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OMICS Group International is an amalgamation of Open Access publications and worldwide international science conferences and events. Established in the year 2007 with the sole aim of making the information on Sciences and technology 'Open Access', OMICS Group publishes 400 online open access scholarly journals in all aspects of Science, Engineering, Management and Technology journals. OMICS Group has been instrumental in taking the knowledge on Science & technology to the doorsteps of ordinary men and women. Research Scholars, Students, Libraries, Educational Institutions, Research centers and the industry are main stakeholders that benefitted greatly from this knowledge dissemination. OMICS Group also organizes 300 International conferences annually across the globe, where knowledge transfer takes place through debates, round table discussions, poster presentations, workshops, symposia and exhibitions.

About OMICS Group Conferences

OMICS Group International is a pioneer and leading science event organizer, which publishes around 400 open access journals and conducts over 300 Medical, Clinical, Engineering, Life Sciences, Pharma scientific conferences all over the globe annually with the support of more than 1000 scientific associations and 30,000 editorial board members and 3.5 million followers to its credit.

OMICS Group has organized 500 conferences, workshops and national symposiums across the major cities including San Francisco, Las Vegas, San Antonio, Omaha, Orlando, Raleigh, Santa Clara, Chicago, Philadelphia, Baltimore, United Kingdom, Valencia, Dubai, Beijing, Hyderabad, Bengaluru and Mumbai.

Dynamic Simulation of a Cranktrain

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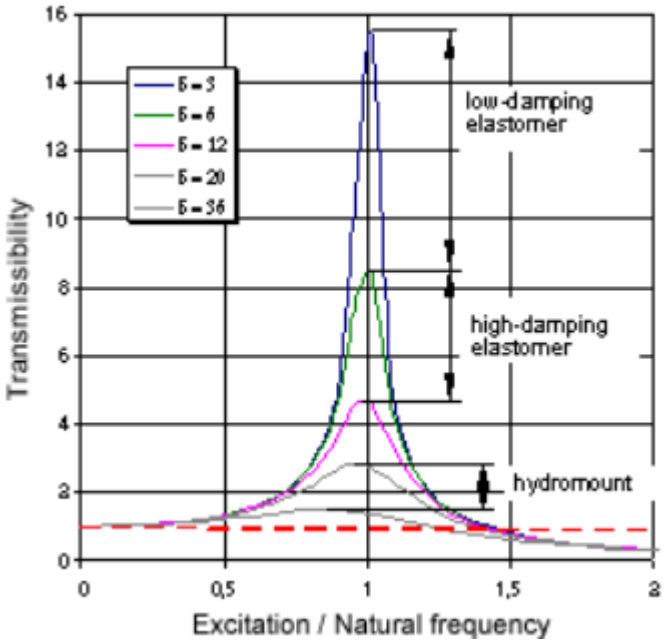
Objective

- To provide
  - Lower vibration magnitudes
  - Reduced maintenance cost and weight
  - More comfort to passengers
  - Increasing the safety

Damping of Torsional Vibration

- Damping refers to keeping the vibration deflection within acceptable limits once the resonance point has been passed as the extraction of kinetic energy by means of thermal conversion
- Elastomer materials exhibit greater damping than metal due to internal material friction.



How do we calculate damping?

$$d = \frac{c.\Psi}{2.\Pi.\omega}$$

- Where ;

$$\omega = \sqrt{\frac{c}{J}}$$

Damping factor d; unit [Nms/rad]

Damping ratio Ψ; unit [-]

Natural frequency of the TV damper ω; unit[1/s]

Torsional stiffness of the TV damper c; unit [Nm/rad]

Mass moment of inertia of the TV damper J; unit [kgm^2]

What is TV Damper?

