The following is a simplified guide to common wire rope problems. In the event of no other standard being applicable, Bridon recommends that ropes are inspected/examined in accordance with ASME B30.5.

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<th>Cause/Action</th>
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| Mechanical damage caused by the rope contacting the structure of the crane on which it is operating or an external structure - usually of a localized nature. | • Generally results from operational conditions.  
• Check sheave guards and support/guide sheaves to ensure that the rope has not “jumped out” of the intended reeving system.  
• Review operating conditions. |
| Opening of strands in Rotation Resistant ropes - in extreme circumstances the rope may develop a “birdcage distortion” or protrusion of inner strands. **Note - Rotation Resistant ropes are designed with a specific strand gap which may be apparent on delivery in an off tension condition. These gaps will close under load and will have no effect on the operational performance of the rope.** | • Check sheave and drum groove radii using sheave gauge to ensure that they are no smaller than nominal rope radius +2.5% - Bridon recommends that the sheave and drum groove radii are checked prior to any rope installation.  
• Repair or replace drum/sheaves if necessary.  
• Check fleet angles in the reeving system - a fleet angle in excess of 1.5 degrees may cause distortion (see Fleet Angle).  
• Check installation method - turn induced during installation can cause excessive rope rotation resulting in distortion (See Product Safety: Handling & Installation).  
• Check if the rope has been cut “on site” prior to installation or cut to remove a damaged portion from the end of the rope. If so, was the correct cutting procedure used? Incorrect cutting of rotation resistant, low rotation and parallel closed ropes can cause distortion in operation (See Product Safety: Handling & Installation).  
• Rope may have experienced a shock load. |
| Broken wires or crushed or flattened rope on lower layers at crossover points in multi-layer coiling situations. Wire breaks usually resulting from crushing or abrasion. | • Check tension on underlying layers. Bridon recommends an installation tension of between 2% and 10% of the minimum breaking force of the wire rope. Care should be taken to ensure that tension is retained in service. Insufficient tension will result in these lower layers being more prone to crushing damage.  
• Review wire rope construction. Dyform wire ropes are more resistant to crushing on underlying layers than conventional rope constructions.  
• Do not use more rope than necessary.  
• Check drum diameter. Insufficient bending ratio increases tread pressure. |
| Wires looping from strands. | • Insufficient service dressing.  
• Consider alternative rope construction.  
• If wires are looping out of the rope underneath a crossover point, there may be insufficient tension on the lower wraps on the drum.  
• Check for areas of rope crushing or distortion.  
• Possible fleet angle problems causing rope rotation. |
<p>| “Pigtail” or severe spiralling in rope. | • Check that the sheave and drum diameter is large enough - Bridon recommends a minimum ratio of the drum/sheave to nominal rope diameter of 18:1. |</p>
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| Two single axial lines of broken wires running along the length of the rope approximately 120 degrees apart indicating that the rope is being “nipped” in a tight sheave. | • Indicates that the rope has run over a small radius or sharp edge.  
• Check to see if the rope has “jumped off” a sheave and has run over a shaft.  
• Check sheave and drum groove radii using sheave gauge to ensure that they are no smaller than nominal rope radius + 5% - Bridon would recommend that the sheave/drum groove radii are checked prior to any rope installation.  
• Repair or replace drum/sheaves if necessary.  
• Check wire rope construction - Dyform ropes are capable of doubling the bending fatigue life of a conventional steel wire rope.  
• Bending fatigue is accelerated as the load increases and as the bending radius decreases (see Bend Fatigue). Consider whether either factor can be improved.  
• Check for contact damage. |
| One line of broken wires running along the length of the rope indicating insufficient support for the rope, generally caused by oversize sheave or drum grooving. | • I Check to see if the groove diameter is no greater than 15% greater than the nominal rope diameter.  
• Repair or replace drum/sheaves if necessary.  
• Check for contact damage. |
| Short rope life resulting from evenly/randomly distributed bend fatigue wire breaks caused by bending through the reeving system. | • Bending fatigue is accelerated as the load increases and as the bending radius decreases (see Bend Fatigue). Consider whether either factor can be improved.  
• Check wire rope construction - Dyform ropes are capable of doubling the bending fatigue life of a conventional steel wire rope. |
| Fatigue induced wire breaks are characterised by flat ends on the broken wires. | • Bending fatigue is accelerated as the load increases and as the bending radius decreases (see Bend Fatigue). Consider whether either factor can be improved.  
• Check wire rope construction - Dyform ropes are capable of doubling the bending fatigue life of a conventional steel wire rope. |
| Short rope life resulting from localised bend fatigue wire breaks. | • Bending fatigue is accelerated as the load increases and as the bending radius decreases (see Bend Fatigue). Consider whether either factor can be improved.  
• Check wire rope construction - Dyform ropes are capable of doubling the bending fatigue life of a conventional steel wire rope. |
| Fatigue induced wire breaks are characterised by flat ends on the broken wires. | • Review operating conditions. |
| Broken rope - ropes are likely to break when subjected to substantial overload or misuse particularly when a rope has already been subjected to mechanical damage. | • Check sheave and drum groove radii using sheave gauge to ensure that they are no smaller than nominal rope radius +2.5% - Bridon recommends that the sheave/drum groove radii are checked prior to any rope installation.  
• Repair or replace drum/sheaves if necessary. |
| Corrosion of the rope both internally and/or externally can also result in a significant loss in metallic area. The rope strength is reduced to a level where it is unable to sustain the normal working load. | • Check sheave and drum groove radii using sheave gauge to ensure that they are no smaller than nominal rope radius +2.5% - Bridon recommends that the sheave/drum groove radii are checked prior to any rope installation.  
• Repair or replace drum/sheaves if necessary. |
| Wave or corkscrew deformations normally associated with multistrand ropes. | • Check sheave and drum groove radii using sheave gauge to ensure that they are no smaller than nominal rope radius +2.5% - Bridon recommends that the sheave/drum groove radii are checked prior to any rope installation.  
• Repair or replace drum/sheaves if necessary. |
### Problem

| Core protrusion or broken core in single layer six or eight strand rope. |
| Rope accumulating or “stacking” at drum flange - due to insufficient fleet angle. |
| Sunken wraps of rope on the drum normally associated with insufficient support from lower layers of rope or grooving. |
| Short rope life induced by excessive wear and abrasion. |
| External corrosion. |
| Internal corrosion. |

### Cause/Action

- Check fleet angles in the reeving system - a fleet angle in excess of 1.5 degrees may cause distortion (see Fleet Angles).
- Check that rope end has been secured in accordance with manufacturers instructions (see Product Safety: Handling & Installation).
- Check operating conditions for induced turn.
- Review rope selection.
- Consider use of rotation resistant or low rotation rope.
- Review rope selection (see Torsion Stability cabling calc.)
- Consider use of rotation resistant or low rotation rope.
- Review installation procedure (see Product Safety: Handling & Installation) or operating procedures.
- Review drum design with original equipment manufacturer - consider adding rope kicker, fleeting sheave etc.
- Check correct rope diameter.
- If grooved drum check groove pitch.
- Check tension on underlying layers - Bridon recommend an installation tension of between 2% and 10% of the minimum breaking force of the wire rope - Care should be taken to ensure that tension is retained in service. Insufficient tension will result in these lower layers being more prone to crushing damage.
- Make sure that the correct rope length is being used. Too much rope (which may not be necessary) may aggravate the problem.
- Consider selection of galvanised rope.
- Review level and type of service dressing.
- Consider selection of galvanised rope.
- Review frequency amount and type of service dressing.
- Consider selection of plastic impregnated (PI) wire rope.