GEMS

Gleason Engineering & Manufacturing System

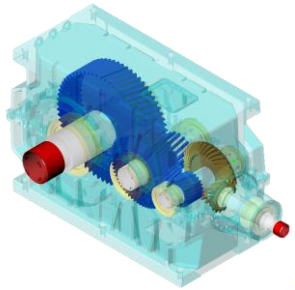
KISSSOFT

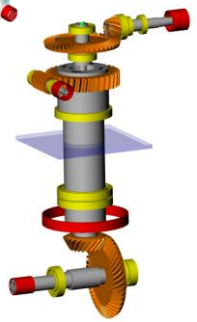
Calculation Programs for Machine Design

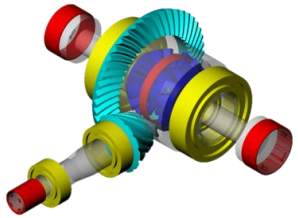
System Design Data Interface

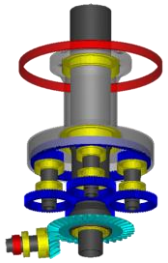
Two Software Solutions / One Common Goal

KISSsys: Design of Transmissions









Kinematic Calculation

- Standard and shifted transmissions.
- Differentials, power split.

Load Capacity of the Transmission

- Life time and strength calculation of gears, shafts, rolling bearings.
- Load spectra and damages.

Efficiency and Thermal Rating

- Power loss and efficiency calculation.
- Heat transfer by the casing, etc..

Housing Stiffness

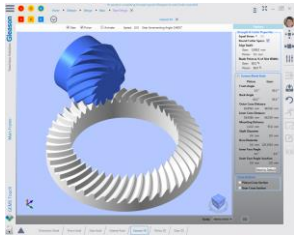
- Housing compliance considered by stiffness matrix.

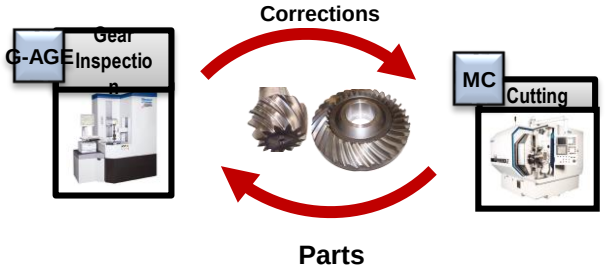
Dynamics of Shaft Systems

- Modal analysis.
- Campbell diagram.

GEMS: Calculation and Manufacturing of Bevel and Hypoid Gears

- Design and analysis of spiral bevel & hypoid gears.
- Establishment of data for Gleason gear production machines.
- Establishment of data for Gleason blade grinding machines.
- Closed Loop to manage manufacturing processes.





Two Software Solutions / Complimentary Process for Bevel and Hypoid Design

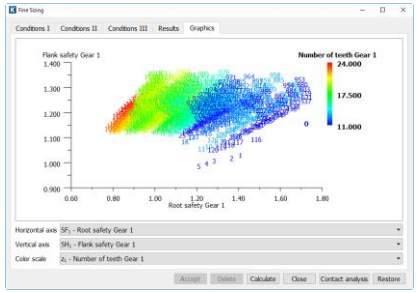
KISSsoft: Design Manufacturing Process

Geometry and Strength Calculation

- ISO 23509, ISO 10300:2014, DIN, AGMA, DNV, Klingelnberg Werksnorm, static, flank fracture.

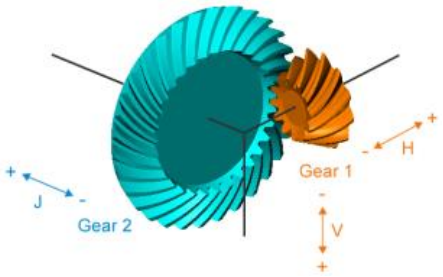
Sizing

- Variation of macro geometry as spiral angle, pressure angle, ..
- Results shown for all variants as safeties, bearing forces, efficiency.
- Specific parameters for differential bevel gears.



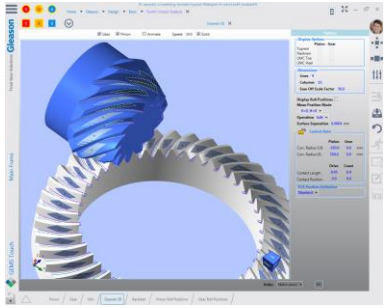
Bevel gears in systems

- EPG (VHJ) values from pinion and wheel shafts.
- Misalignment values including shaft bending, bearing stiffness, housing deformation, thermal effects.



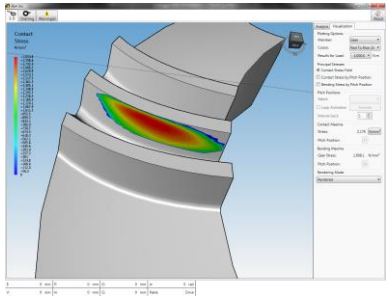
Open Design, Seamless Connectivity

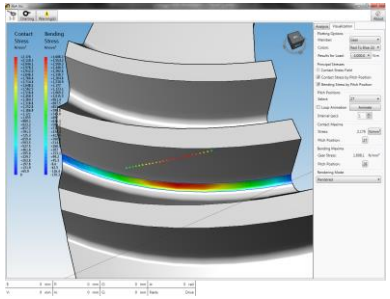
- Easily connect to, and transfer data with, CAGETM,
- UNICAL, and common design software.
- Import design data files from CAGE and UNICAL.
- Connect with GEMS on-line via web app.



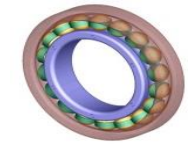
Powerful New Features

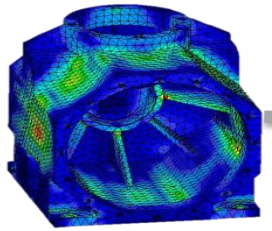
- Interface with GEMS through touchscreen or conventional mouse/keyboard.
- 3D gear and pinion graphics with animation.
- Combined ease-off and TCA for pinion and gear.
- Interactive tooth surface and ease-off correction and optimization.
- Real blank geometry for both pinion and gear.
- 2D tooth profiles along the face width.
- 2D/3D loaded TCA, including interactive root bending stress and contact stress output with S-N Curves.
- Interactive tool design with graphical slot and blade output.