- Torsional Vibration

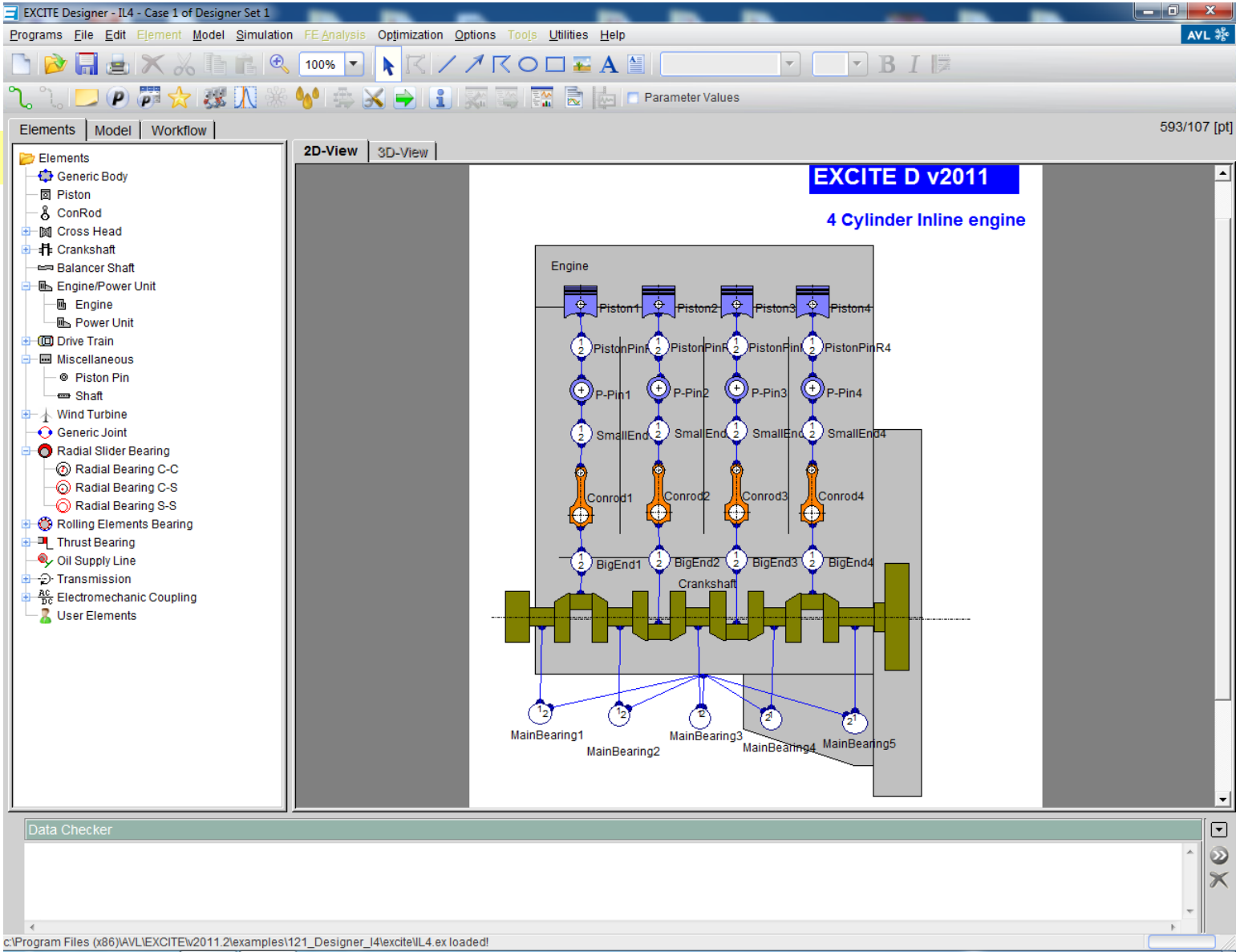
- Designed to;
  - prevent from fatigue failures of crankshaft
  - Protect other driveline parts from wear
  - İncreasing the NVH performance of the car
  - AVL Excite Designer software is used to simulate the system

