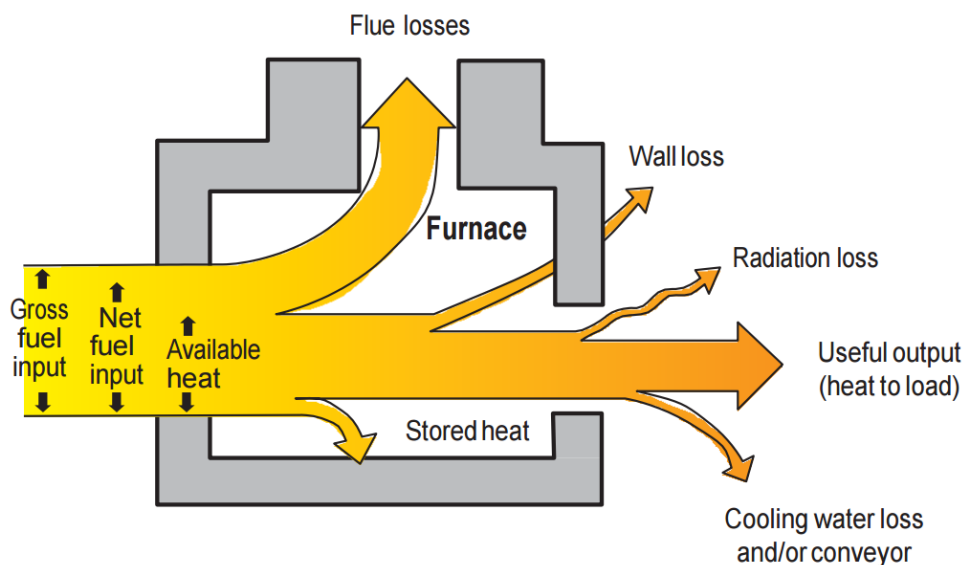
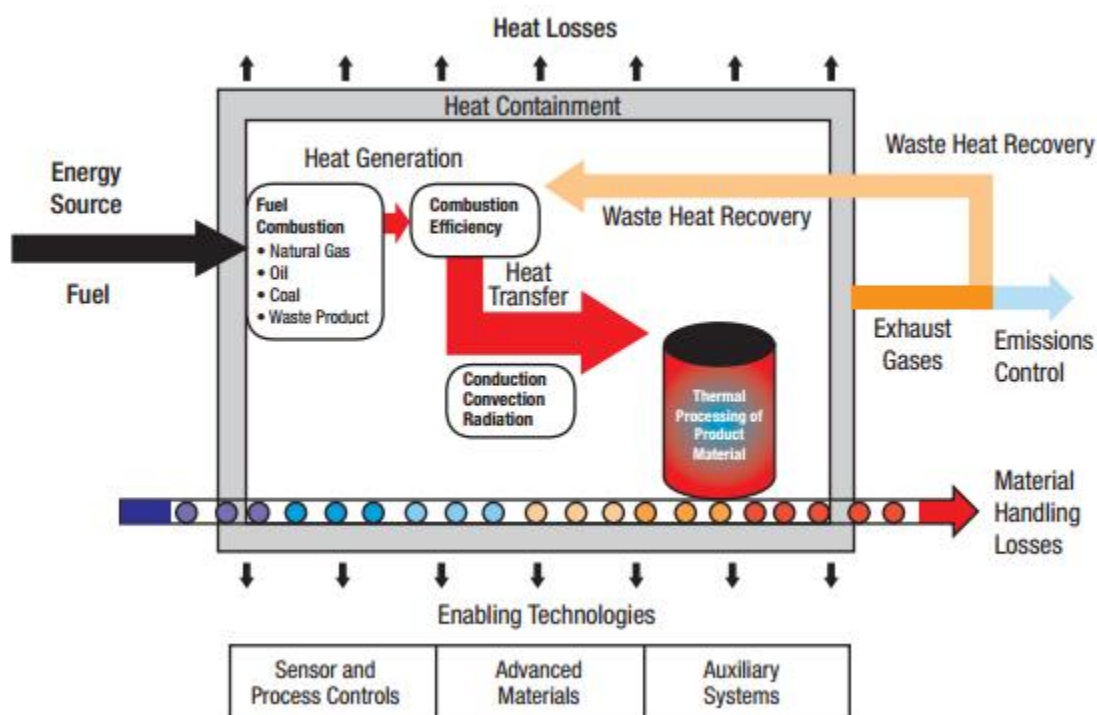


Best Practices

- 1.) Optimize oxygen level in flue (exhaust) gases or optimize combustion burner air-fuel ratio
- 2.) Reduce/eliminate openings and air leakage in the furnace
- 3.) Furnace scheduling, loading, shut down - avoiding delays, waits, cooling between operations etc.
- 4.) Clean heat transfer surfaces - radiant tubes, heat exchangers, heater tubes, electrical heating elements
- 5.) Use of flue or exhaust gas heat for combustion air preheating or waste heat recycling



Component	Things to Check	Comments
Heat Generation	<ul style="list-style-type: none"> • Combustion air leakage • Opportunities with Fuel/Air ratio 	<ul style="list-style-type: none"> • Does the combustion air leak downstream of control valve? • Linkage condition can lead to poor control of the fuel/air mixture over the range of operating conditions. • Excess oxygen in the furnace exhaust gases indicates unwanted excessive air • Flame un-stability indicates improper fuel/air control
Heat Containment	<ul style="list-style-type: none"> • Reduce Heat Losses • Opportunities with insulation • Opportunities with Waste Heat recovery 	<ul style="list-style-type: none"> • Higher than necessary operating temperature leads to increased losses • Reduce/eliminate openings and air leakage in the furnace • Clean heat transfer surfaces • Insulate associated piping to avoid sagging and distortion. • Is the furnace properly insulated? Any cracks/ holes? • What is the temperature of the exhaust? • Can the heat from the exhaust be recovered and used?
Enabling Technology	<ul style="list-style-type: none"> • Opportunities with furnace operation/ scheduling • Opportunities with material handling 	<ul style="list-style-type: none"> • Is there frequent and avoidable furnace starts and stops? • Are there long periods of idle time between batches? • Is there extended periods of low-capacity furnace operation? • Is batch production possible? • Can the conveyors be stopped during non-production? • Can the weight of the fixtures be reduced/ alternate fixtures removed? • What is the temperature of the components going out? • Can heat be recovered from the components?

For more info – [Improving Process Heating System Performance – A Sourcebook for Industry, 3rd Edition](#).