INTEGRATED MULTIBODY DYNAMICS AND FATIGUE MODELS FOR PREDICTING THE FATIGUE LIFE OF POLY–V RIBBED BELTS

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Figure 174 Drive shaft torque in the idle operation range with pinion tooth stiffness increased to $4 \times 10^{13} N/m$ instead of $2 \times 10^{13} N/m$ in the baseline.
Figure 175 Crankshaft angular velocity in the UnloadedDown operation range with pinion tooth stiffness increased to $4 \times 10^{13} \text{N/m}$ instead of $2 \times 10^{13} \text{N/m}$ in the baseline.
Figure 176 Drive shaft angular velocity in the UnloadedDown operation range with pinion tooth stiffness increased to $4 \times 10^{13} N/m$ instead of $2 \times 10^{13} N/m$ in the baseline
Figure 177 Crankshaft angular velocity in the UnloadedDown operation range with pinion tooth stiffness increased to $4 \times 10^{13} \text{N/m}$ instead of $2 \times 10^{13} \text{N/m}$ in the baseline.
Figure 178 Crankshaft angular velocity in the UnloadedUp operation range with pinion tooth stiffness increased to $4 \times 10^{13} \text{N/m}$ instead of $2 \times 10^{13} \text{N/m}$ in the baseline.
Figure 179 Drive shaft angular velocity in the UnloadedUp operation range with pinion tooth stiffness increased to $4 \times 10^{13} N/m$ instead of $2 \times 10^{13} N/m$ in the baseline
Figure 180 Drive shaft torque in the UnloadedUp operation range with pinion tooth stiffness increased to $4 \times 10^{13} N/m$ instead of $2 \times 10^{13} N/m$ in the baseline.
Pinion Tooth Damping Decreased To $2 \times 10^6 N. s/m$ Instead Of $4 \times 10^6 N. s/m$ In The Baseline

Figure 181 Crankshaft angular velocity in the A100 operation range with pinion tooth damping decreased to $2 \times 10^6 N. s/m$ instead of $4 \times 10^6 N. s/m$ in the baseline
Figure 182 Drive shaft angular velocity in the A100 operation range with pinion tooth damping decreased to $2 \times 10^6 N.s/m$ instead of $4 \times 10^6 N.s/m$ in the baseline.
Figure 183 Drive shaft torque in the A100 operation range with pinion tooth damping decreased to $2 \times 10^6 \text{N.s/m}$ instead of $4 \times 10^6 \text{N.s/m}$ in the baseline.
Figure 184 Crankshaft angular velocity in the B100 operation range with pinion tooth damping decreased to $2 \times 10^6 N \cdot s/m$ instead of $4 \times 10^6 N \cdot s/m$ in the baseline.
Figure 185 Drive shaft angular velocity in the B100 operation range with pinion tooth damping decreased to $2 \times 10^6 N.s/m$ instead of $4 \times 10^6 N.s/m$ in the baseline.
Figure 186 Drive shaft torque in the B100 operation range with pinion tooth damping decreased to $2 \times 10^6 N.s/m$ instead of $4 \times 10^6 N.s/m$ in the baseline.
Figure 187 Crankshaft angular velocity in the C100 operation range with pinion tooth damping decreased to $2 \times 10^6 N. s/m$ instead of $4 \times 10^6 N. s/m$ in the baseline.
Figure 188 Drive shaft angular velocity in the C100 operation range with pinion tooth damping decreased to $2 \times 10^6 \text{N.s/m}$ instead of $4 \times 10^6 \text{N.s/m}$ in the baseline.
Figure 189 Drive shaft torque in the C100 operation range with pinion tooth damping decreased to $2 \times 10^6 N.s/m$ instead of $4 \times 10^6 N.s/m$ in the baseline.
Figure 190 Crankshaft angular velocity in the idle operation range with pinion tooth damping decreased to $2 \times 10^6 N. s/m$ instead of $4 \times 10^6 N. s/m$ in the baseline.
Figure 191 Drive shaft angular velocity in the idle operation range with pinion tooth damping decreased to $2 \times 10^6 N \cdot s/m$ instead of $4 \times 10^6 N \cdot s/m$ in the baseline.
Figure 192 Drive shaft torque in the idle operation range with pinion tooth damping decreased to $2 \times 10^6 \text{N.s/m}$ instead of $4 \times 10^6 \text{N.s/m}$ in the baseline.