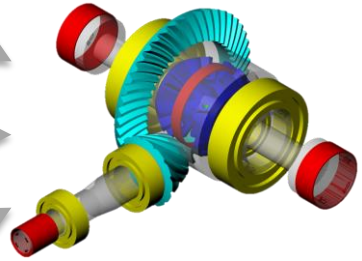


System Design Loop / KISSsys using GEMS





System Design & Simulation



Gear Design & Analysis

GEMS

Manufacturing

Cutting

Grinding

Gear Optimization
Strength
NVH
Efficiency

Gear Testing

System Testing

Customer Value Proposition / System Design + Gear Design + Manufacturing

Dramatically improve customer experience, human efficiency, and part quality by connecting System Design, Gear Design, and Gear Manufacturing Software Systems.

Export Gear Geometry from GEMS to KISSsoft

GEMS
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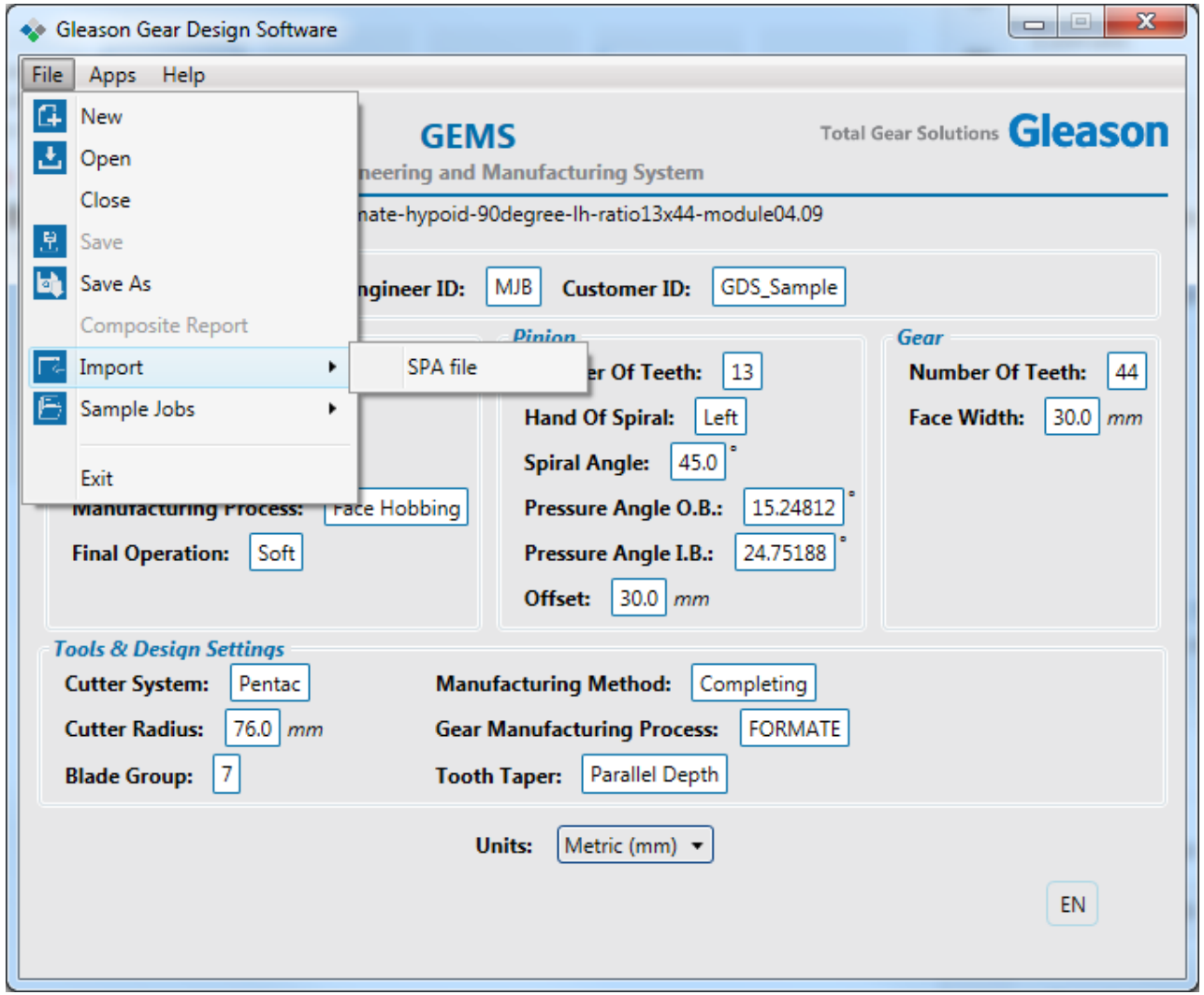
Calculation Programs for Machine Design

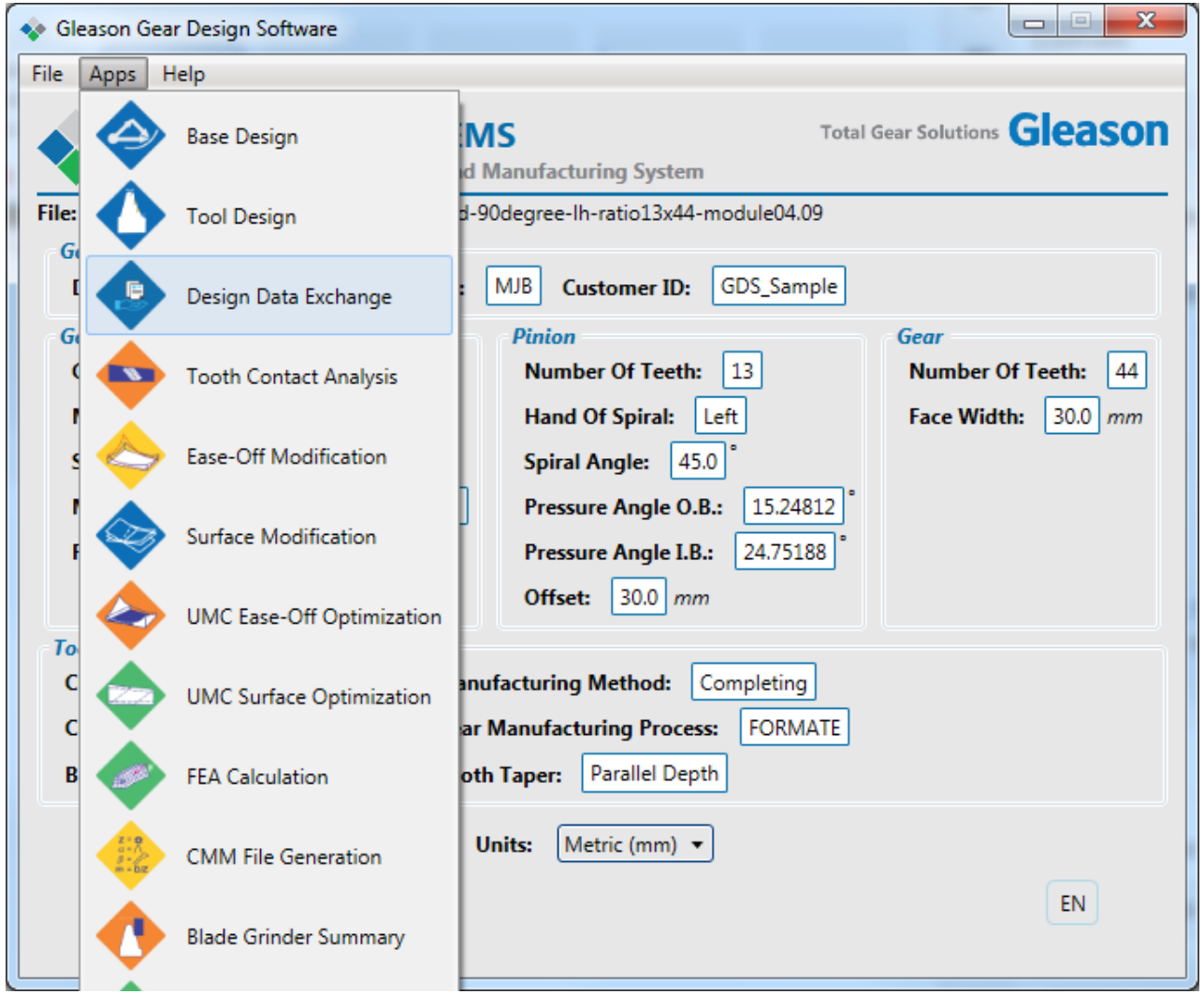
Export Gear Geometry from GEMS to KISSsoft



