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

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
- Gear Optimization
  - Strength
  - NVH
  - Efficiency
- System Testing
- Gear Testing
- Manufacturing
  - Cutting
  - Grinding
- GEMS

System Design Data Interface
Export Gear Geometry from GEMS to KISSsoft
Export Gear Geometry from GEMS to KISSsoft

- Import SPA file
Export Gear Geometry from GEMS to KISSsoft

• Select Design Data Exchange
Export Gear Geometry from GEMS to KISSsoft

- Export Geometry Data as presented in new window
Import Gear Geometry Data in KISSsoft

- Create system model in KISSsys
- Import GEMS data
Import Gear Geometry Data in KISSsoft

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

<table>
<thead>
<tr>
<th>Basic data</th>
<th>Manufacturing</th>
<th>Reference profile</th>
<th>Tolerances</th>
<th>Modifications</th>
<th>Rating</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuration</td>
<td>Type</td>
<td>Constant slot width, Fig 2 (Gleason Duplex)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Geometry**
  - Mean normal module: 3.3463 mm
  - Outer pitch diameter gear 2: 193.4596 mm
  - Pressure angle at normal section: 20.0000°
  - Gear 1: helix left hand (spiral teeth)
  - Mean spiral angle gear 1: 45.5851°
  - Addendum angle gear 2: 1.2382°
  - Dedendum angle gear 2: 3.8152°

- **Gear 1**
  - Number of teeth: 13
  - Facewidth (b): 36.7645 mm
  - Profile shift coefficient (x): 0.6600
  - Tooth thickness modification factor (x): 0.0102
  - Quality (ISO 17963): 6
  - Shaft angle (I): 90.0000°
  - Hypoid offset (a): 30.0000 mm

- **Gear 2**
  - Number of teeth: 44
  - Facewidth (b): 32.0000 mm
  - Profile shift coefficient (x): 0.6600
  - Tooth thickness modification factor (x): 0.0103
  - Quality (ISO 17963): 6

- **Material and lubrication**
  - Gear 1: 18CrNiMo7-6, case-carburized steel, case-hardened, ISO 6336-5 Figure 9/10 (MQ), Core hardness >=25 HRc Jominy 3=12mm<HRc28
  - Gear 2: 18CrNiMo7-6, case-carburized steel, case-hardened, ISO 6336-5 Figure 9/10 (MQ), Core hardness >=25 HRc Jominy 3=12mm<HRc28
  - Lubrication: Oil ISO VG 100, Oil bath lubrication
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

- 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

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

- Results generated. Export to use in designer
Import Load Cases Results in KISSsoft
Inclusion of Analysis Results

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