Figure 193 Crankshaft angular velocity in the UnloadedDown operation range with pinion tooth damping decreased to $2 \times 10^6 \, N.\, s/m$ instead of $4 \times 10^6 \, N.\, s/m$ in the baseline.
Figure 194 Drive shaft angular velocity in the UnloadedDown operation range with pinion tooth damping decreased to $2 \times 10^6 N.s/m$ instead of $4 \times 10^6 N.s/m$ in the baseline
Figure 195 Drive shaft torque in the UnloadedDown operation range with pinion tooth damping decreased to $2 \times 10^6 \, N \cdot s/m$ instead of $4 \times 10^6 \, N \cdot s/m$ in the baseline.
Figure 196 Crankshaft angular velocity in the UnloadedUp operation range with pinion tooth damping decreased to $2 \times 10^6 \text{ N.s/m}$ instead of $4 \times 10^6 \text{ N.s/m}$ in the baseline.
Figure 197 Drive shaft angular velocity in the UnloadedUp operation range with pinion tooth damping decreased to $2 \times 10^6 \text{ N.s/m}$ instead of $4 \times 10^6 \text{ N.s/m}$ in the baseline.
Figure 198 Drive shaft torque in the UnloadedUp operation range with pinion tooth damping decreased to $2 \times 10^6 \, N.s/m$ instead of $4 \times 10^6 \, N.s/m$ in the baseline.
Drive Shaft Torsional Stiffness Increased To 7500 Nm/rad Instead Of 5674 Nm/rad

Figure 199 Crankshaft angular velocity in the A100 operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 200 Drive shaft angular velocity in the A100 operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 mN/rad.
Figure 201 Drive shaft torque in the A100 operation range with drive shaft torsional stiffness increased to 7500 $Nm/rad$ instead of 5674 $Nm/rad$
Figure 202 Crankshaft angular velocity in the B100 operation range with drive shaft torsional stiffness increased to $7500 \, Nm/rad$ instead of $5674 \, Nm/rad$.
Figure 203 Drive shaft angular velocity in the B100 operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 204 Drive shaft torque in the B100 operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 205 Crankshaft angular velocity in the C100 operation range with drive shaft torsional stiffness increased to $7500\ \text{Nm/rad}$ instead of $5674\ \text{Nm/rad}$
Figure 206 Drive shaft angular velocity in the C100 operation range with drive shaft torsional stiffness increased to $7500 \text{ Nm/rad}$ instead of $5674 \text{ Nm/rad}$
Figure 207 Drive shaft torque in the C100 operation range with drive shaft torsional stiffness increased to $7500 \text{ Nm/rad}$ instead of $5674 \text{ Nm/rad}$
Figure 208 Crankshaft angular velocity in the idle operation range with drive shaft torsional stiffness increased to $7500 \text{ Nm/rad}$ instead of $5674 \text{ Nm/rad}$
Figure 209 Drive shaft angular velocity in the idle operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 210 Drive shaft torque in the idle operation range with drive shaft torsional stiffness increased to 7500 \( Nm/rad \) instead of 5674 \( Nm/rad \)
Figure 211 Crankshaft angular velocity in the UnloadedDown operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 212 Drive shaft angular velocity in the UnloadedDown operation range with drive shaft torsional stiffness increased to 7500 $Nm/rad$ instead of 5674 $Nm/rad$
Figure 213 Drive shaft torque in the UnloadedDown operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Figure 214 Crankshaft angular velocity in the UnloadedUp operation range with drive shaft torsional stiffness increased to $7500 \, Nm/rad$ instead of $5674 \, Nm/rad$
Figure 215 Drive shaft angular velocity in the UnloadedUp operation range with drive shaft torsional stiffness increased to $7500 \text{ Nm/rad}$ instead of $5674 \text{ Nm/rad}$.