GEMS

- Import SPA file

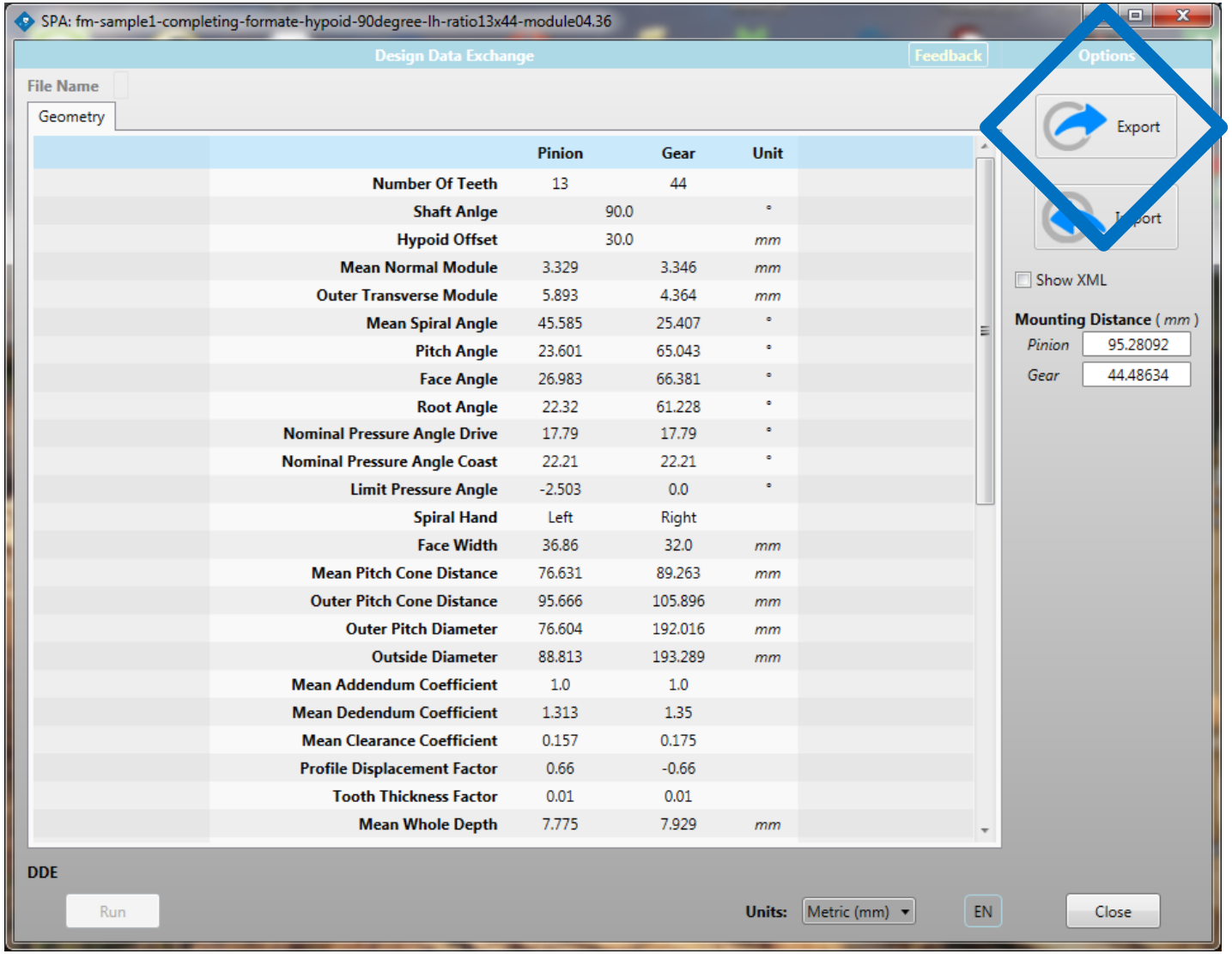
Export Gear Geometry from GEMS to KISSsoft



