Building Leadership Excellence

people resources solutions

Effectiveness of Paper Dryer Journal Insulating Sleeves

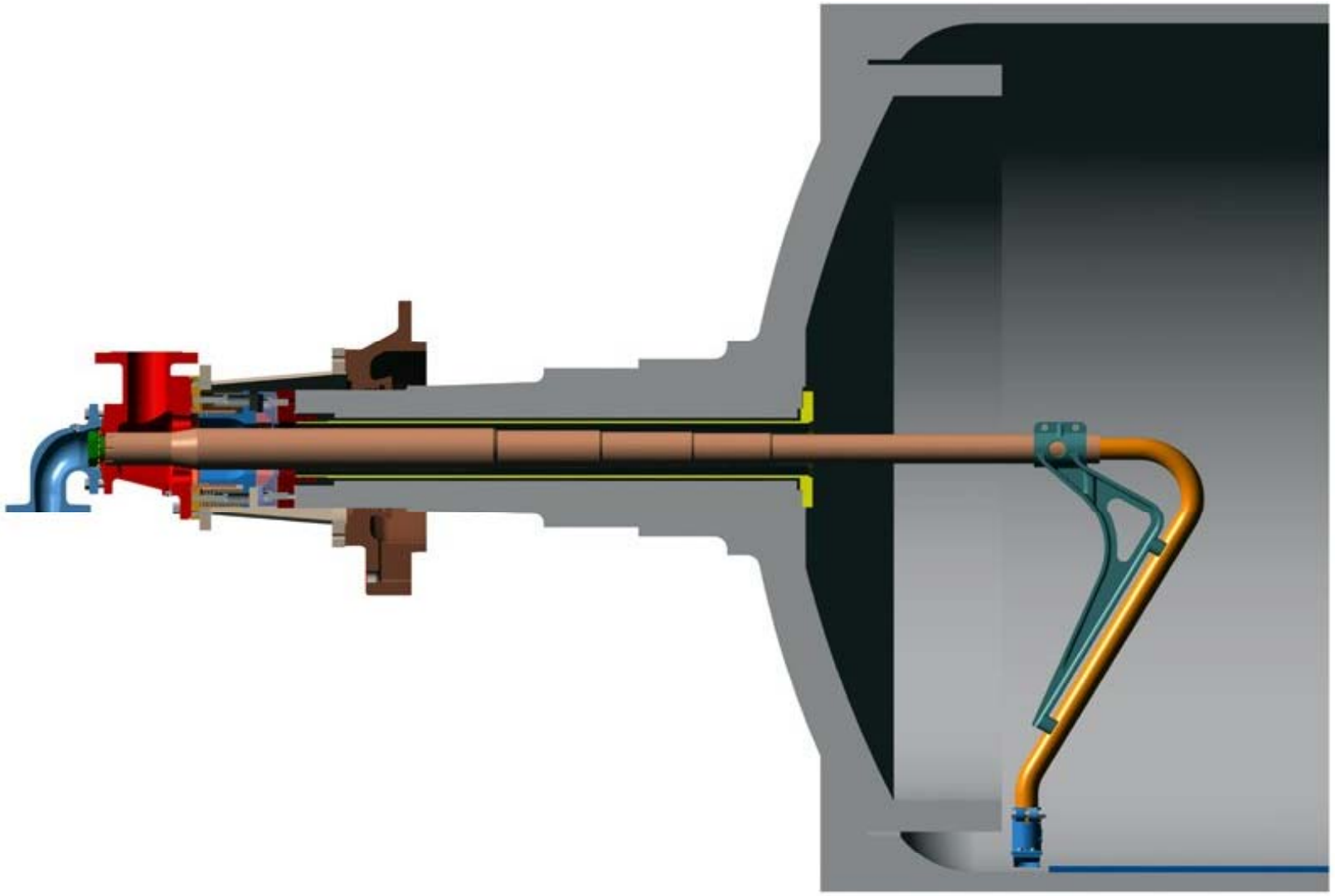
May 1-4
PaperCon 2011
Northern Kentucky Convention Center

RETHINK PAPER:
Lean and Green

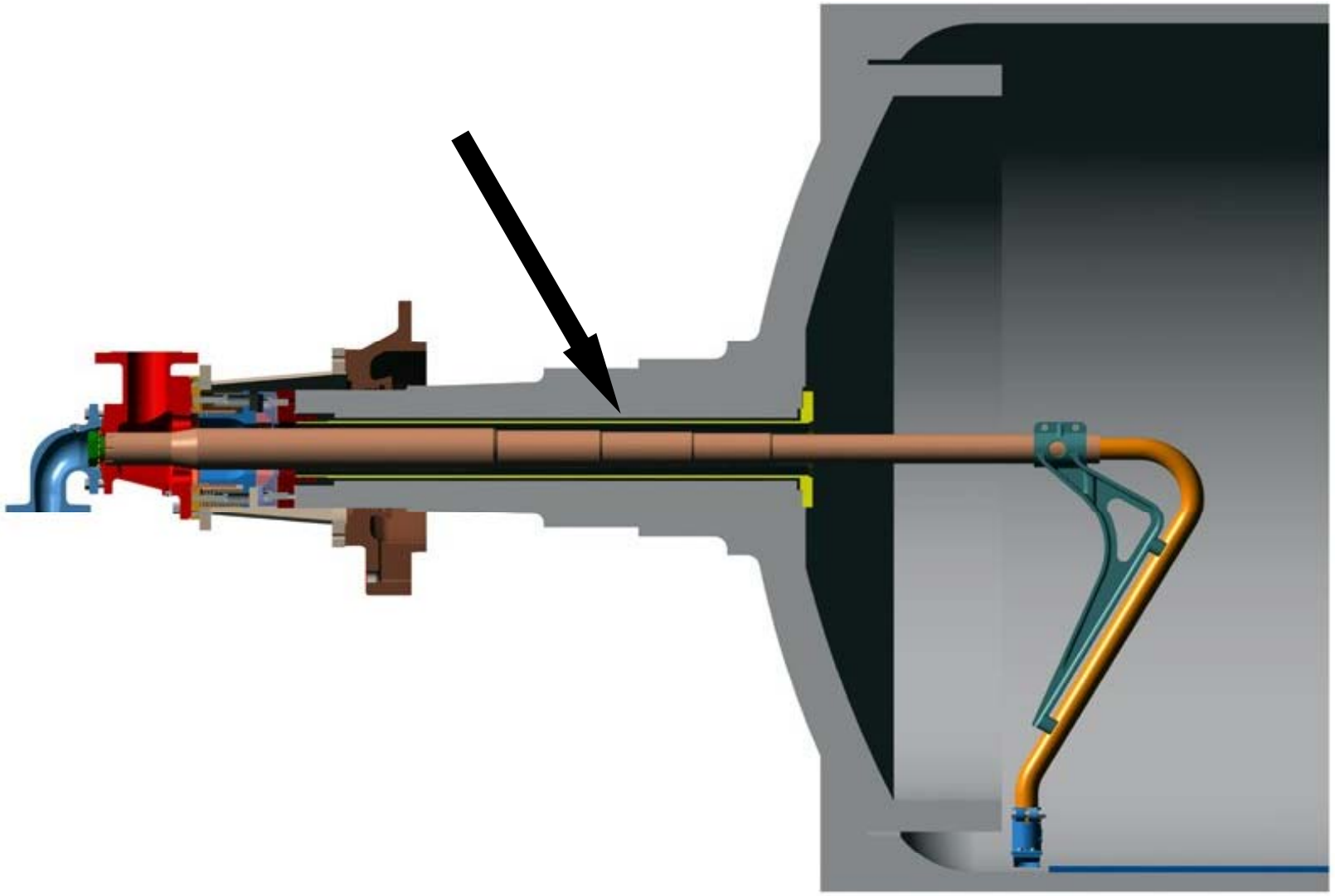
Effectiveness of Insulating Sleeves

- Greg Wedel – Kadant Johnson Inc.
- Jerry Timm – Kadant Johnson Inc.