Figure 216 Drive shaft torque in the UnloadedUp operation range with drive shaft torsional stiffness increased to 7500 Nm/rad instead of 5674 Nm/rad
Drive Shaft Damping Decreased To $35 \text{ N.m.s/rad}$ Instead Of $45 \text{ N.s/rad}$ In The Baseline

Figure 217 Crankshaft angular velocity in the A100 operation range with drive shaft damping decreased to $35 \text{ N.m.s/rad}$ instead of $45 \text{ N.m.s/rad}$ in the baseline
Figure 218 Drive shaft angular velocity in the A100 operation range with drive shaft damping decreased to $35 \text{N.m.s/rad}$ instead of $45 \text{N.m.s/rad}$ in the baseline
Figure 219 Drive shaft torque in the A100 operation range with drive shaft damping decreased to $35 \, \text{N.m.s/rad}$ instead of $45 \, \text{N.m.s/rad}$ in the baseline.
Figure 220 Crankshaft angular velocity in the B100 operation range with drive shaft damping decreased to $35 \text{N.m.s/\emph{rad}}$ instead of $45 \text{N.m.s/\emph{rad}}$ in the baseline
Figure 221 Drive shaft angular velocity in the B100 operation range with drive shaft damping decreased to $35 \, N.m.s/rad$ instead of $45 \, N.m.s/rad$ in the baseline.
Figure 222 Drive shaft torque in the B100 operation range with drive shaft damping decreased to $35\, N\cdot m\cdot s/rad$ instead of $45\, N\cdot m\cdot s/rad$ in the baseline.
Figure 223 Crankshaft angular velocity in the C100 operation range with drive shaft damping decreased to $35 \text{N.m.s/rad}$ instead of $45 \text{N.m.s/rad}$ in the baseline
Figure 224 Drive shaft angular velocity in the C100 operation range with drive shaft damping decreased to $35\, N.m.s/rad$ instead of $45\, N.m.s/rad$ in the baseline.
Figure 225 Crankshaft angular velocity in the idle operation range with drive shaft damping decreased to $35 \, N.m.s/rad$ instead of $45 \, N.m.s/rad$ in the baseline.
Figure 226 Drive shaft angular velocity in the idle operation range with drive shaft damping decreased to $35 \text{N.m.s/rad}$ instead of $45 \text{N.m.s/rad}$ in the baseline.
Figure 227 Drive shaft torque in the idle operation range with drive shaft damping decreased to $35 \text{ N.m.s/rad}$ instead of $45 \text{ N.m.s/rad}$ in the baseline.
Figure 228 Crankshaft angular velocity in the UnloadedDown operation range with drive shaft damping decreased to $35 \text{ N.m.s/rad}$ instead of $45 \text{ N.m.s/rad}$ in the baseline.
Figure 229 Drive shaft angular velocity in the UnloadedDown operation range with drive shaft damping decreased to $35 \text{ N.m.s/rad}$ instead of $45 \text{ N.m.s/rad}$ in the baseline.
Figure 230 Drive shaft torque in the UnloadedDown operation range with drive shaft damping decreased to $35 \text{ N.m.s}/\text{rad}$ instead of $45 \text{ N.m.s}/\text{rad}$ in the baseline.
Figure 231 Crankshaft angular velocity in the UnloadedUp operation range with drive shaft damping decreased to 35 N.m.s/rad instead of 45 N.m.s/rad in the baseline.
Figure 232 Drive shaft angular velocity in the UnloadedUp operation range with drive shaft damping decreased to $35\text{N.m.s/rad}$ instead of $45\text{N.m.s/rad}$ in the baseline
Figure 233 Drive shaft torque in the UnloadedUp operation range with drive shaft damping decreased to $35 \text{ N.m.s/ rad}$ instead of $45 \text{ N.m.s/ rad}$ in the baseline.
Turbine Shaft Torsional Stiffness Decreased To 1000 $Nm/rad$ Instead Of 1442 $N/rad$

Figure 234 Crankshaft angular velocity in the A100 operation range with turbine shaft torsional stiffness decreased to 1000 $Nm/rad$ instead of 1442 $Nm/rad$
Figure 235 Drive shaft angular velocity in the A100 operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 236 Crankshaft angular velocity in the B100 operation range with turbine shaft torsional stiffness decreased to 1000 $Nm/rad$ instead of 1442 $Nm/rad$. 
Figure 237 Drive shaft angular velocity in the B100 operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 238 Drive shaft torque in the B100 operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 239 Crankshaft angular velocity in the C100 operation range with turbine shaft torsional stiffness decreased to 1000 $Nm/rad$ instead of 1442 $Nm/rad$. 