AVL Excite Designer

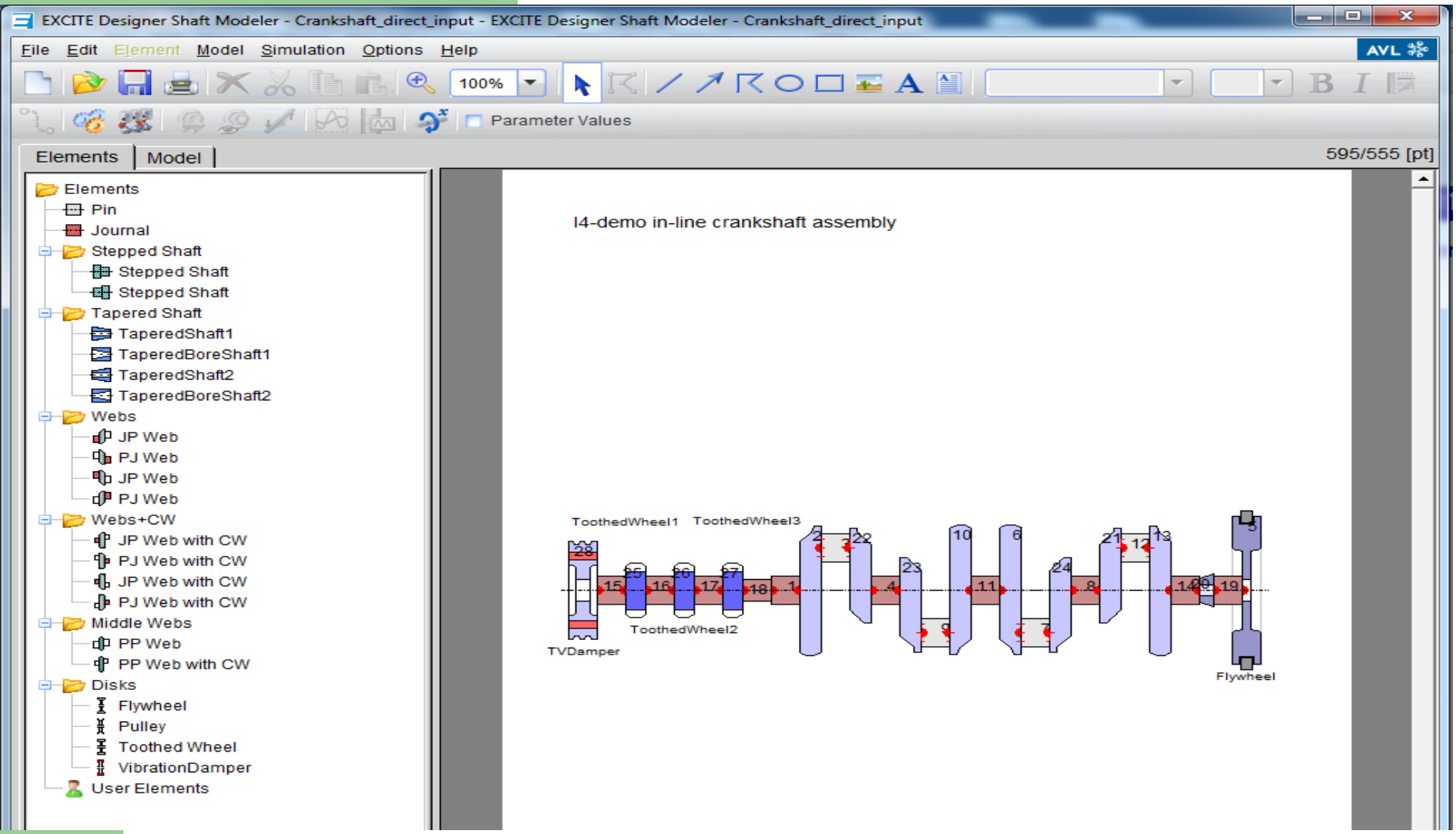
- Leads crank train and driveline design analysis with less set of data
- Performs modal analysis of the system and determines its torsional frequencies and torsional modes, as well as critical speeds
- Results of dynamic forced response calculation include dynamic torques, angular displacements, and dissipation power of torsional vibration damper

