KISSsoft & KISSsys:
Gear up your design

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How to make KISSsoft implementation, a success!
Challenges for a Gear Company

• Unawareness about the changes in Standards of gears and bearings
• Home made programme
• Delayed response to the customer
• Expensive and time consuming physical prototypes & tests
• Dependent on vendors – Cutters, Oil, Bearing etc.
• Design documentation – Not meeting standard & non-comprehensive
• Error prone manual calculations
Benefits of using KISSsoft

- Gear geometry
- Gear strength based on globally accepted ISO/DIN/AGMA/VDI standards
- Reduction of design time by over 90%
- Optimisation
- Loaded tooth contact analysis and suggestions for the modification required in design
- Shaft modelling and rating
- Bearing calculations
- Automatic generation of accurate 2d profiles and 3d models
- System level calculation
- Optimisation of lifetime & quick simulation of different gearbox configuration
- Catalogue generation
KISSsoft : Gear geometry

Gear geometry
• Consider multiple tools for gear geometry
• Include microgeometry / modifications including topological modification
• Export manufacturing data
• Ring gear based on shaping cutter geometry
• Consider protuberance tool
KISSsoft : Gear Strength

Gear strength and life rating
- Root strength / pitting, static rating, ISO 6336/DIN3990 /AGMA/VDI
- Micropitting method A / B, ISO TR 151544
- Scuffing rating along ISO/TR13989, DIN3990-4, AGMA925
- Ring gear strength VDI 2737
- \textbf{Khbeta} along ISO6336-1, Annex E
- Wear calculation along Plewe method
KISSsoft : Optimization

Gear sizing

• Software can size from basic inputs like torque/power, speed along with the ratio

• Optimization gear pair with respect to
  - Weight
  - Strength
  - Contact ratio
KISSsoft : Loaded tooth contact analysis

Gear analysis
- For parallel or planetary stages
- Consider different microgeometry definitions
- Contact stress, transmission error, Oil film analysis
KISSsoft : Shafts

Versatile shaft modeling and rating
• Static / fatigue rating along DIN743, FKM and AGMA 6101-E08/6001-E08
• For nominal and extreme load and with LDD
• Automatic connections between shaft deformation and tooth contact analysis
KISSsoft : Bearing

Highly detailed bearing analysis
• Basic, basic modified, reference and modified reference rating
• Load distribution and contact stress calculation
• For single load and LDD
• Thermal rating, friction and power loss
• Own definitions of rolling elements correction
KISSsoft : 2d & 3d models

Software can generate accurate 2d profile and 3d model

- 2d profile save as .dxf file format
- 3d model save as .step and parasolid file format
**KISSsoft : Systems modeling**

System analysis with KISSsys
- Any kind of gearbox kinematics including compound, differential, CVT and Flexpin system
- With or without main shaft model
- LDD on complete system level
- Output reports ready for certification documentation
- Includes scripting / programming language
- LTCA including non linear bearing stiffness, non linear shaft deformation, housing deformation, planet carrier torsion
## ROI of KISSsoft

<table>
<thead>
<tr>
<th>Cost Parameter</th>
<th>Cost per annum (INR)</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of one engineer to the company</td>
<td>6,00,000/-</td>
<td></td>
</tr>
<tr>
<td>Cost of the software</td>
<td>15,00,000/-</td>
<td>24,00,000/-</td>
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<tr>
<td>Engineers Productivity Enhancement – 4Xtime</td>
<td></td>
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<tr>
<td>Payback of the software = Productivity/Cost in months</td>
<td></td>
<td>8-9 months</td>
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<tr>
<td>Ability to design complex transmission – 10% of your turnover</td>
<td></td>
<td>25,00,000/-</td>
</tr>
<tr>
<td>Enhancement of company’s reputation</td>
<td></td>
<td>Priceless</td>
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Suggestions for implementation

• Selection of proper modules - omitting some modules may severely restrict the utilisation or design capability
• Use of network license to increase the productivity - Flexibility of use, dongle loss/damage
• Proper implementation plan - Set milestones with 'What is current'
• Cross-check the results manually before full-rollout of KISSsoft
• Company should invest in ISO/DIN/AGMA Gear Standards
• Involvement of manufacturing people
• Design should specify manufacturing/cutter/tool information
• Bearing selection - try for cheaper bearings with same service life
Q&A

Thank you