Figure 240 Drive shaft angular velocity in the C100 operation range with turbine shaft torsional stiffness decreased to 1000 $Nm/rad$ instead of 1442 $Nm/rad$
Figure 241 Drive shaft torque in the C100 operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 242 Crankshaft angular velocity in the idle operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 243 Drive shaft angular velocity in the idle operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 244 Drive shaft torque in the idle operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 245 Crankshaft angular velocity in the UnloadedDown operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 246 Drive shaft angular velocity in the UnloadedDown operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 247: Drive shaft torque in the UnloadedDown operation range with turbine shaft torsional stiffness decreased to 1000 $Nm/rad$ instead of 1442 $Nm/rad$.
Figure 248 Crankshaft angular velocity in the UnloadedUp operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 249 Drive shaft angular velocity in the UnloadedUp operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Figure 250 Drive shaft torque in the UnloadedUp operation range with turbine shaft torsional stiffness decreased to 1000 Nm/rad instead of 1442 Nm/rad
Turbine Shaft Torsional Damping Decreased To $2 \, N \cdot m \cdot s/\text{rad}$ Instead Of $4 \, N \cdot m \cdot s/\text{rad}$

Figure 251 Crankshaft angular velocity in the A100 operation range with turbine shaft torsional damping decreased to $2 \, N \cdot m \cdot s/\text{rad}$ instead of $4 \, N \cdot m \cdot s/\text{rad}$
Figure 252 Drive shaft angular velocity in the A100 operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$
Figure 253 Drive shaft torque in the A100 operation range with turbine shaft torsional damping decreased to \(2 \text{ N.m.s/rad}\) instead of \(4 \text{ N.m.s/rad}\)
Figure 254 Crankshaft angular velocity in the B100 operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$
Figure 255 Drive shaft angular velocity in the B100 operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$.
Figure 256 Drive shaft torque in the B100 operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$
Figure 257 Crankshaft angular velocity in the C100 operation range with turbine shaft torsional damping decreased to $2 \, N\cdot m\cdot s/\text{rad}$ instead of $4 \, N\cdot m\cdot s/\text{rad}$
Figure 258 Drive shaft angular velocity in the C100 operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$
Figure 259 Drive shaft torque in the C100 operation range with turbine shaft torsional damping decreased to $2 \, N\cdot m/s/rad$ instead of $4 \, N\cdot m/s/rad$
Figure 260 Crankshaft angular velocity in the idle operation range with turbine shaft torsional damping decreased to 2 $N\cdot m/s/\text{rad}$ instead of 4 $N\cdot m/s/\text{rad}$
Figure 261 Drive shaft angular velocity in the idle operation range with turbine shaft torsional damping decreased to $2 \text{ N.m.s/rad}$ instead of $4 \text{ N.m.s/rad}$
Figure 262 Drive shaft torque in the idle operation range with turbine shaft torsional damping decreased to $2 \, N \cdot m \cdot s/\text{rad}$ instead of $4 \, N \cdot m \cdot s/\text{rad}$
Figure 263 Crankshaft angular velocity in the UnloadedDown operation range with turbine shaft torsional damping decreased to 2 $N\cdot m\cdot s/\text{rad}$ instead of 4 $N\cdot m\cdot s/\text{rad}$
Figure 264 Drive shaft angular velocity in the UnloadedDown operation range with turbine shaft torsional damping decreased to 2 \( \text{N.m.s/rad} \) instead of 4 \( \text{N.m.s/rad} \).
Figure 265 Drive shaft torque in the UnloadedDown operation range with turbine shaft torsional damping decreased to 2 N.m.s/rad instead of 4 N.m.s/rad
Figure 266 Crankshaft angular velocity in the UnloadedUp operation range with turbine shaft torsional damping decreased to $2 \, N.m.s/\text{rad}$ instead of $4 \, N.m.s/\text{rad}$.
Figure 267 Drive shaft angular velocity in the UnloadedUp operation range with turbine shaft torsional damping decreased to \(2 \text{ N}.\text{m}.\text{s}/\text{rad}\) instead of \(4 \text{ N}.\text{m}.\text{s}/\text{rad}\).
Figure 268 Drive shaft torque in the UnloadedUp operation range with turbine shaft torsional damping decreased to 2 N. m. s/rad instead of 4 N. m. s/rad