Dryer Journal Insulating Sleeves



Dryer Journal Insulating Sleeves



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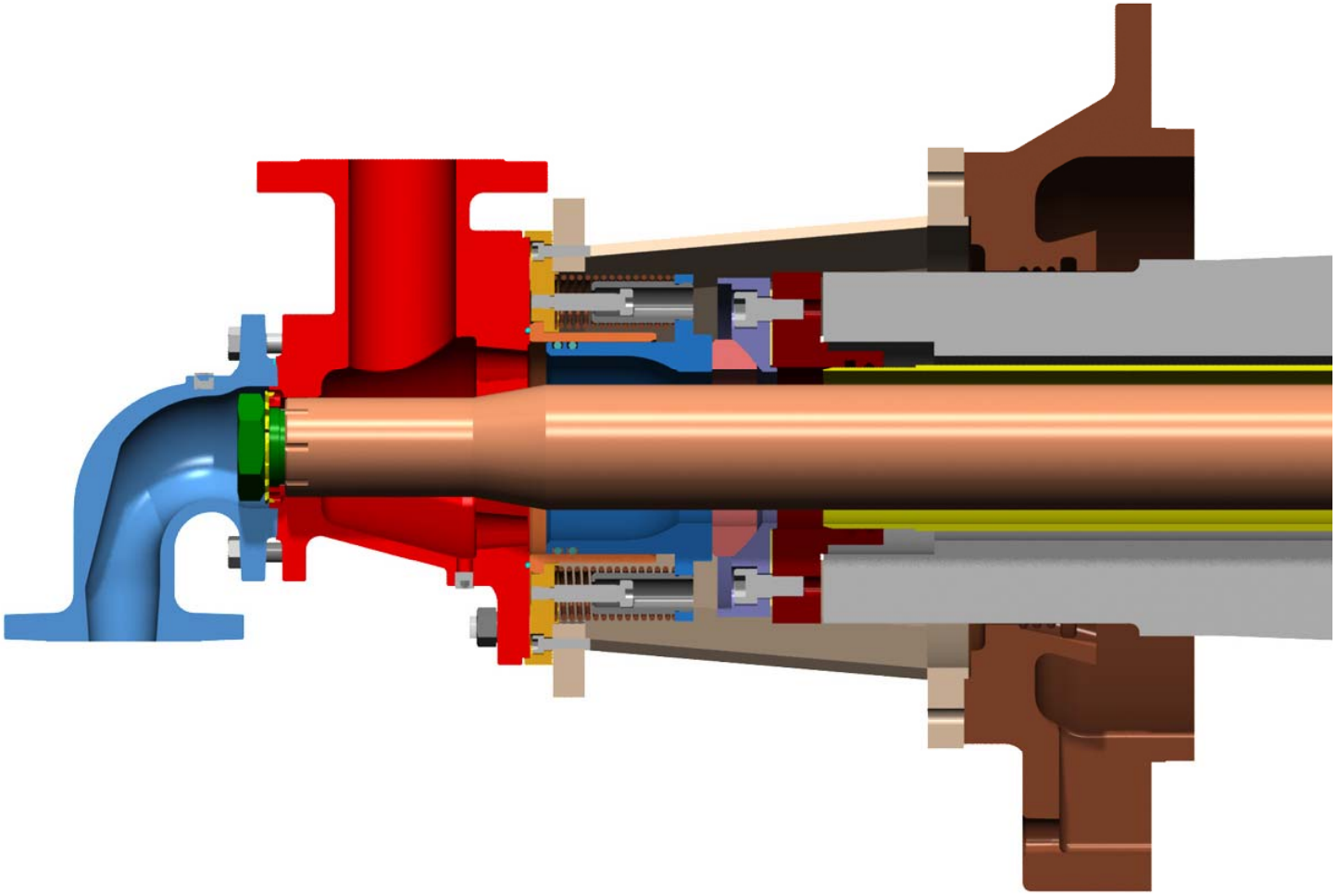


Without a Dryer Journal Insulating Sleeve

- Increase heat transfer through dryer journals
- Increase heat transfer to the bearings
- Increase bearing race temperature
- Increase heat transfer to oil lubrication system
- Increase tendency for oil carbonizing
- Increase dryer journal thermal response

Cracked Dryer Bearing Inner Race

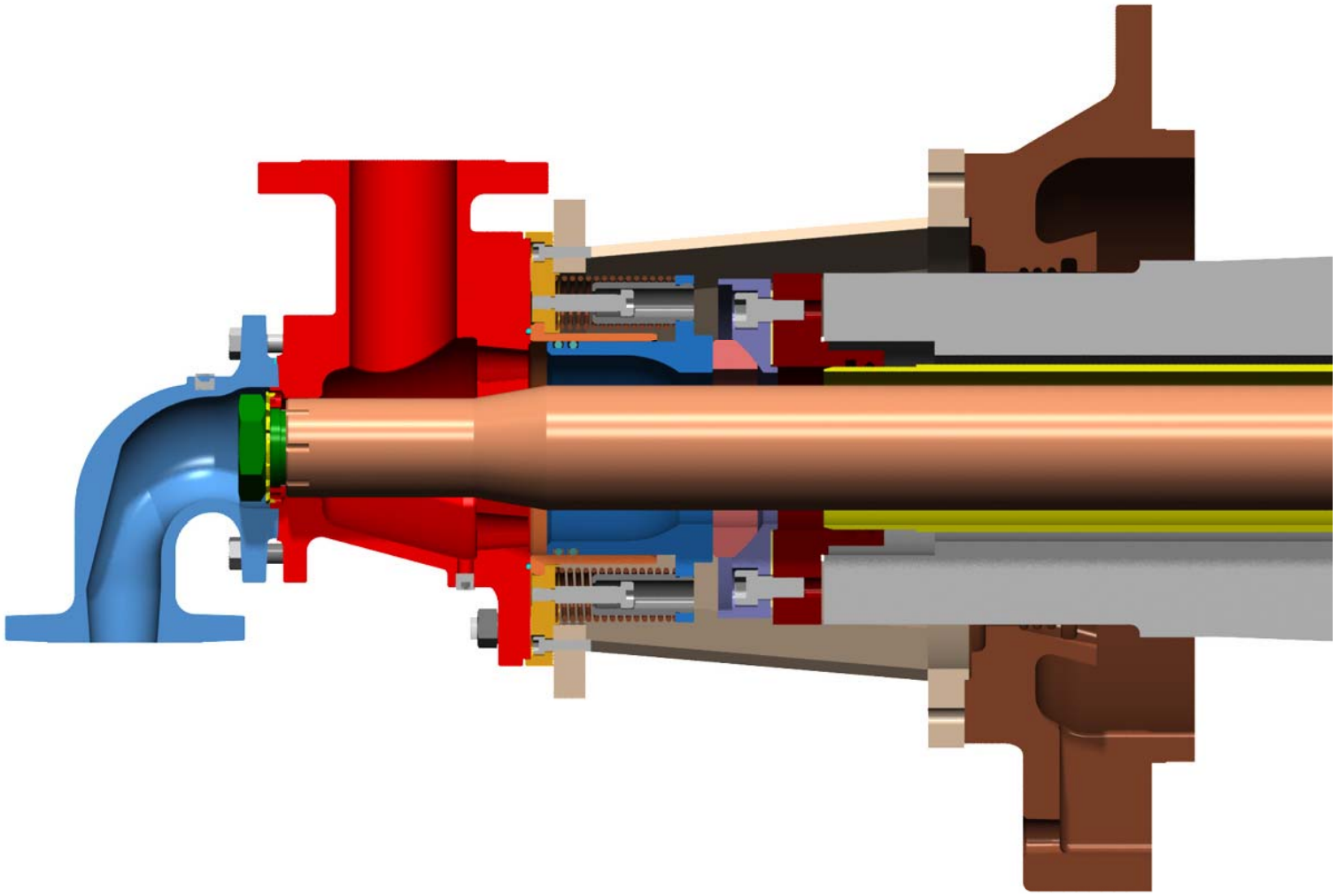
Courtesy Society of Tribologists and Lubrication Engineers

