## VIBRATION SOLUTIONS
by Piping Technology & Products, Inc.

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<th>Source</th>
<th>Potential Issues</th>
<th>PT&amp;P Solutions</th>
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<td>Process Changes to Increase Revenue</td>
<td>• Increase vibration from flow</td>
<td>• Add stiffness via hold-downs</td>
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<td>• Increased temperature leading to poorly managed stress</td>
<td>• Add vibration dampening to absorb vibration energy</td>
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<tr>
<td>Poorly Managed Pipe Stress</td>
<td>• Piping System not properly supported in hot condition</td>
<td>• Redo stress engineering</td>
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<td>Corrosion</td>
<td>• Reduction in piping thickness increases piping flexibility</td>
<td>• Add stiffness via hold-downs and vibration dampening</td>
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<td>• Replace piping</td>
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**HOLD-DOWNS**

**VIBRATION DAMPENING MATERIALS**

**SPRING BASED VIBRATION DAMPENING**

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Piping Technology & Products, Inc.


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Vibration Checklist

1. Unit Type
2. Line Type
3. Pipe Specifics – Diameter, Material, Thickness
4. Process Specifics – Media, temperature, pressure, equipment
5. Changes that have been Made to Process – Pressure, Media, Temperature (purpose of changes)
6. Other changes that have been to the line including new equipment, new valves…
7. Pipe Support Spacing – any notable issues with under supported areas
8. Condition of Equipment Supporting structure and tightness of equipment bolting
9. Check Pipe Supports for Clamp Bolting/Nut Tight Fit
10. Piping Deterioration – check issues with reduced pipe thickness and other issues due to corrosion or deformation
11. Estimated Frequency and Amplitude of Vibration at:
   a. Main Piping Line
   b. Moving Equipment
   c. Small Bore Connections
12. Other elements on line that are vibration – equipment, Tanks…
13. Estimate length of line
14. Take as many pictures of overall line as possible
15. Ask for any ISOs, Stress Models, 3D Models
Pipe Stress / Vibration Case Study

Customer Experience:
Strong Vibration on Flash Tank

PT&P Assessment Showed Poorly Managed Thermal Growth Leading to Insufficient Support of Piping and Damage to 3 of 6 Concrete Foundation for Tank Supports

PT&P Recommends Quick Fixes to Control Vibration in Short Term

- Replace with Vibration Dampening Anchor that Accomodates Axial Movement
- Replace with Spring Support to accommodate Vertical Movement

PT&P Assessment Showed Poorly Managed Thermal Growth Leading to Insufficient Support of Piping and Damage to 3 of 6 Concrete Foundation for Tank Supports

PT&P Recommends Long Term Fix to Redo Pipe Stress Analysis and Make Changes Accordingly (Optional)
10-point operational integrity check list when inspecting spring supports in the field:

- ✓ Beam attachment
- ✓ Beam attachment pin
- ✓ Spring hanger attachment
- ✓ Load flange movement
- ✓ Spring coil corrosion
- ✓ Check load indication for hot load
- ✓ Note load deviations
- ✓ Turnbuckle/locknuts
- ✓ Threaded rod/weldless eye, hex nuts
- ✓ Pipe clamp attachment pin

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