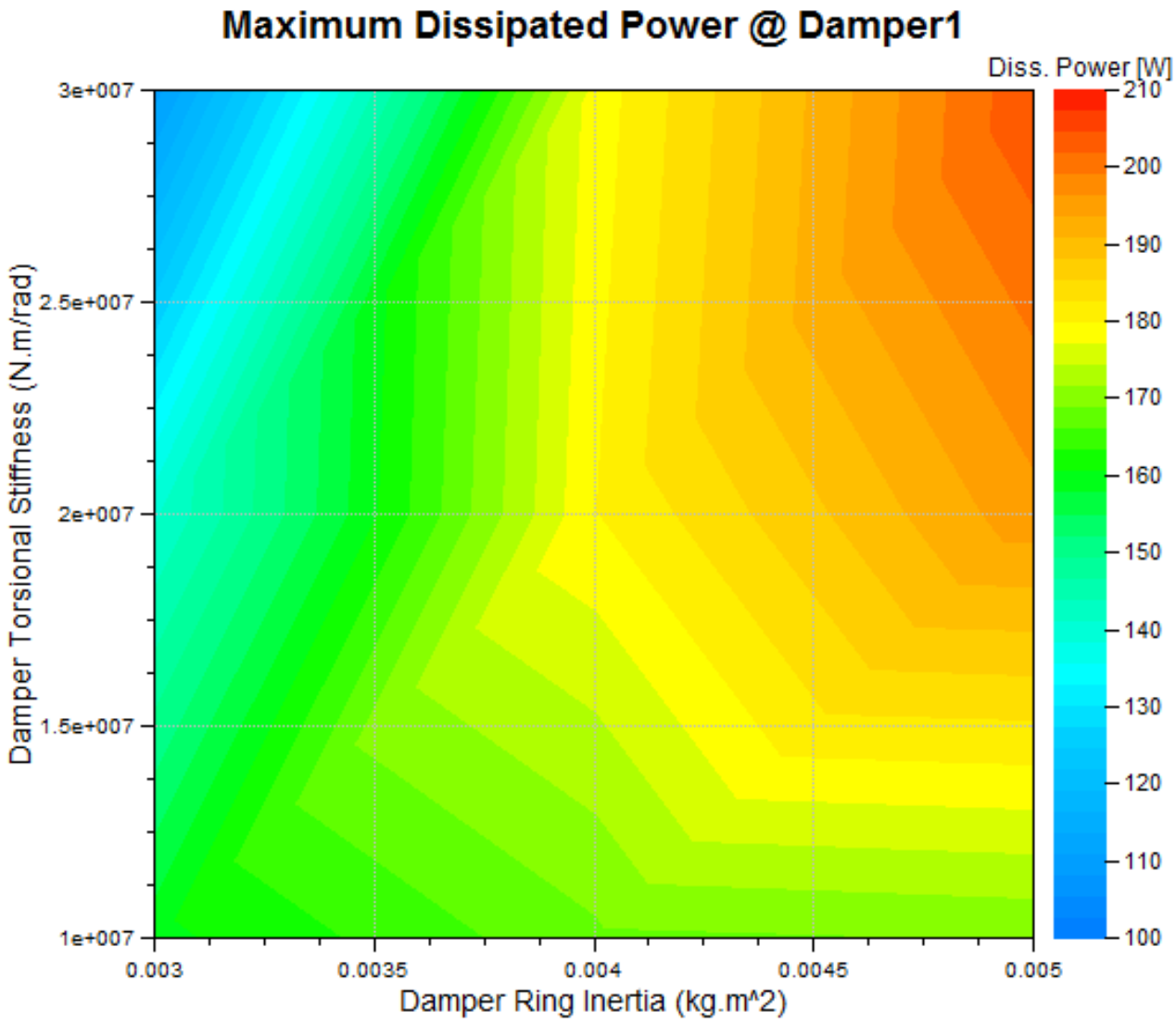
Simulation Interface

- Engine Illustration

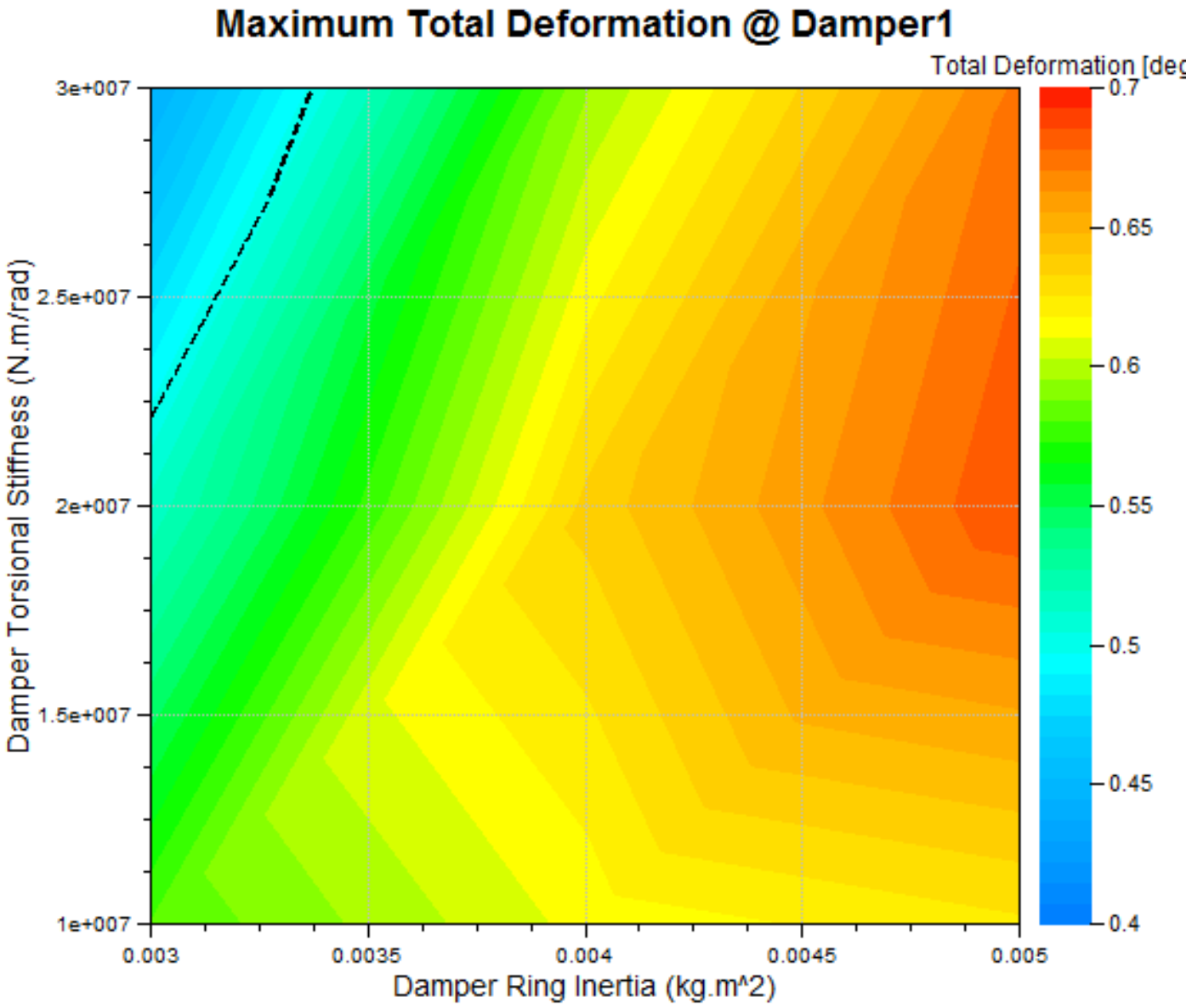


- The Crankshaft Model

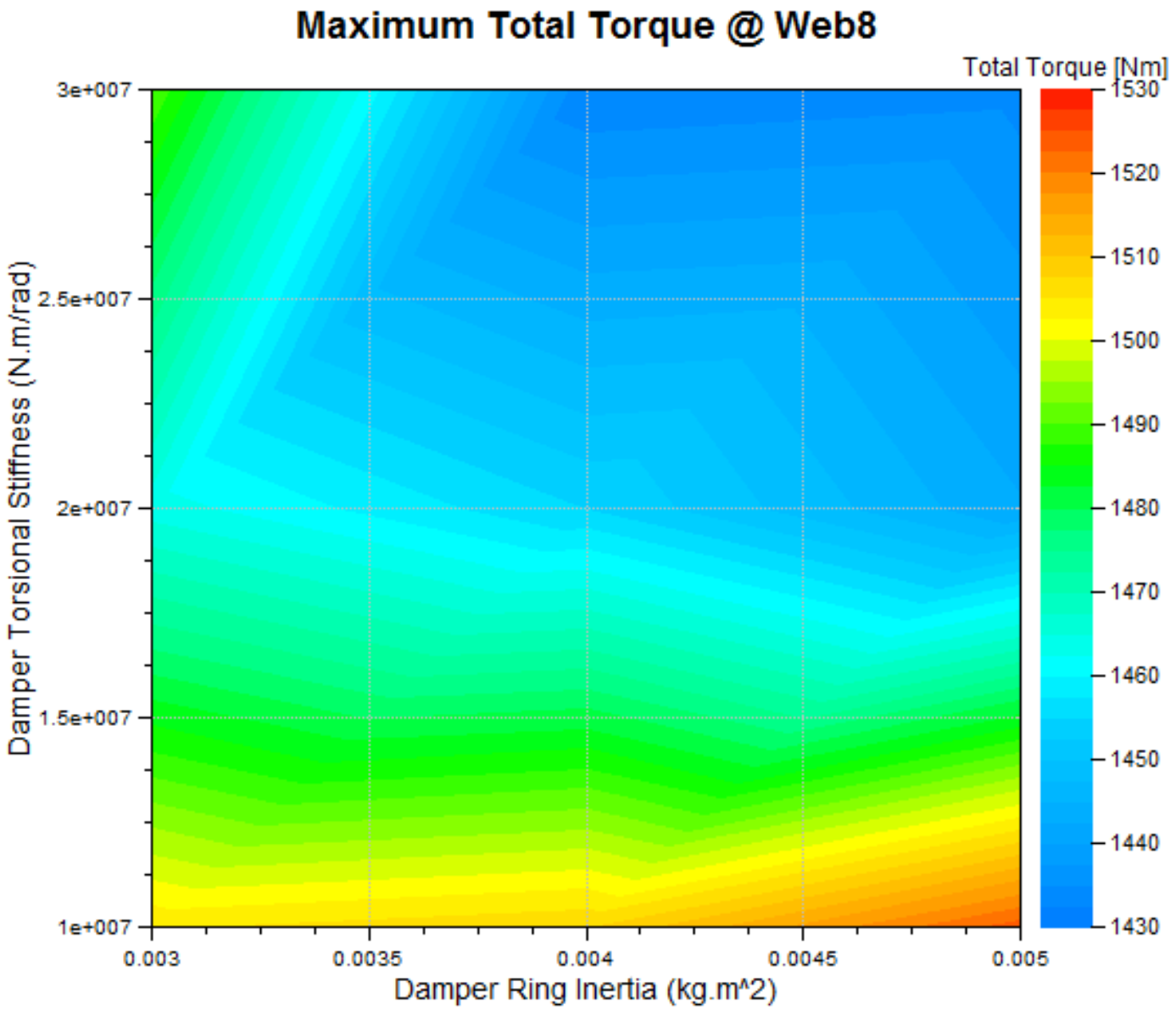




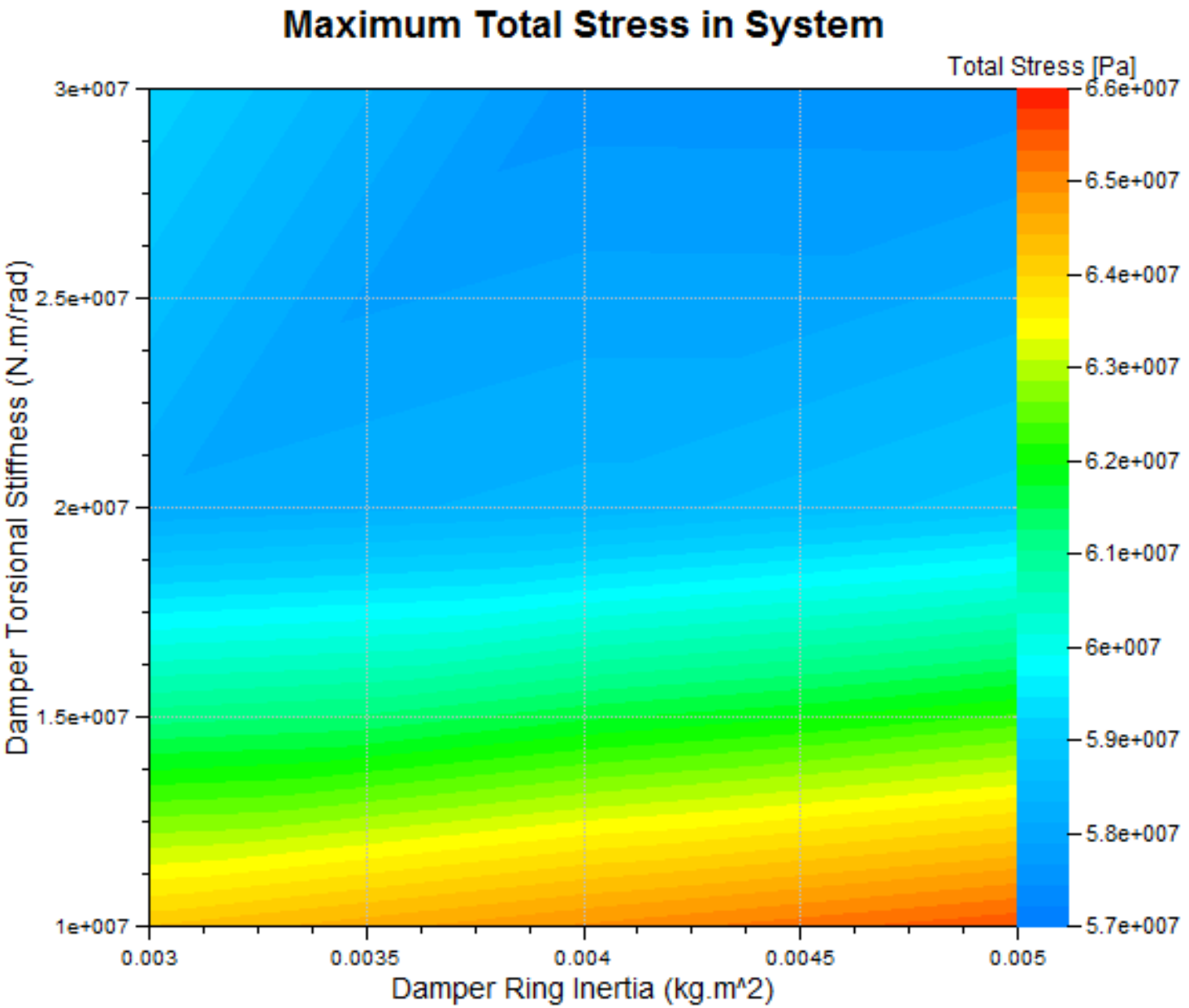
The biggest power dissipation (210 W) occur at right and upper side. Too much dissipated power can wear elastomer material of TV damper.



The most deformation on TV damper occurs at 2*107 stifness and 0.005 inertia value as smilar with dissipated power graph



The highest magnitude of torsional torque occurs at fillet of web8 . it can reach more than 1500 N.m



The total stress values graph of the sytem is in parallel with the graph of web8.

Conclusions

- Damper inertia and stiffness have a big impact on maximum torsion torque on the system.
- Lower stiffness values increase the torsional torque on the system.
- Decreasing the inertia of the damper can eliminate deformation and dissipated power on the TV damper

Acknowledgement

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Thanks for Listening

Any questions?