Pilot Test Dryers

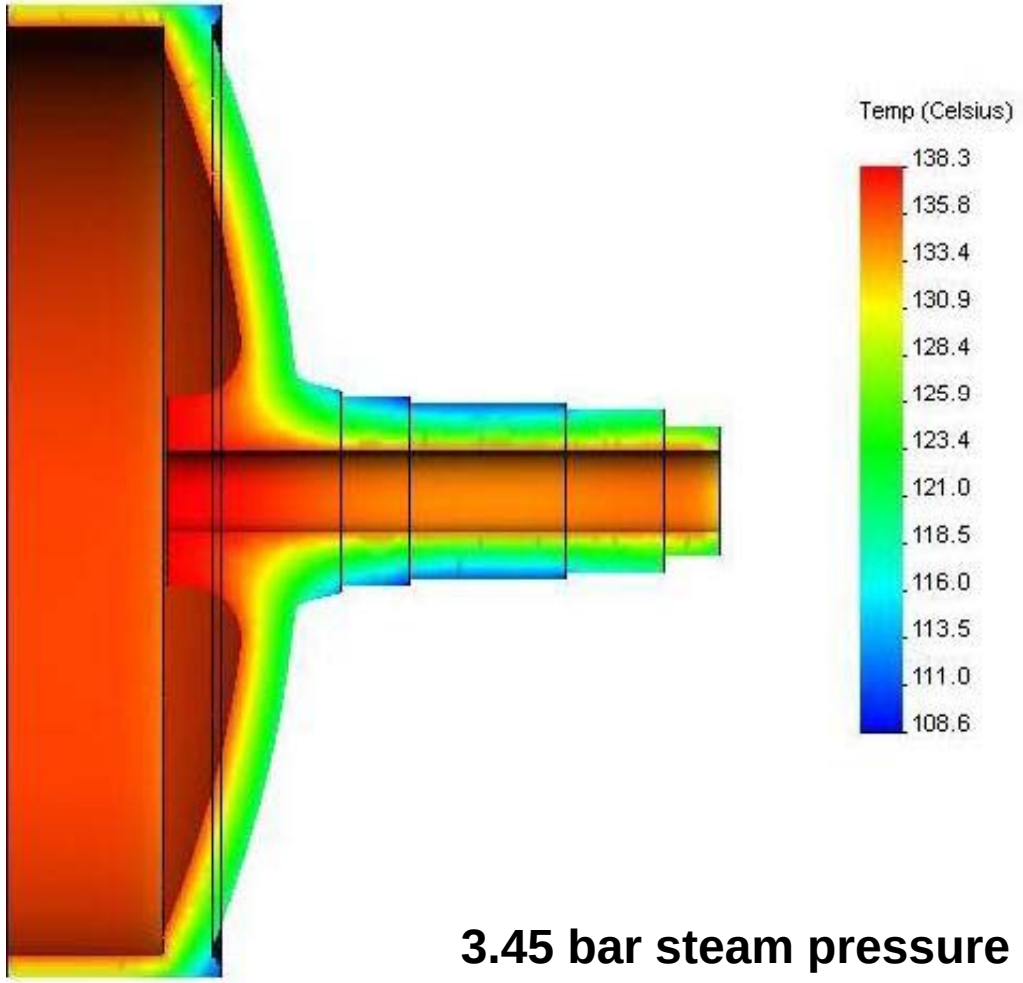
JOCO 6000 Pilot Test Dryer

Diameter	1.8 m	72”
Face	8.76 m	345”
Speed	2000 mpm	6560 fpm
Pressure	11 bar	160 psig
Condensing	49 kg/hr-m^2	10 lb/hr-ft^2
Syphon	Rotating or stationary	

