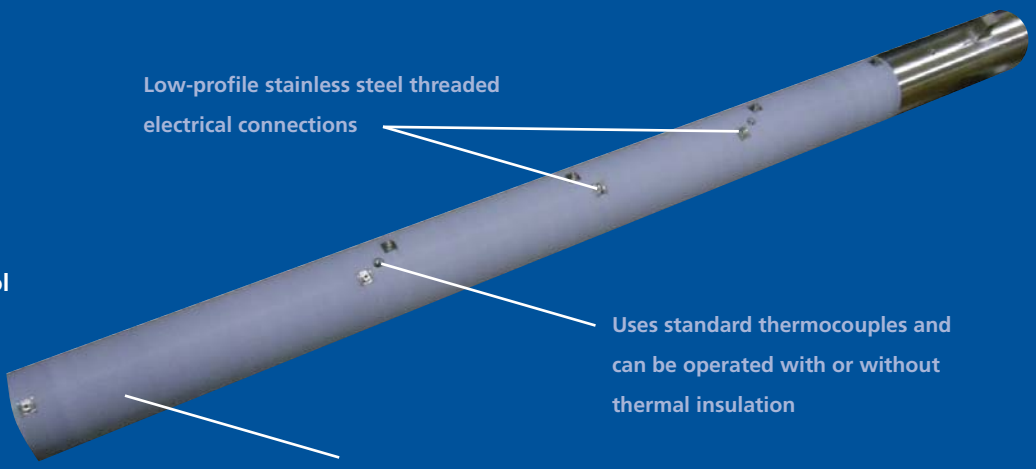
SmartHeat™ Integrated Melt-Stream Heating

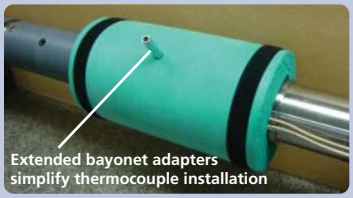
Patents pending



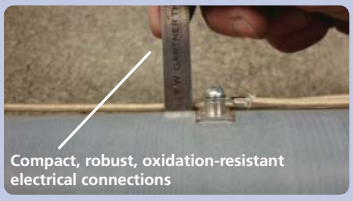
Advantages

- Maximum Energy Savings
- Uniform Heating
- Faster, Tighter Temperature Control
- Faster Heat-up
- Improved Operator Safety
- Eliminates Heater Maintenance

*Smart*Heat™ thermal insulating sheet is made of vacuum-formed bio-soluble Superwool™. High-temperature power connection wires run along the surface of the barrel underneath the insulation to eliminate exposed wires for maximum safety. Insulation thickness can be trimmed as needed to fit under existing covers.



*Smart*Heat™ is designed for lifetime reliability, with compact stainless steel electrical terminations (universal M5/10-32 threads) and oxidation-resistant nickel-plated ring terminals and power connection wires rated to 538°C (1000°F).



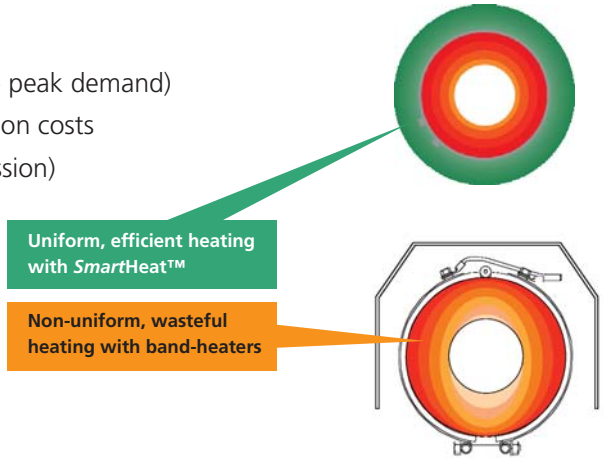
*Smart*Heat™ is supplied with optional ceramic insulating caps for safer installation when covers and/or thermal insulation are not used. This allows complete process customization – all, some or no zones may be thermally insulated.

***Smart*Heat™ Integrated Melt-Stream Heating.** This advanced new technology virtually eliminates melt-stream energy losses and improves the process for a fast return on investment. *Smart*Heat™ uses a robust "heater coating" plasma-sprayed to the exterior surface of the process element (barrel, melt-pipe, shot-pot, etc.). This integrated approach ensures uniform heating and responsive control for superior processing.

*Smart*Heat™ is a Sustainability Solution. Wrapped with high-efficiency thermal insulation the outside stays "cool-to-the-touch" with no exposed wires for improved operator safety and reduced air-conditioning load. *Smart*Heat™ is also designed for lifetime use to eliminate heater maintenance costs and downtime – and unlike band-heaters, *Smart*Heat™ heating performance never changes or degrades so optimized processes stay optimized.

