

## Lubrication Checkup: Issues Around Copper Lines

Written by Dr. Lube, aka Ken Bannister  
Wednesday, 21 March 2012 14:43

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### Symptom:

*“Dr. Lube, in your book Lubrication for Industry, specifically in the chapter ‘Selecting a Lubricant Delivery System,’ under ‘Lube Lines,’ you say that copper can deplete certain additive packages from oil. Could you explain this a bit more?”*

### Diagnosis:

Copper is an easy material to bend and, thus, is often favored for piping lubrication-delivery systems. One of the perceived benefits is the softness of the metal that contributes to easy installation. In fact, that very quality is a drawback when the metal is overworked during the initial bending process, causing work hardening and cracking of the line’s surface.

Hardening is accelerated as a result of subsequent machine vibration, which releases a fine copper “dust” into the fluid. As with any tubing or piping material used to carry fluid, erosion wear caused by the fluid moving over the tubing surface (i.e., think smooth rocks in a fast-moving river bed) will occur (especially at sharp bends or corners) and, over time, release copper particulate into the fluid.

How does this affect lubricants in a delivery system? Copper literally attacks the antioxidant packages in industrial and automotive oils. (It’s the primary material used in laboratory testing to accelerate oxidation when testing lubricants!) Copper’s impact on antioxidants is more common in recirculative systems than in total-loss systems. A similar effect can be seen in the cooking arena, where use of copper cleaning pads in deep fryers is known to accelerate the breakdown of oils and fats.

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In areas where large temperature swings are the norm, moisture can build up in copper lines and release copper ions. This is an important issue for refineries, as distillate fuels and oils can contain sulfur-based compounds called mercaptides. Copper—*like brass*—is incompatible with mercaptides. Together, they form a gel similar to insoluble grease that will plug filters and lines. Additives to prevent this from occurring are available.

### Prescription:

When choosing a premium line material for a lubrication-delivery system (any lube-delivery system, that is), the ideal choice is copper-coated (on the outside) steel. These types of lines will not only withstand heavy shock load and trauma, they'll have a higher burst pressure—*and look much neater if bent using the correct tools*

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**MT**

*Lube questions? Ask Dr. Lube, aka Ken Bannister, author of the book Lubrication for Industry and the Lubrication section of the 28th edition*

*Machinery's Handbook.*

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