<table>
<thead>
<tr>
<th>Cause</th>
<th>Frequency</th>
<th>Dominant Plane</th>
<th>Power Cut</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misalignment</td>
<td></td>
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<tr>
<td>1.) Bearing</td>
<td></td>
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<tr>
<td>2.) Coupling</td>
<td></td>
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<tr>
<td>Rub (Seal or bearing)</td>
<td>1/4x, 1/3x, 1/2x &amp; 1x with slip frequency side bands</td>
<td>Radial</td>
<td>Disappears suddenly as some lower speed</td>
<td>1.) Full rubs tend to be 10-20x higher 2.) Bearing misalignment can give rub symptoms</td>
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<tr>
<td>Rub (Rotor)</td>
<td></td>
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<tr>
<td>Looseness</td>
<td></td>
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<tr>
<td>1.) Bearing (non-rotating)</td>
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<td>2.) Rotor Core (rotating)</td>
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<td>3.) Pedestals (non-rotating)</td>
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<td>4.) External fans</td>
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<tr>
<td>Unbalance rotor</td>
<td>1x rotor speed</td>
<td>Radial</td>
<td>Level drops slowly</td>
<td>Rotor has unbalance - can be due to thermal problems</td>
</tr>
<tr>
<td>Bent shaft</td>
<td>2x primary (1x may be seen)</td>
<td>Axial</td>
<td>Level drops slowly</td>
<td>DE runout should give higher 2x axial at that end. Normal runout on core is 1-2 mils.</td>
</tr>
<tr>
<td>Eccentric air gap</td>
<td>Strong 120Hz. Some 1x may be seen</td>
<td>Radial</td>
<td>Immediately drops</td>
<td>Air gap ratios from one side to the other. Should be 0.10 or greater Very load sensitive</td>
</tr>
<tr>
<td>Eccentric rotor</td>
<td>1x primarily. Some 60 &amp; 120Hz</td>
<td>Radial</td>
<td>Immediately drops</td>
<td></td>
</tr>
<tr>
<td>Rotor Bow (thermal bow)</td>
<td>1x Dominant (120Hz may be seen slip beat)</td>
<td>Radial</td>
<td>Some drop but high level would come down with speed</td>
<td>1.) Heat related 2.) Examine rotor stack for uneven stack tightness or looseness 3.) Shorted rotor iron 4.) Check bar looseness</td>
</tr>
<tr>
<td>Broken rotor bars</td>
<td></td>
<td>Radial</td>
<td>Immediately drops</td>
<td></td>
</tr>
<tr>
<td>Loose bars</td>
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<td>Radial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unbalanced line voltages</td>
<td>120Hz</td>
<td>Steady</td>
<td>120Hz &amp; possible beat</td>
<td>Immediately disappears</td>
</tr>
<tr>
<td>Electrical noise vibration</td>
<td>(RPM x # of rotor slots) / 60 +/- 120, 240 etc.</td>
<td>Steady</td>
<td></td>
<td>Immediately disappears</td>
</tr>
<tr>
<td>Oil film instability (Oil whirl)</td>
<td>Approx. 1/2 rotational (43 - .48)</td>
<td>Steady</td>
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<td>Anti Friction Bearing Problems</td>
<td></td>
<td>Steady</td>
<td></td>
<td></td>
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<tr>
<td>Resonant Parts</td>
<td></td>
<td>Steady</td>
<td>Drops rapidly</td>
<td>May be adjacent parts</td>
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</table>