GEMS

- Select Design Data Exchange

Export Gear Geometry from GEMS to KISSsoft

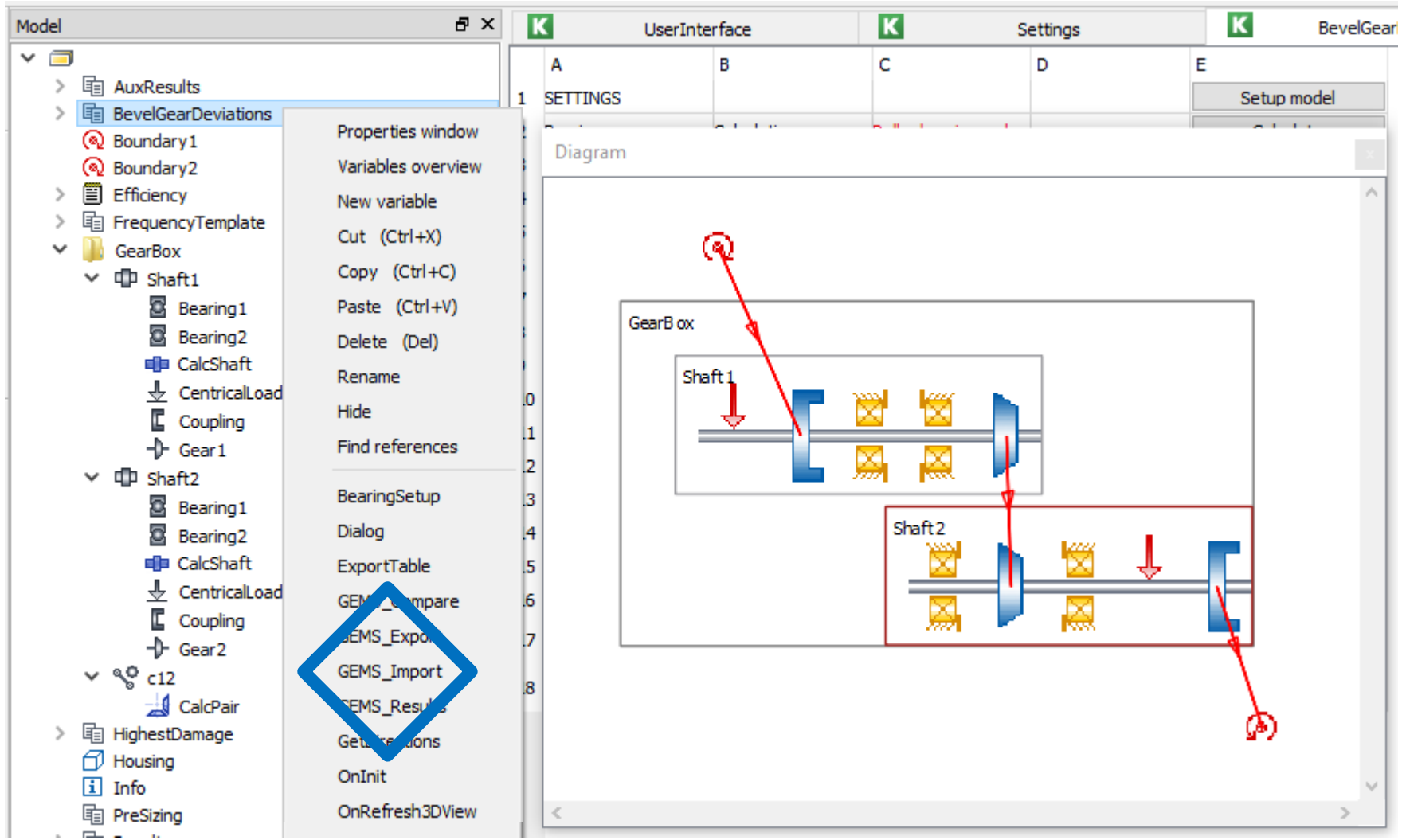


	Pinion	Gear	Unit
Number Of Teeth	13	44	
Shaft Anlge	90.0		°
Hypoid Offset	30.0		mm
Mean Normal Module	3.329	3.346	mm
Outer Transverse Module	5.893	4.364	mm
Mean Spiral Angle	45.585	25.407	°
Pitch Angle	23.601	65.043	°
Face Angle	26.983	66.381	°
Root Angle	22.32	61.228	°
Nominal Pressure Angle Drive	17.79	17.79	°
Nominal Pressure Angle Coast	22.21	22.21	°
Limit Pressure Angle	-2.503	0.0	°
Spiral Hand	Left	Right	
Face Width	36.86	32.0	mm
Mean Pitch Cone Distance	76.631	89.263	mm
Outer Pitch Cone Distance	95.666	105.896	mm
Outer Pitch Diameter	76.604	192.016	mm
Outside Diameter	88.813	193.289	mm
Mean Addendum Coefficient	1.0	1.0	
Mean Dedendum Coefficient	1.313	1.35	
Mean Clearance Coefficient	0.157	0.175	
Profile Displacement Factor	0.66	-0.66	
Tooth Thickness Factor	0.01	0.01	
Mean Whole Depth	7.775	7.929	mm

GEMS

- Export Geometry Data as presented in new window

Import Gear Geometry Data in KISSsoft



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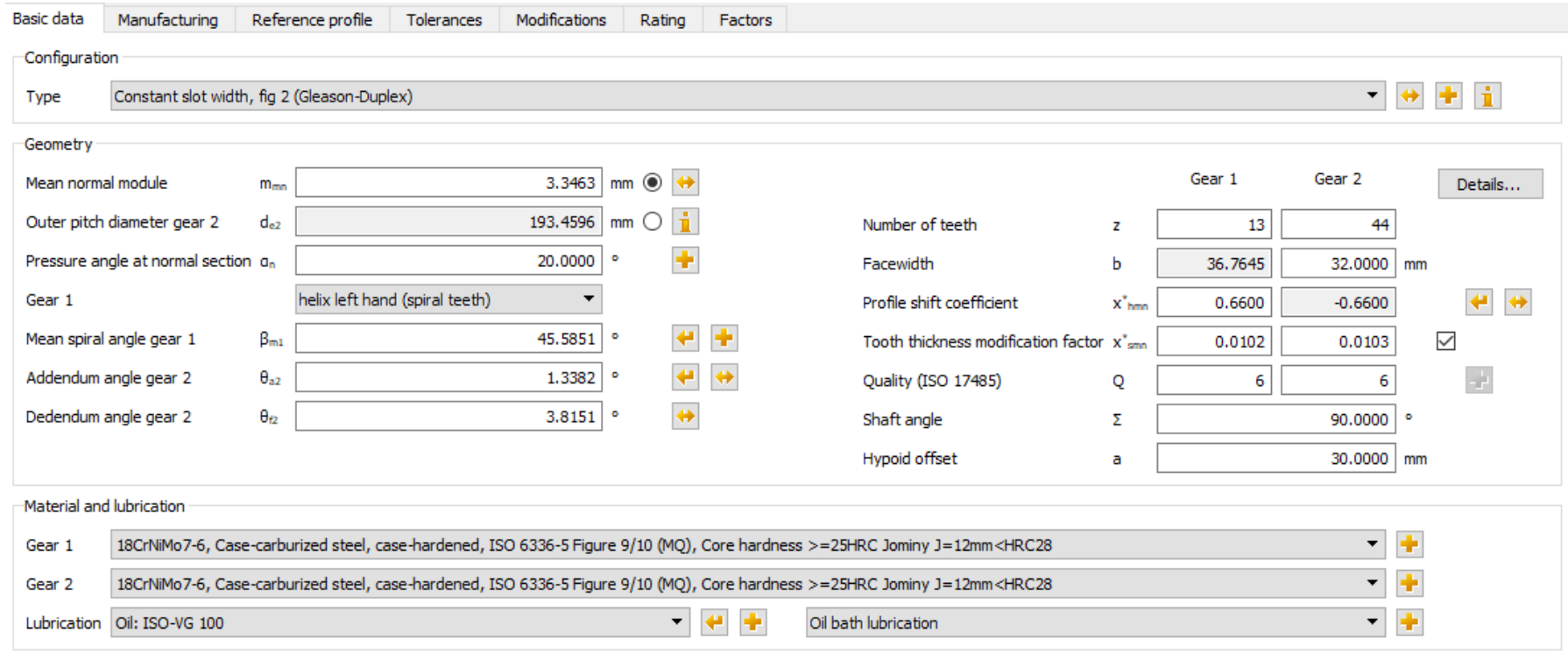
Calculation Programs for Machine Design