Dryer Journal Insulating Sleeves

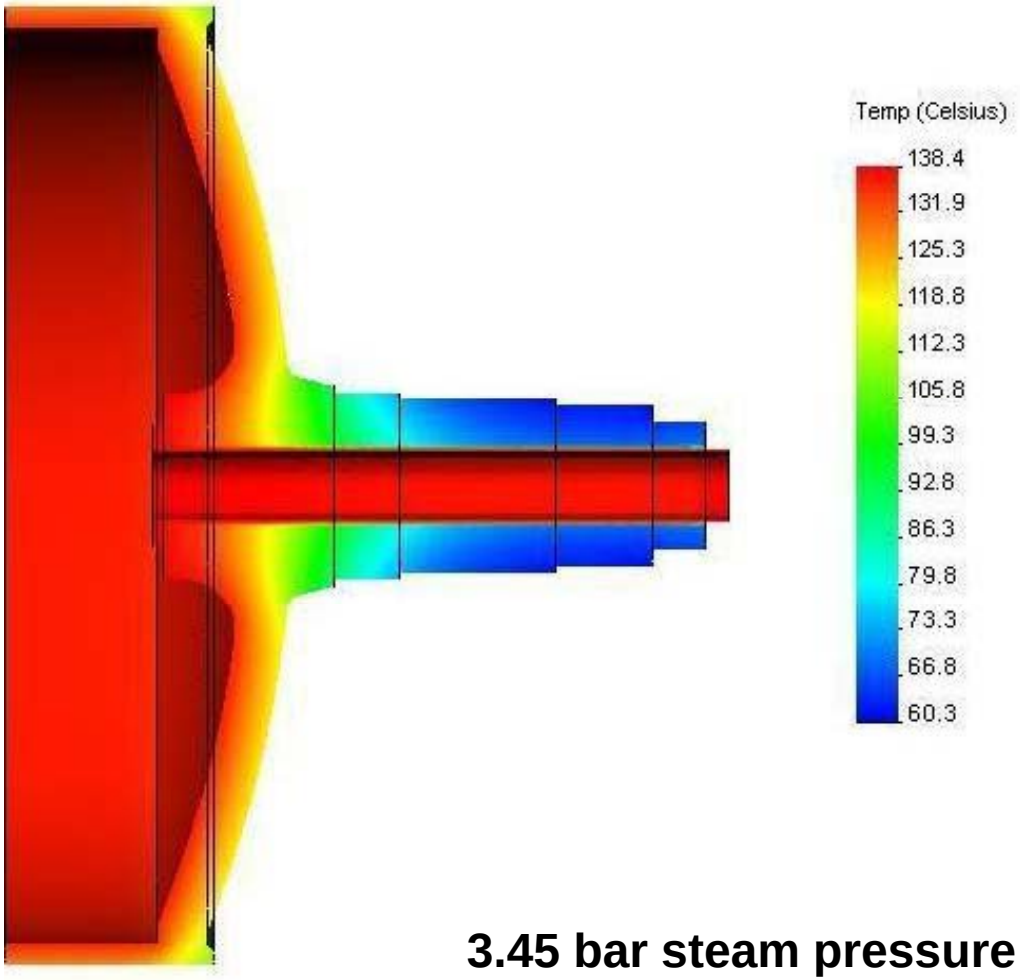


No Dryer Journal Insulating Sleeve



3.45 bar steam pressure

Dryer Journal Insulating Sleeve

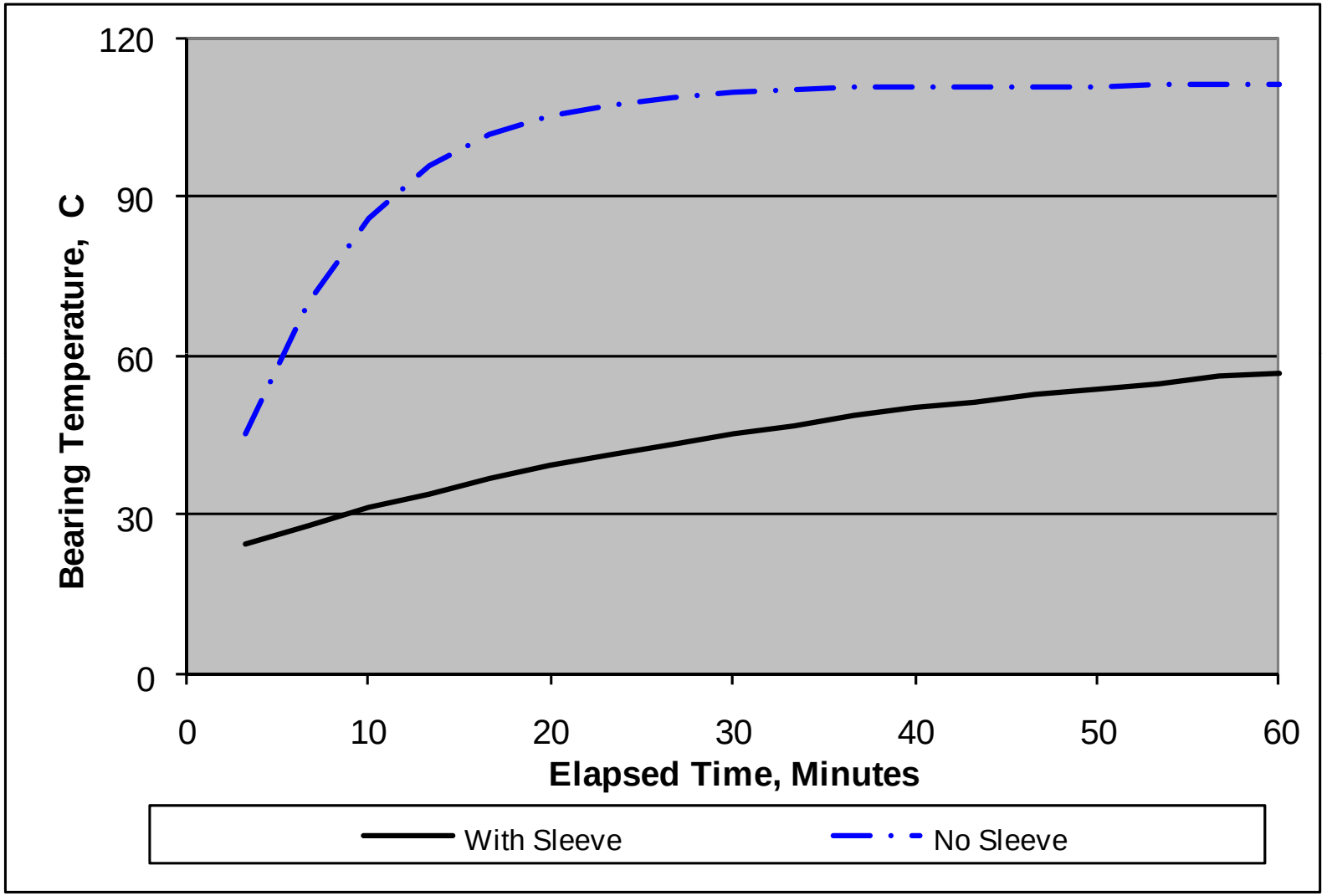


3.45 bar steam pressure

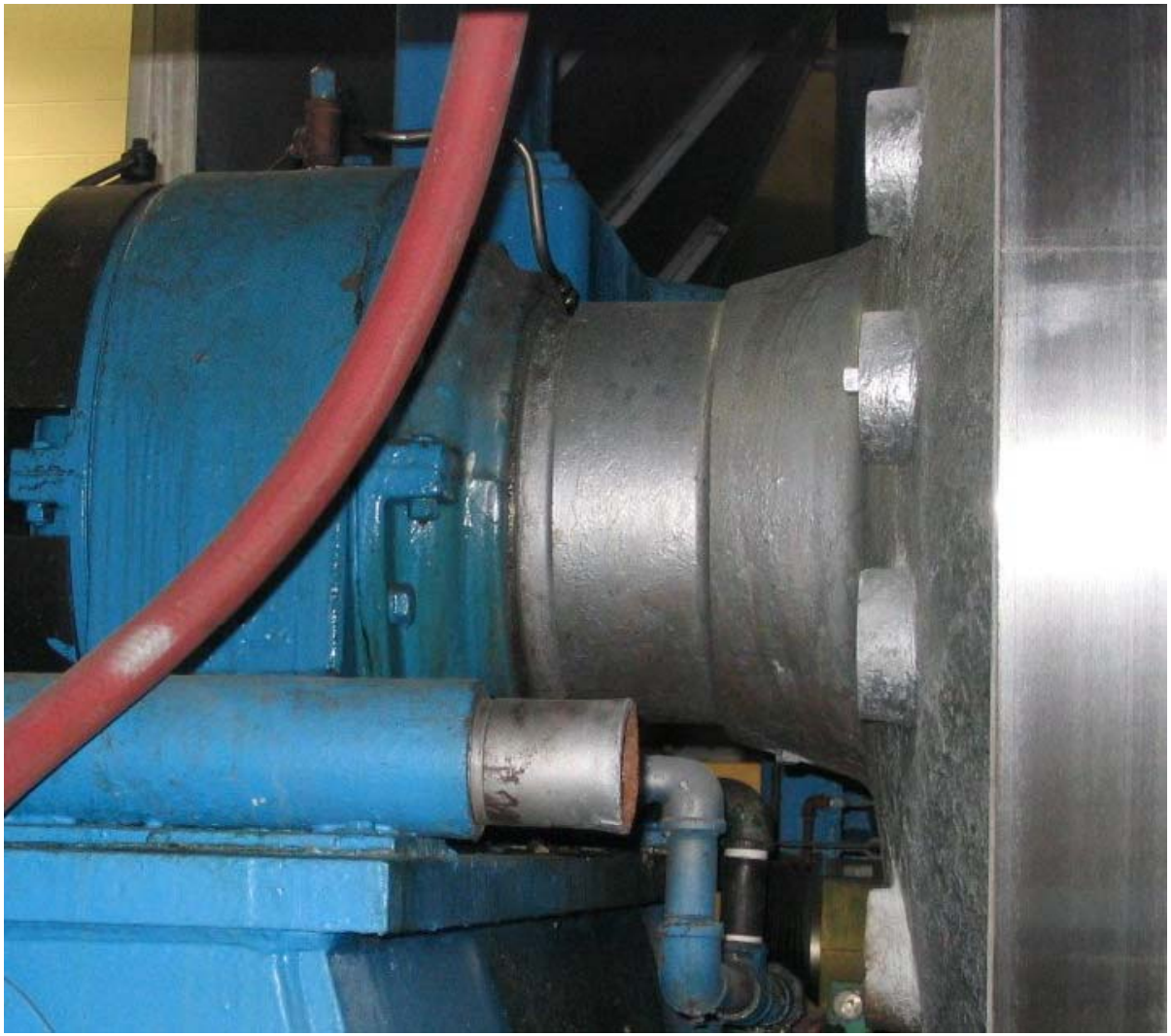
Dryer Journal Insulating Sleeves

Dryer Sleeve Configuration	Dryer Steam Pressure bar (psia)	Journal Temperature under the Bearing °C (°F)	Heat Transfer to the Bearing kW (Btu/hr)
No sleeve	3.45 (50)	110 (230)	2.6 (8840)
No sleeve	6.90 (100)	130 (266)	3.3 (11288)
Sleeve	3.45 (50)	66 (150)	1.0 (3400)
Sleeve	6.90 (100)	71 (160)	1.2 (4080)