Highlights

- Saves energy and cuts power costs (process heating + air conditioning + peak demand)
- Increases capacity and avoids expansion costs (air-conditioning and power transmission)
- Increases Yields
  - Reduces startup times
  - Reduces cycle times
  - Reduces material use
  - Reduces scrap
- Eliminates heater maintenance



COOPER technology

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*Smart*Heat™ Integrated Melt-Stream Heating

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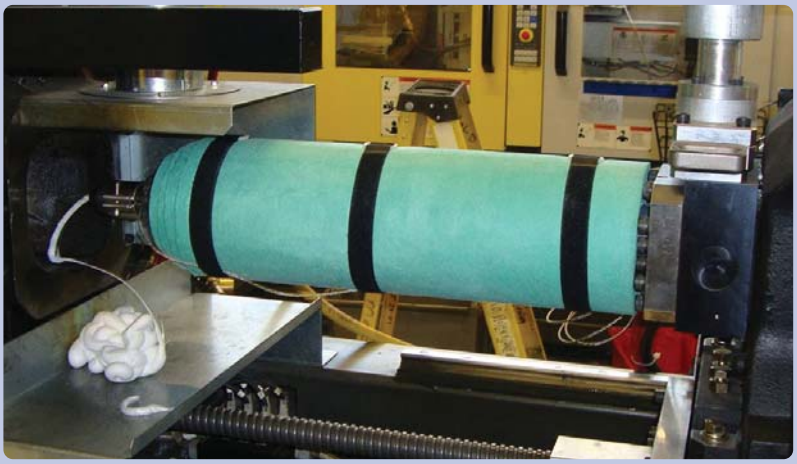
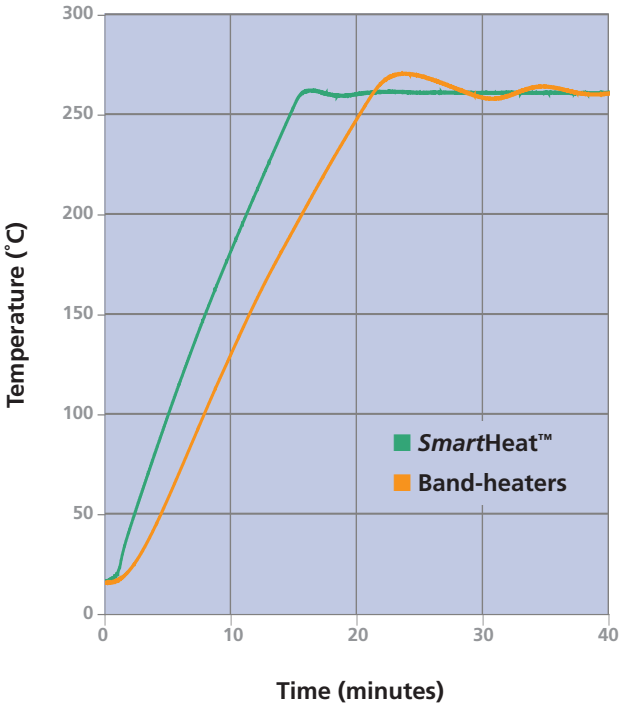


Specifications

- Uses standard single-phase "band-heater" power (voltage specified by customer).
- Controlled just like a band-heater (power turned on/off by machine's temperature control relays).
- Typically one 2-wire connection per control zone.
- Up to 15 amps per termination (zones can be split into sections to permit higher amperages).
- Typical design wattage when thermally insulated is equivalent to 5.4-6.2 watts/cm² (35-40 watts/inch²) with un-insulated band-heaters.

Typical Performance Comparison

- 30% faster using 23% less power
- Superior temperature stability

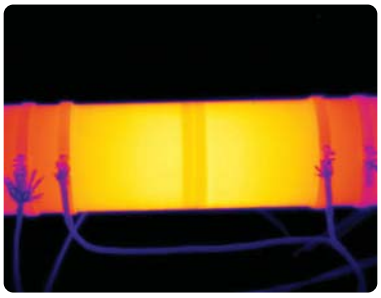


*Smart*Heat™

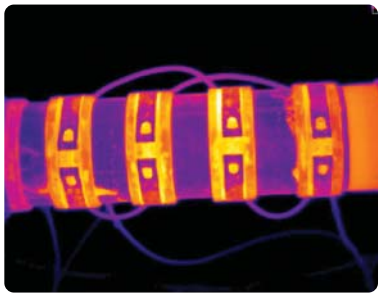
- ~98% efficient with *Smart*Heat™ thermal insulation
- Heat generated directly in coating
- Thermal inertia is virtually eliminated
- Heat applied uniformly
- Heater performance stays constant
- Heater temperature barely exceeds the process temperature, maximizing efficiency, safety and reliability

Band-heaters

- Typically 30-70% efficient
- Heat must conduct across contact resistance
- Heater mass adds thermal inertia
- Heat not applied uniformly
- Heater performance degrades
- Heater operates at elevated temperature, compromising efficiency, safety and reliability



IR Camera — *Smart*Heat™
Uniform, Responsive Heating



IR Camera — Band-heaters
Non-uniform, Sluggish Heating

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