- Create system model in KISSsys
- Import GEMS data

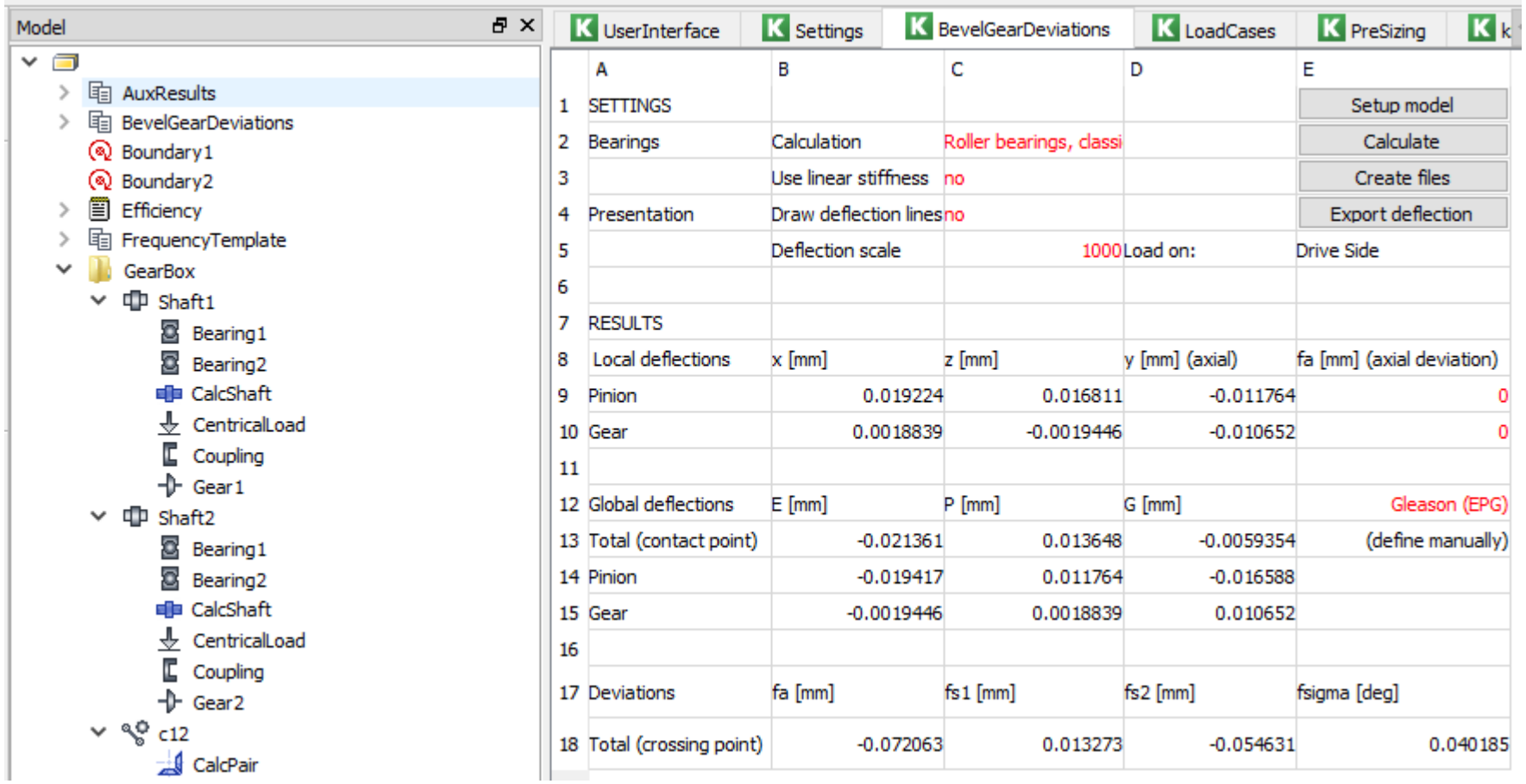
Import Gear Geometry Data in KISSsoft



KISSSOFT
Calculation Programs for Machine Design

- This will update the gear data in KISSsoft to match the GEMS definition

Import Gear Geometry Data in KISSsoft



UserInterface | Settings | BevelGearDeviations | LoadCases | PreSizing | k

	A	B	C	D	E
1	SETTINGS				Setup model
2	Bearings	Calculation	Roller bearings, classi		Calculate
3		Use linear stiffness	no		Create files
4	Presentation	Draw deflection lines	no		Export deflection
5		Deflection scale	1000	Load on:	Drive Side
6					
7	RESULTS				
8	Local deflections	x [mm]	z [mm]	y [mm] (axial)	fa [mm] (axial deviation)
9	Pinion	0.019224	0.016811	-0.011764	0
10	Gear	0.0018839	-0.0019446	-0.010652	0
11					
12	Global deflections	E [mm]	P [mm]	G [mm]	Gleason (EPG)
13	Total (contact point)	-0.021361	0.013648	-0.0059354	(define manually)
14	Pinion	-0.019417	0.011764	-0.016588	
15	Gear	-0.0019446	0.0018839	0.010652	
16					
17	Deviations	fa [mm]	fs1 [mm]	fs2 [mm]	fsigma [deg]
18	Total (crossing point)	-0.072063	0.013273	-0.054631	0.040185