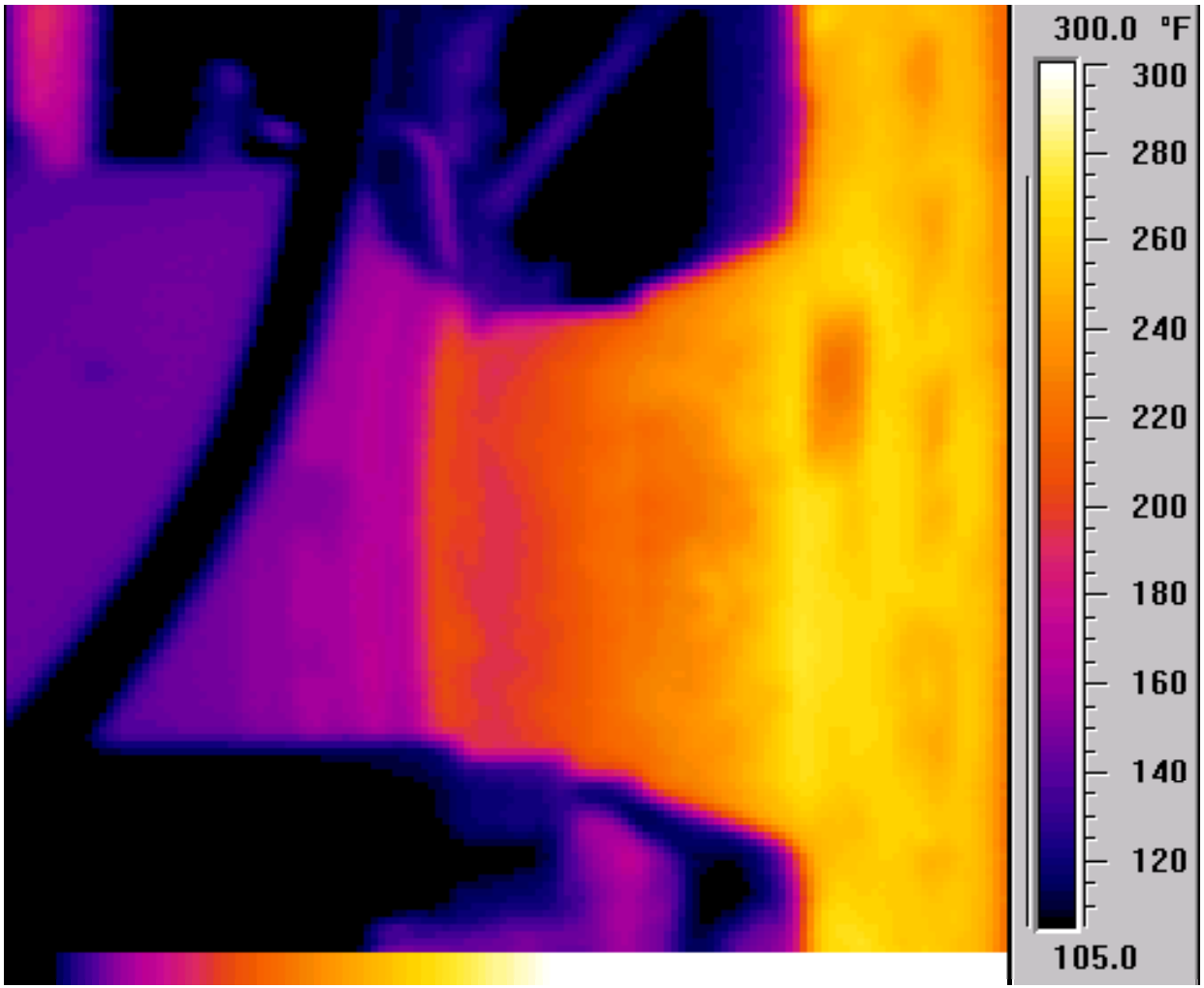
Dryer Journal Insulating Sleeves



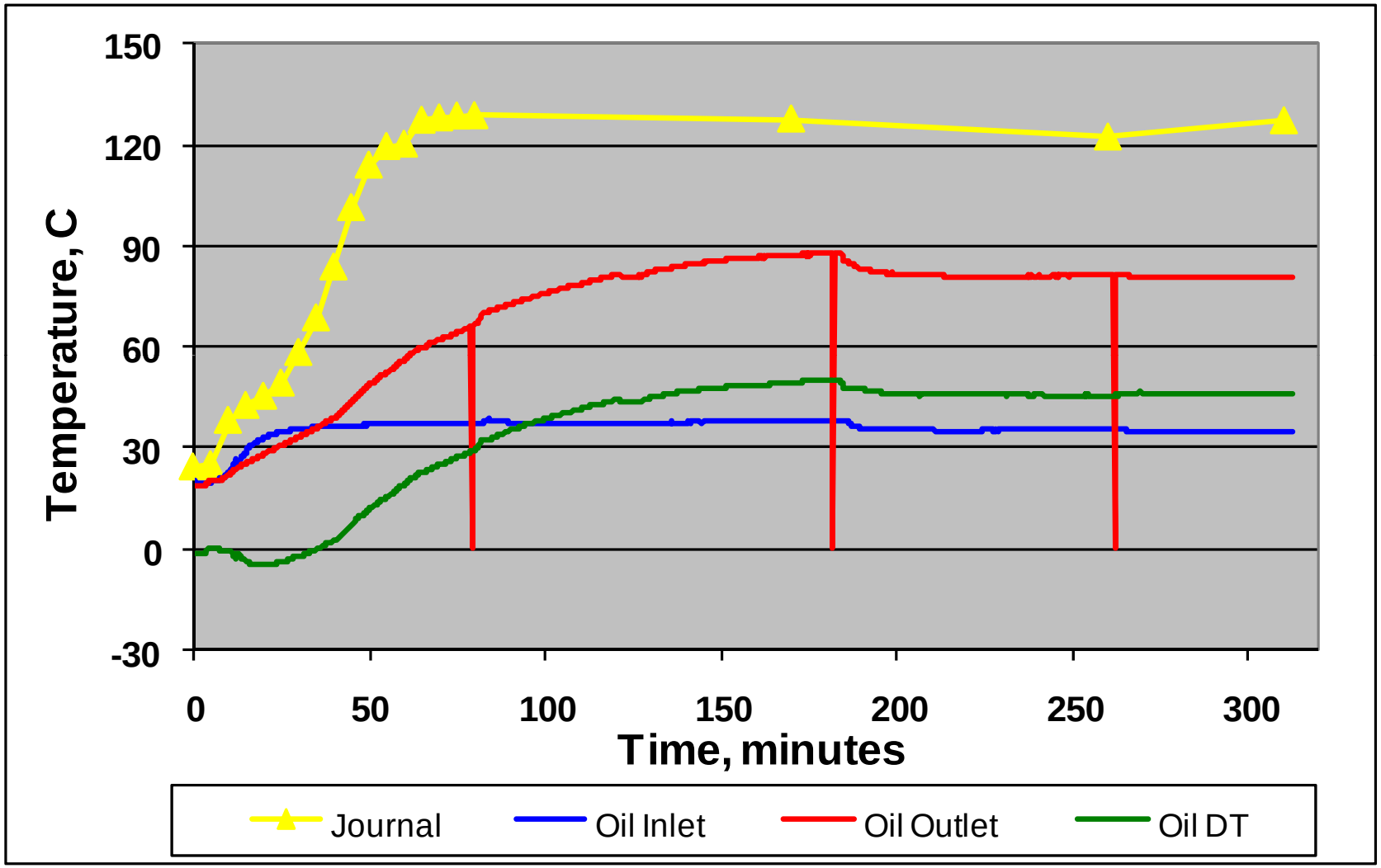
Dryer Journal Insulating Sleeves



Dryer Journal Insulating Sleeves

