

# Torsional Vibration Examples And Solutions

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 Mechanical Vibrations  
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 How To Analyze & Measure Torsional Vibration  
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## GIDEON LOPEZ

*Measuring Torsional Twist & Vibration Through a Drivetrain*  
 Torsional Vibration Examples And Solutions  
 A torsional vibration calculation is an analysis of a complex system, usually a propeller installation or drive mechanism, with regards to the non-uniform rotation present in the installation. Because of resonance this non-uniform rotation can lead to very serious vibrations and in some cases even to damage. Torsional vibration calculations - Techno Fysica  
 High torsional vibrations can lead to high cycle fatigue or stress corrosion [1] and in the long run can be very destructive. The measurement of torsional vibration has multiple applications, including marine propulsion [2], automotive [3, 4] and power generation industry systems [5–7].  
 Torsional Vibration - an overview | ScienceDirect Topics  
 Torsional Vibrations: ---When a shaft is transmitting torque it is subjected to twisting of torsional deflection; and if there are cyclic variations in the transmitted torque the shaft will oscillate, that is twist and untwist.  
 Assumption: Mass moment of inertia of the disk is large compared with the mass moment of inertia of the shaft.  
 Torsional Vibrations - Christian Brothers University  
 Initially there is a mean torsional twist of around  $-2.3^\circ$  with a vibration amplitude of about  $\pm 0.15^\circ$  crank angle. However after 22 seconds, which corresponds to a speed of about 10000 rpm, it would appear that the shaft has some form of resonance at this speed. Figure 7 below shows the angular vibration plotted versus speed.  
 Measuring Torsional Twist & Vibration Through a Drivetrain  
 Torsional vibration is the fluctuation in the rotational velocity of a rotating component. These fluctuations are superimposed on the steady running speed. Why does torsional vibration matter? Just about every rotating machinery system has fluctuations in speed (engines, electric motors, hydraulic pumps, etc.). Some examples include:  
 Torsional Vibration: What is it?  
 The torsional vibration software option of Dewesoft is used to obtain a rotational/torsional vibration monitoring and analyzing solution, for research, development, and optimization. With the small form factor of the Dewesoft instruments (e.g. SIRIUS, DEWE-43, ...) the perfect mobile solution for test engineers and consultants is born.  
 Rotational and torsional vibration | Dewesoft Training Portal  
 Strain gage and its telemetry is used in conjunction with vibration analyzer as data acquisition unit and present measured data in various plots. Gapless (raw) vibration data can also be recorded for playing back and post processing if required and this is supplementary to real-time torsional vibration data.  
 Real-time torsional vibration measurement and analysis  
 Brief introduction to Single two and three rotor torsional vibration system, torsionally equivalent shaft solved examples.  
 TORSIONAL VIBRATION  
 ME 563 Mechanical Vibrations Fall 2010. 2-16. For example, if we choose both  $x$  or  $\phi$  to locate and orient the disk, then we can use Eq. ( 2.4 ) to obtain the number of DOFs with the single constraint,  $x = -a\phi$ :  
 $\#DOFs = \#coord. - \#constraints = 2 - 1 = 1$ . We will choose the phase angle,  $\phi$ , as our main coordinate.  
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 Compute free vibration solution of a two DOF spring-mass system as shown in above with  $m_1 = 9$ ;  $m_2 = 1$ ;  $k_1 = 38$ ;  $k_2 = 2$ ;  $k_3 = 3$  and the following initial conditions:  $y_1(0) = 1$ ;  $y_2(0) = 0$ ;  $v_1(0) = 0$ ;  $v_2(0) = 0$   
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 Powertrain Example. Below is a simple example of a fictitious 60 Hz, 2-pole, steam turbine generator powertrain. All rotor models (turbine and generator) were analyzed together to obtain the result. The torsional natural frequencies are shown below in Figure 4.  
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 The procedure to solve any vibration problem is: 1. Derive the equation of motion, using Newton's laws (or sometimes you can use energy methods, as discussed in Section 5.3) 2. Do some algebra to arrange the equation of motion into a standard form. 3.

Look up the solution to this standard form in a table of solutions to vibration problems.  
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 Torsional vibration is angular vibration of an object—commonly a shaft along its axis of rotation. Torsional vibration is often a concern in power transmission systems using rotating shafts or couplings where it can cause failures if not controlled. A second effect of torsional vibrations applies to passenger cars.  
 Torsional vibration - Wikipedia  
 torsional vibrations which enter the gearbox may be transmitted further via propeller shafts and differentials to the vehicle wheels [1, 2, 3]. Increasing demands to shorten development cycles mean that less time is available for both testing and mathematical modelling. Meaningful solutions may not be arrived at by treating vibration dampers, tim-  
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 Knowing how to measure torsional vibration is of key importance in the area of vehicle development and refinement. The main contributory source is the engine where periodically occurring combustion cycles cause variation in the crankshaft rotary vibration.  
 How To Analyze & Measure Torsional Vibration  
 Torsional Vibration Analysis integrated with the Pulsation and Mechanical Vibration Analysis ensures superior study results. Determination of risks due to lateral frame forces caused by torsional responses in reciprocating compressors and integration with Wood's Mechanical Vibration Analysis results in lower probability of vibration.  
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 Torsional vibration solution of tapered pile considering stress diffusion effect of pile end soil Article (PDF Available) in IOP Conference Series Earth and Environmental Science 304:032095 ...  
 (PDF) Torsional vibration solution of tapered pile ...  
 Natural Frequency of Free Torsional Vibration of Two Rotor System & Solved Problems on it. - Duration: 24:43. Shri Tech-Education 1,448 views. 24:43.  
 Torsional Vibrations  
 Typical examples of the first condition are hammermill and log chipper drives. The shafting acts as a torsion spring with a characteristic natural frequency. If this frequency is too close to that of the periodic impacts, vibration can become destructive. A common solution is to use a resilient coupling to provide vibration damping.  
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*Lecture 4: Undamped Free Vibration - University of Iowa*

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