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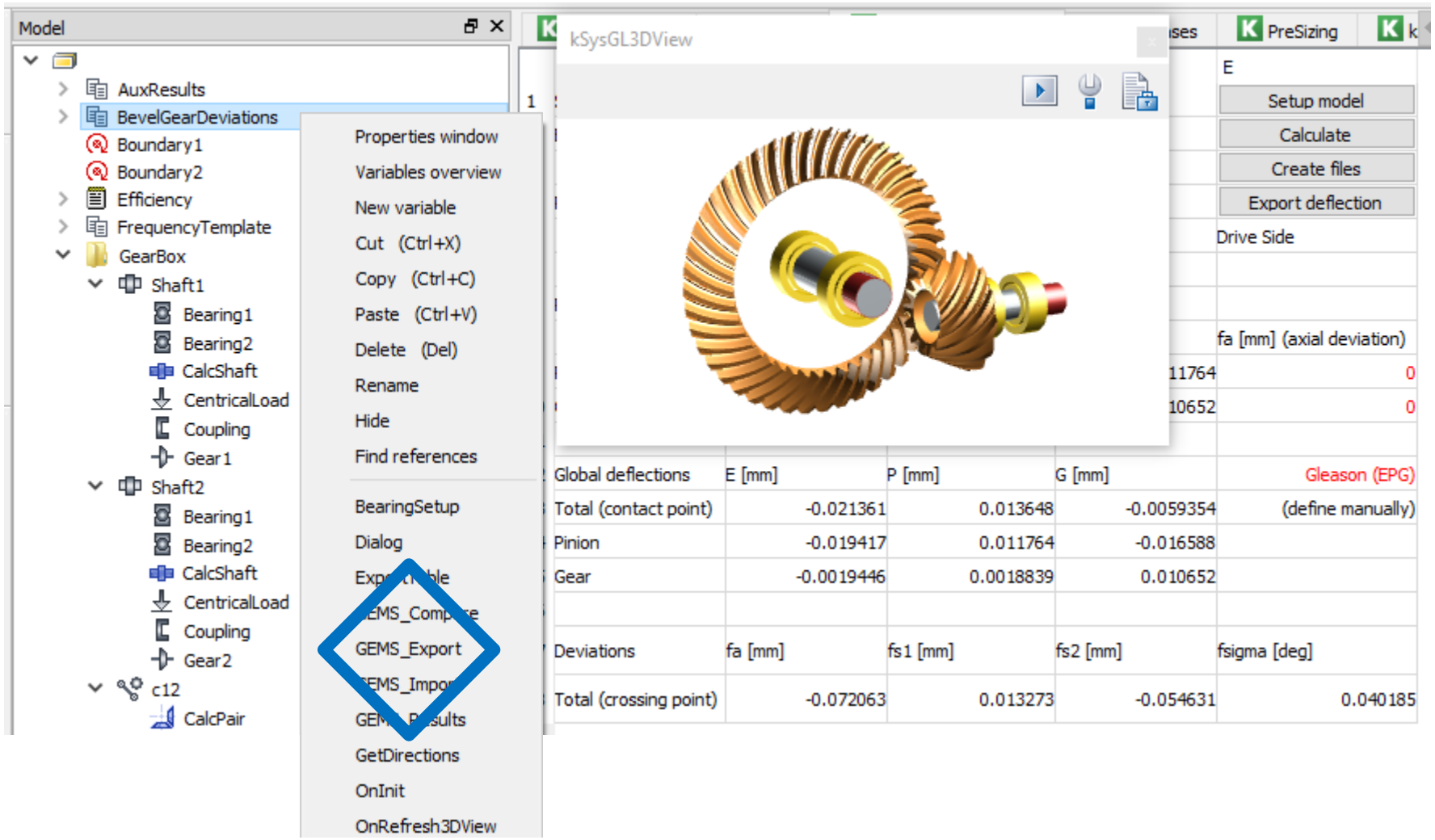
Calculation Programs for Machine Design

- It will then run each load case specified and export all corresponding misalignment information

Export Gear Geometry from KISSsoft to GEMS

Export Gear Geometry from KISSsoft to GEMS



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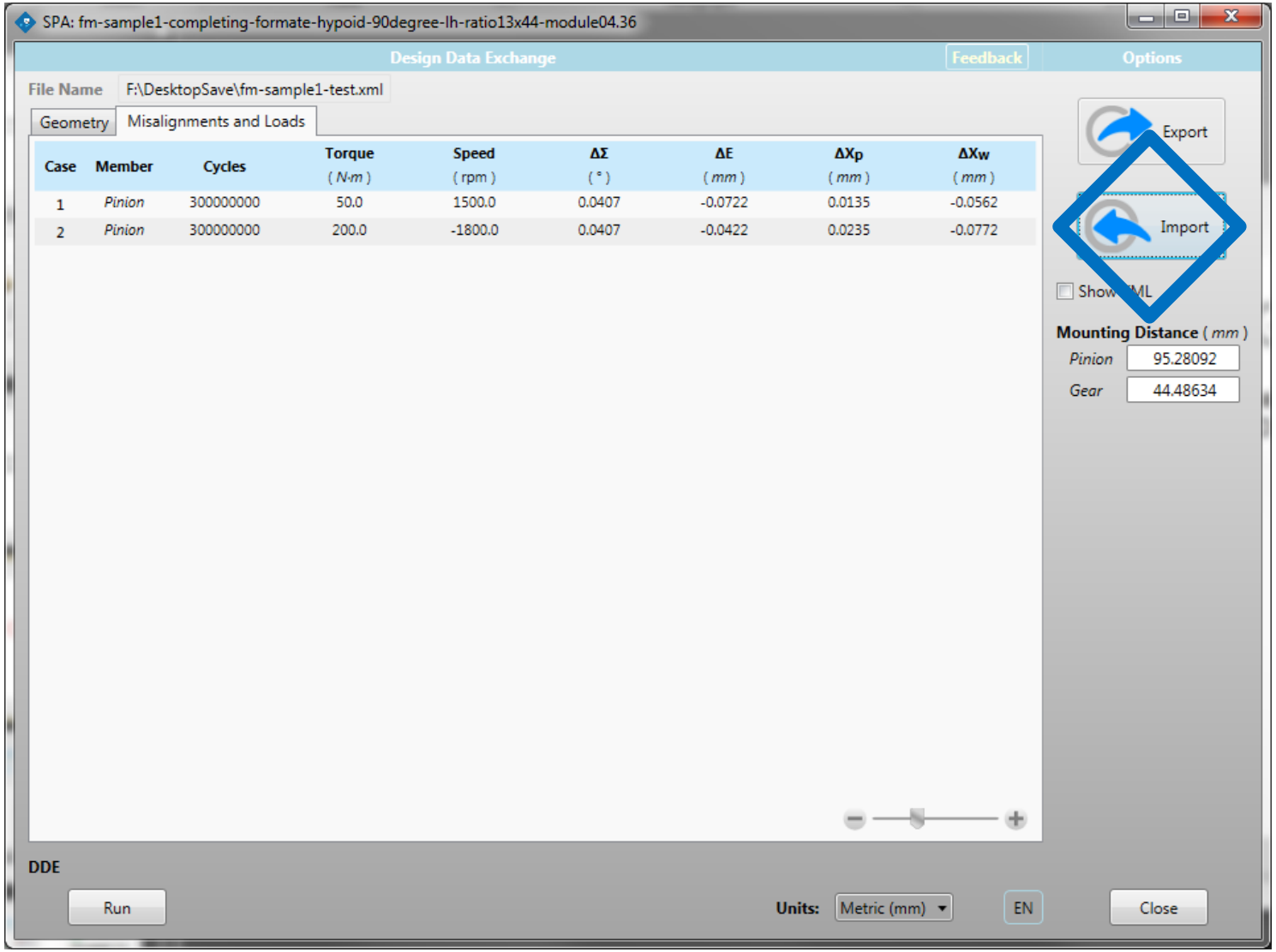
Calculation Programs for Machine Design