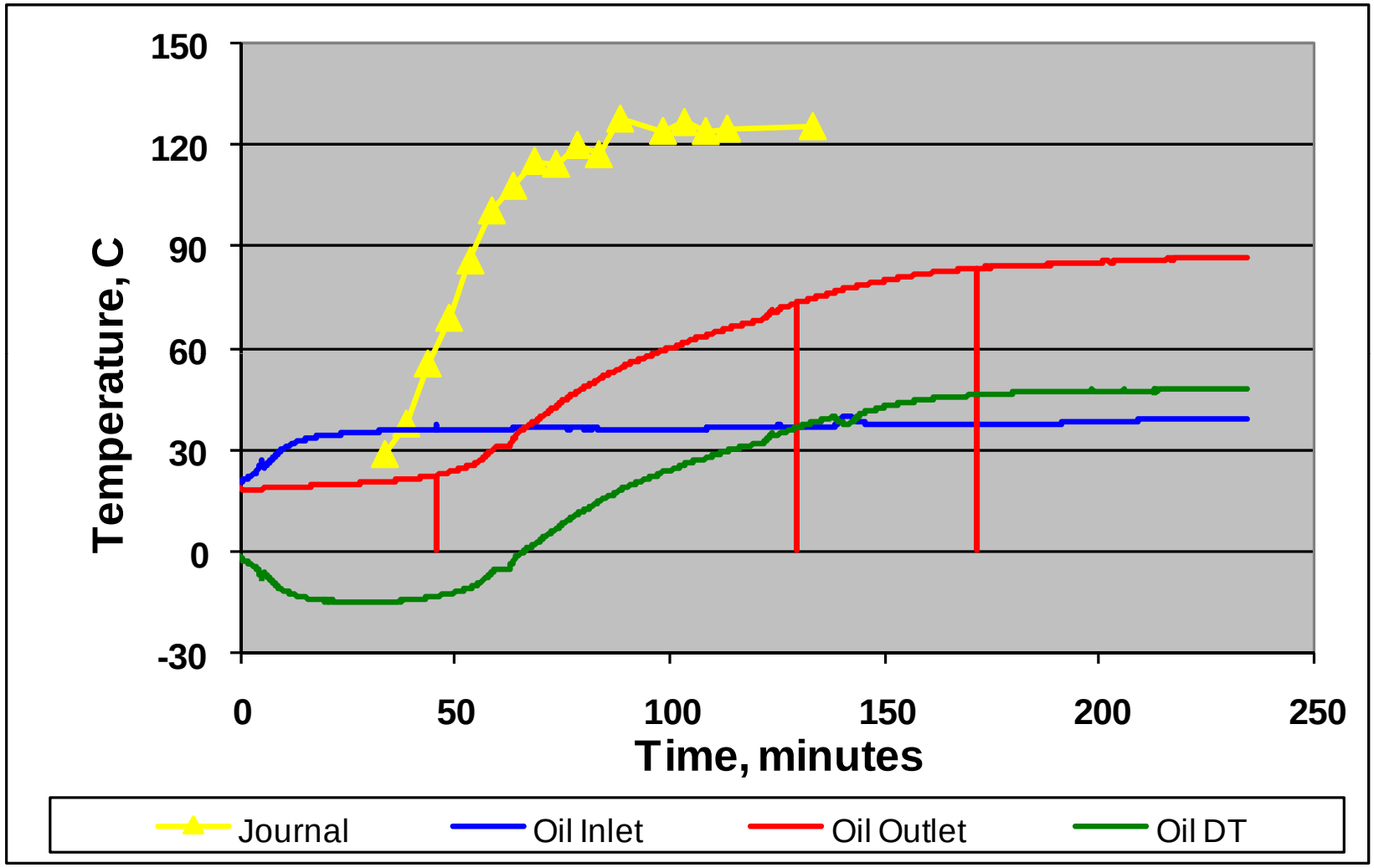


No Insulating Sleeve



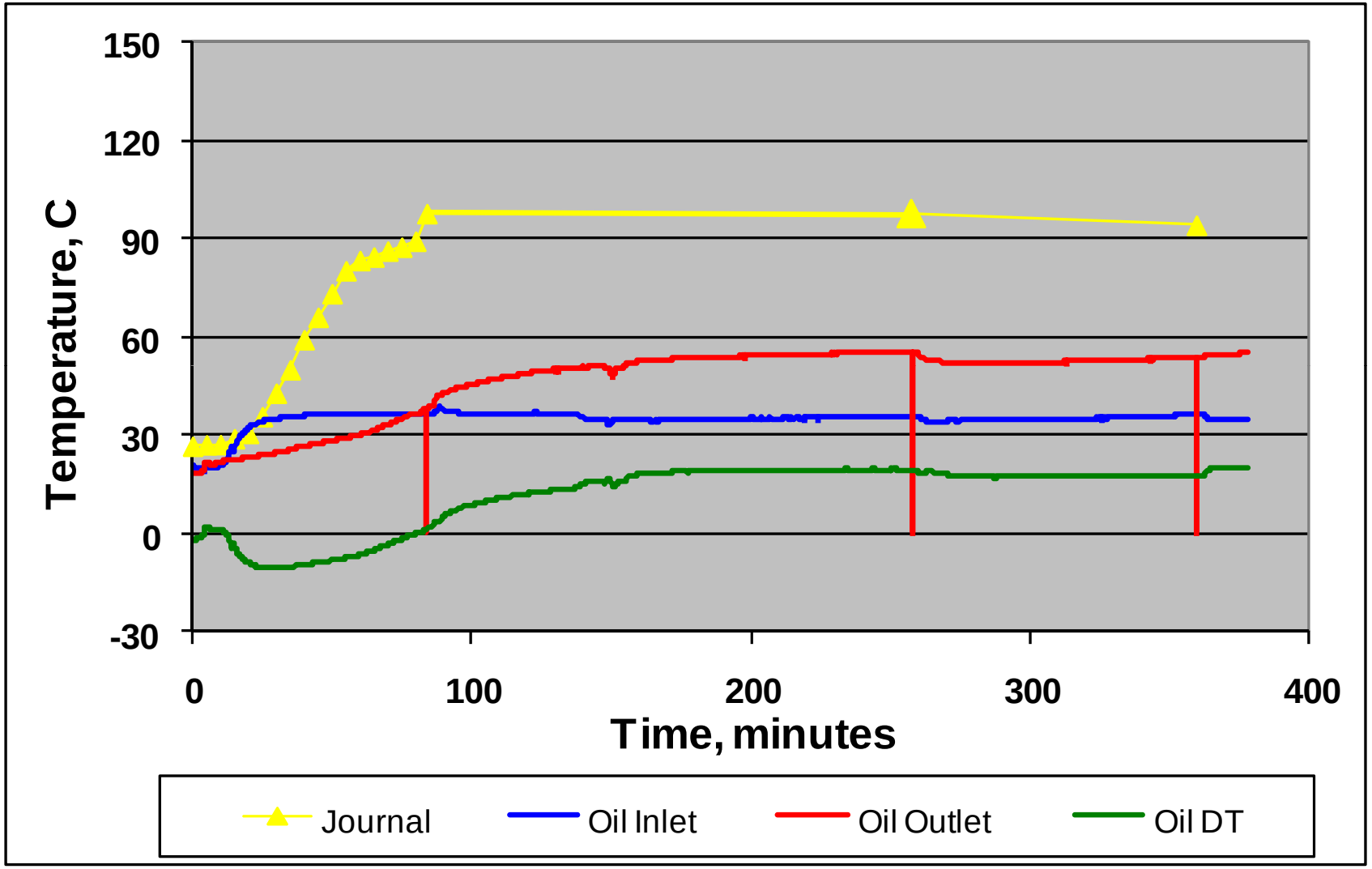
6.9 bar

Partially Sealed Insulating Sleeve (6.9 bar)



