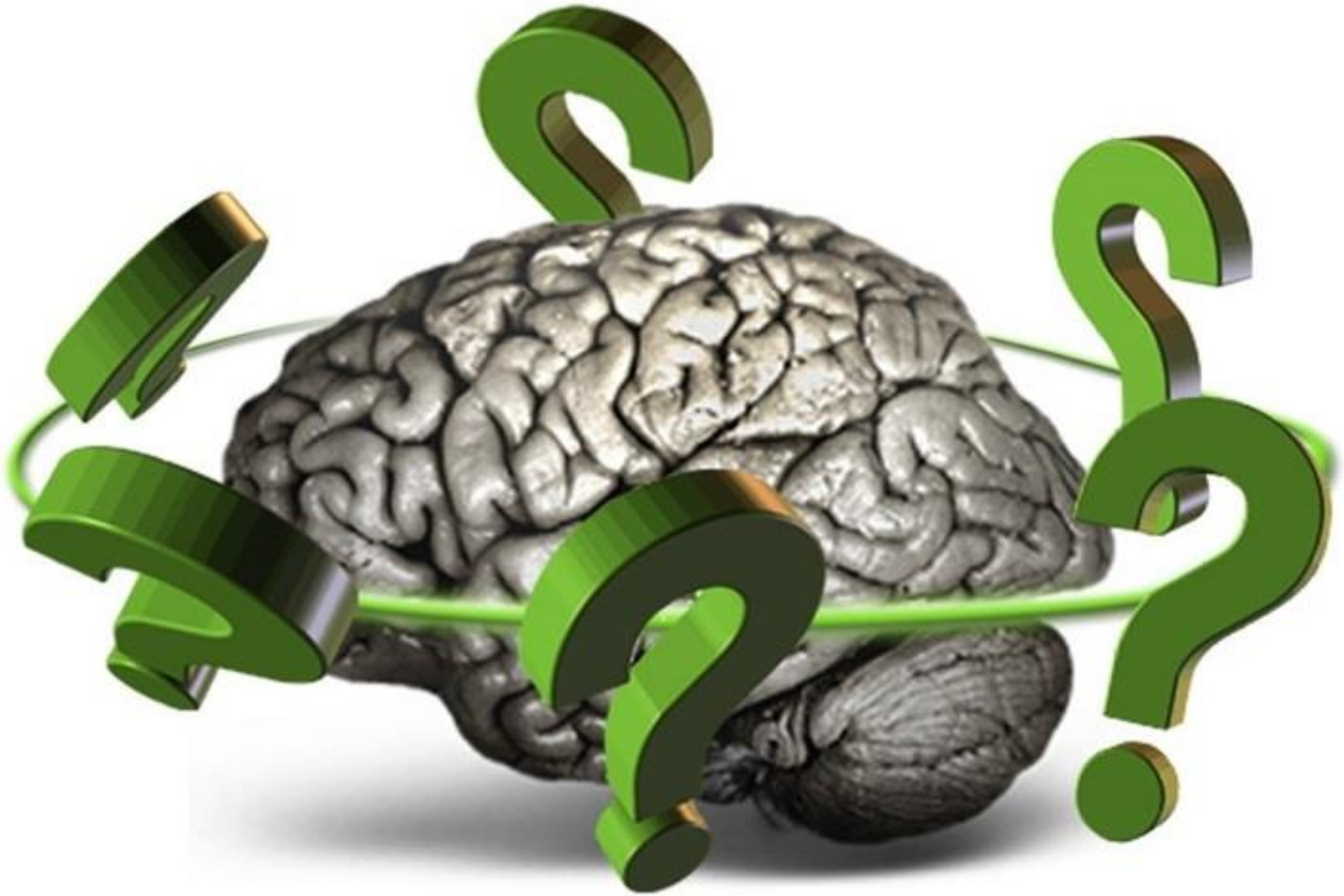
- Save Playback-File in PTC Creo Mechanism
- Create New Animation by Importing the Playback-File in PTC Creo Animation
- Springs / Arrows can be displayeed







Questions



Thank You