- It is also possible to directly export the gear geometry defined in KISSsoft together with the load cases results

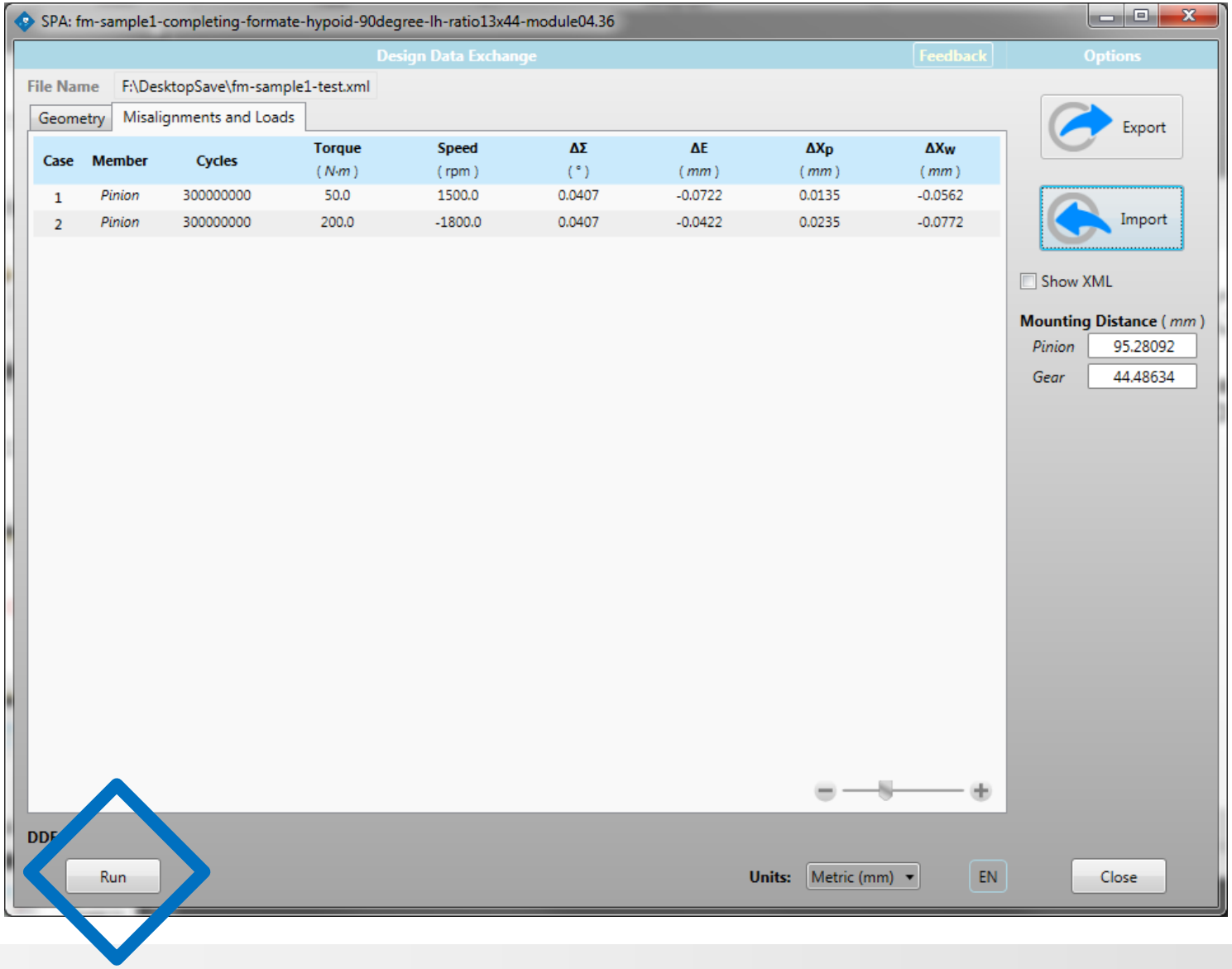
Import Load Cases in GEMS

Import Load Cases



- Import Load Cases (Open GEMS DDE first then select import)