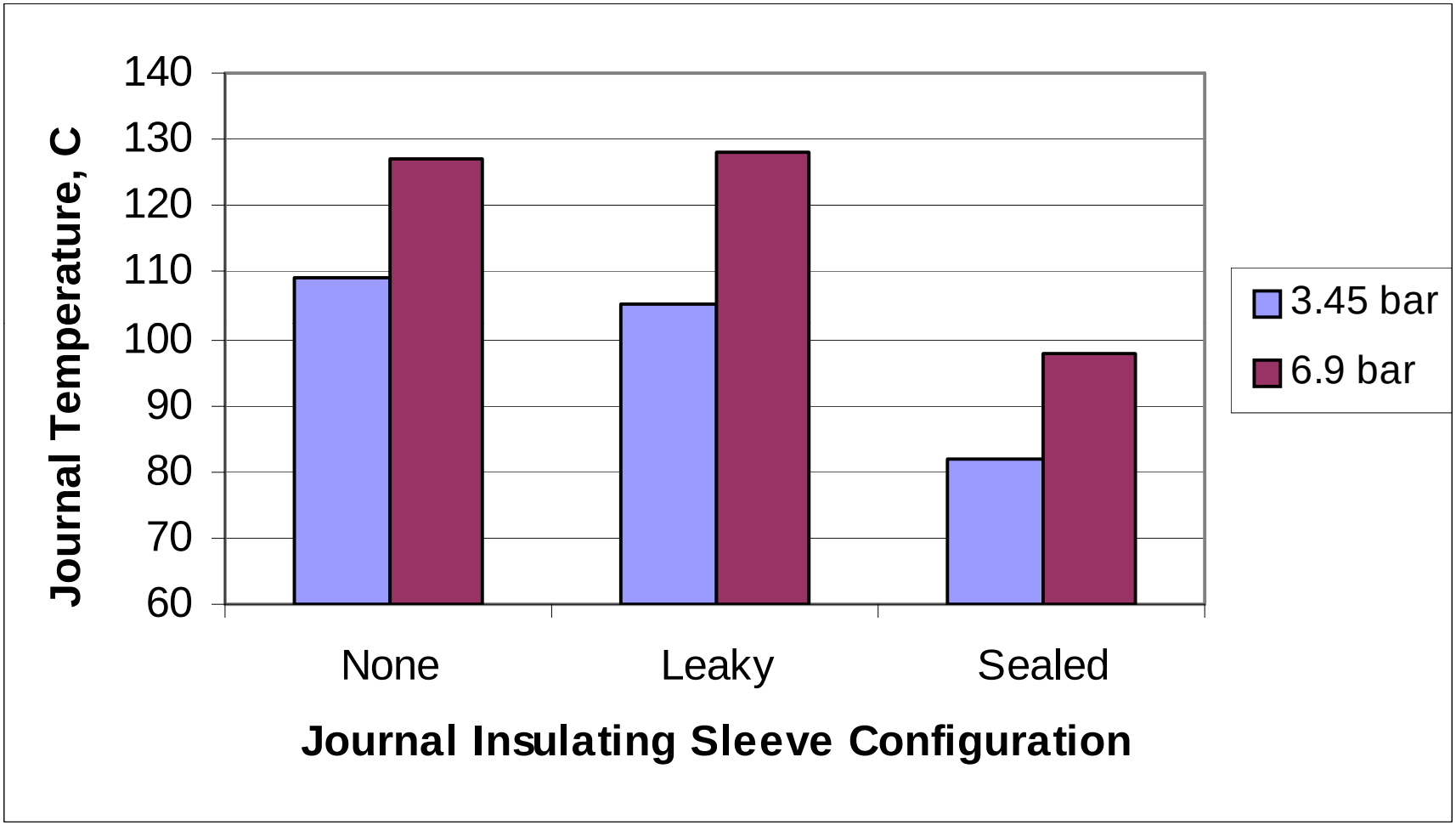
6.9 bar

Sealed Insulating Sleeve

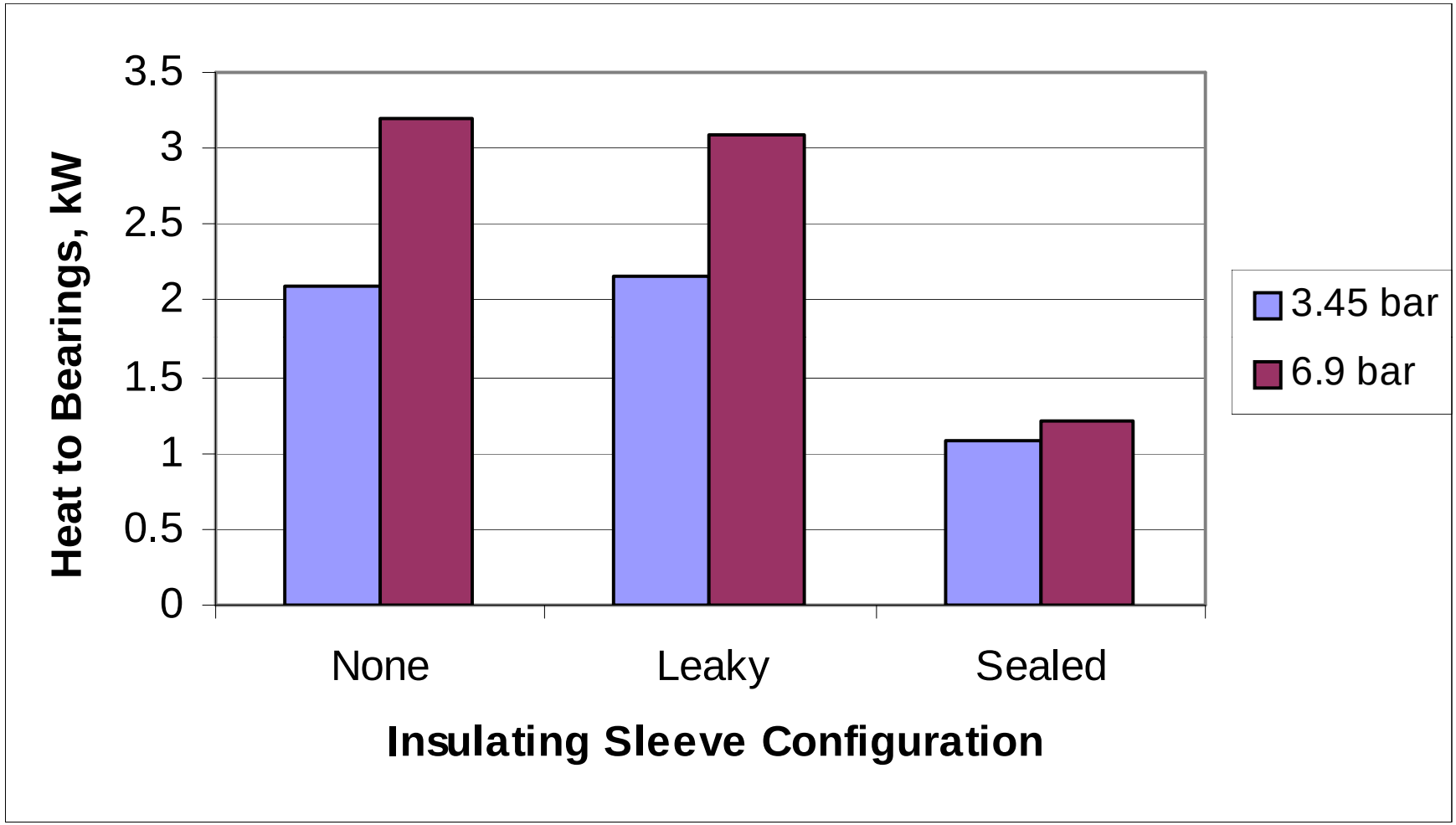


6.9 bar

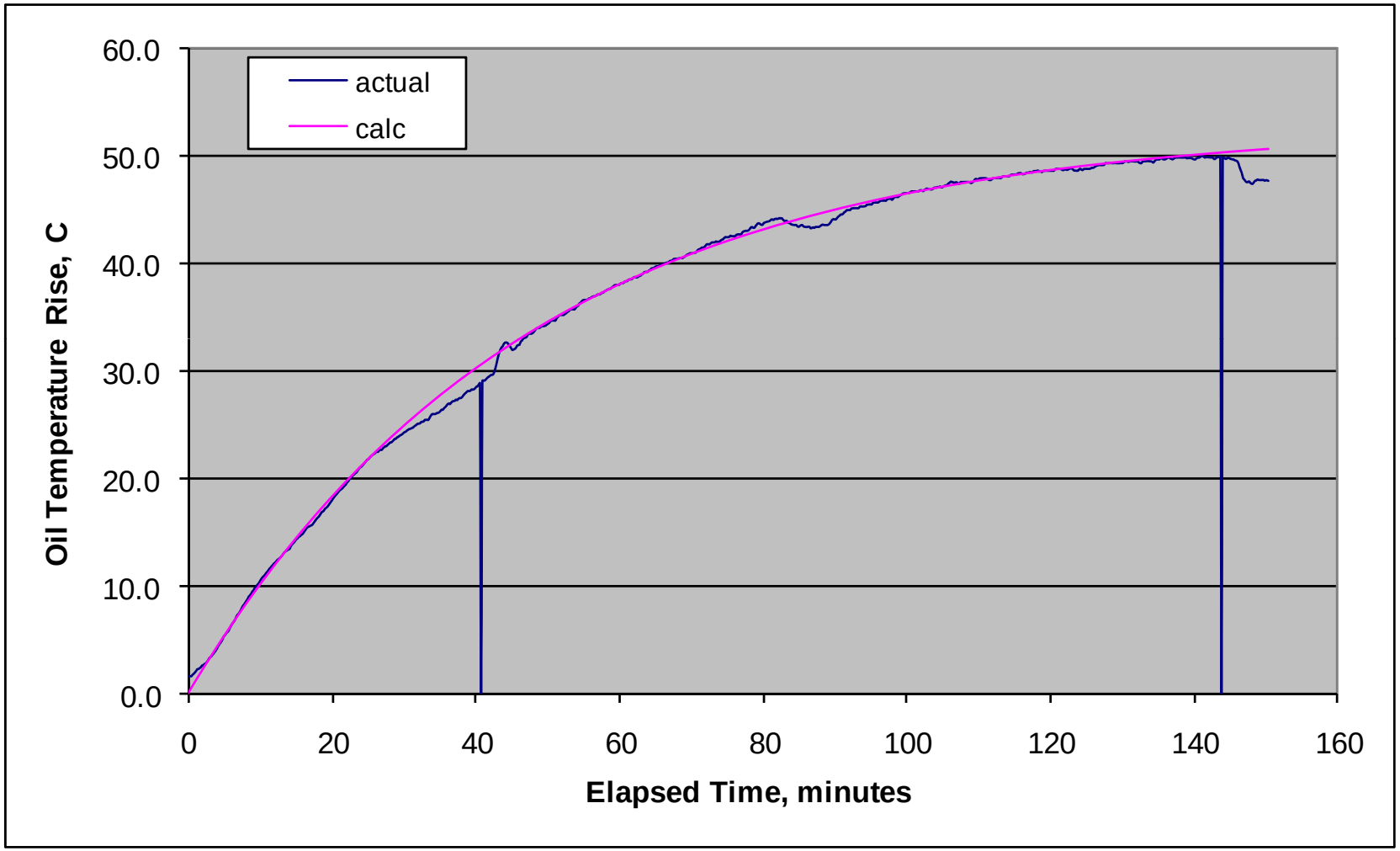
Dryer Journal Temperature



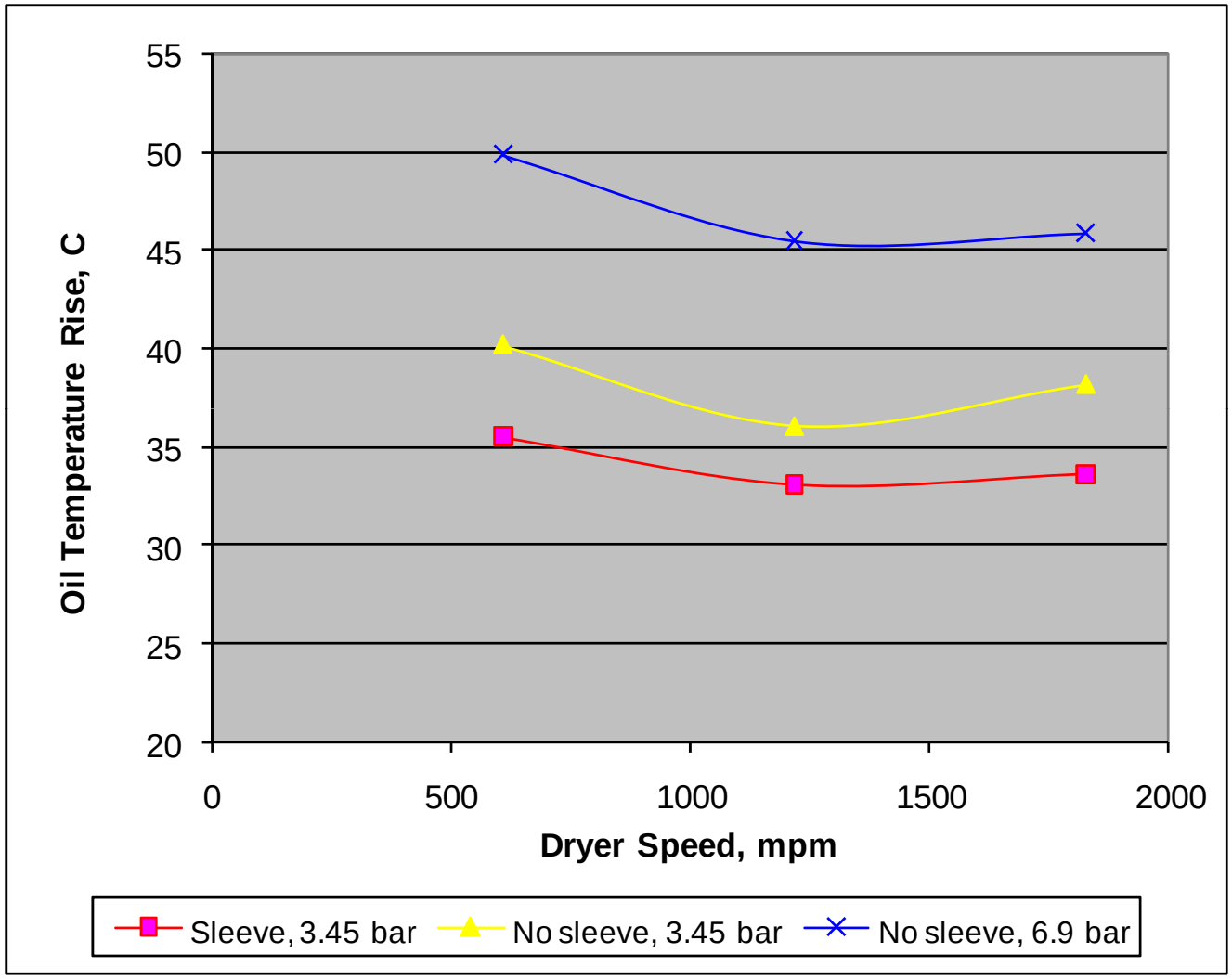
Heat Transfer to Dryer Bearing



Lubrication Oil Temperature Rise



Effect of Dryer Speed



Summary

- Effectiveness of the insulating sleeves
  - No insulating sleeve
  - Non-vented and improperly sealed sleeve
  - Vented, properly sealed sleeve

- Effect of insulating sleeves
  - Decrease bearing race temperature
  - Decrease heat transfer to the bearings
  - Decrease heat transfer to oil lubrication system
  - Reduced tendency for oil carbonizing
  - Reduced dryer journal thermal response

Summary

- For steam pressures below 5 bar (75 psig):
  - Heat flow < 2.6 kW (9000 Btu/hr)
  - May operate a dryer without an insulating sleeve
  - Carefully control warm-up procedures

- For steam pressures over 5 bar (75 psig)
  - Recommend insulating sleeves
  - Heat flow << 2.6 kW (9000 Btu/hr)

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