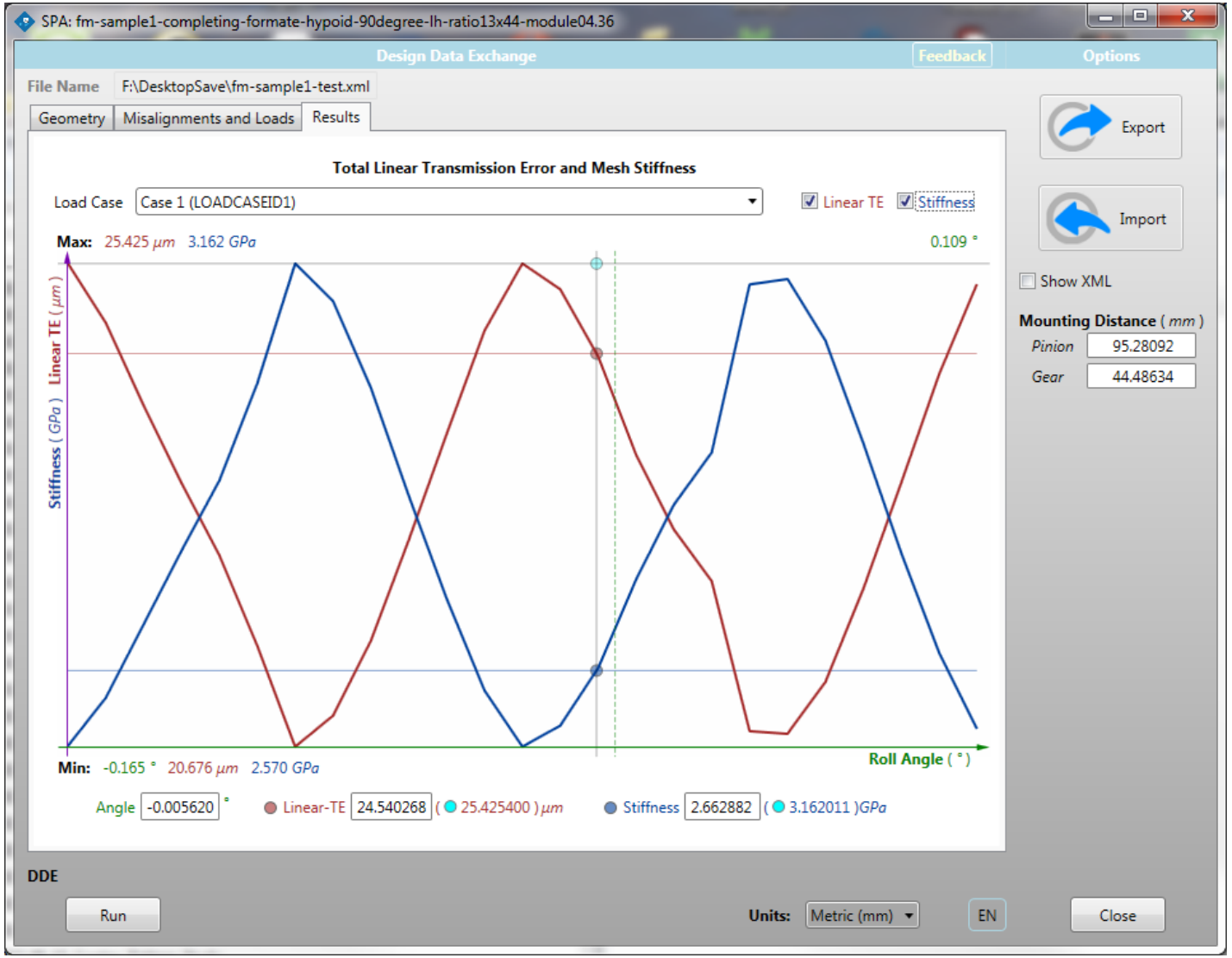
Run FEA Application



GEMS

- Imported load case file must match loaded design file. Press RUN when file loaded to execute the FEA application

Transmission and Stress Results

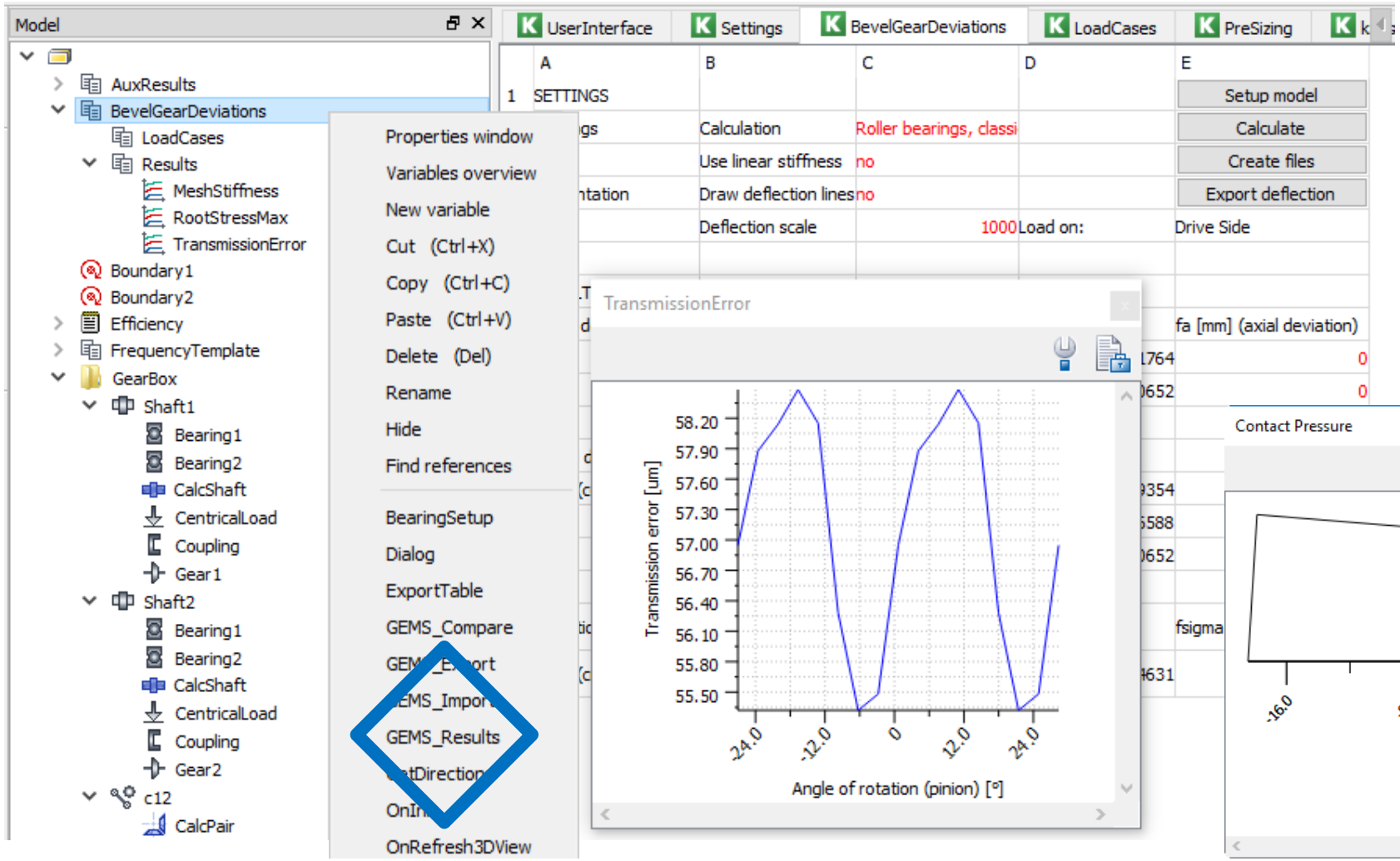


GEMS

- Results generated. Export to use in designer

Import Load Cases Results in KISSsoft

Inclusion of Analysis Results



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Calculation Programs for Machine Design

- Import Stress and TE results
- Continue to run NVH analysis