

## ABSTRACT

### IN-SITU GENERATION OF HEAT TREATING ATMOSPHERES USING NON-CRYOGENICALLY PRODUCED NITROGEN

A process for generating in-situ low-cost atmospheres suitable for annealing and heat treating ferrous and non-ferrous metals and alloys, brazing metals and ceramics, sealing glass to metals, and sintering metal and ceramic powders in a continuous furnace from non-cryogenically produced nitrogen containing up to 5% residual oxygen is presented. The disclosed process involves mixing nitrogen gas containing residual oxygen with a pre-determined amount of a reducing gas such as hydrogen, a hydrocarbon, or a mixture thereof, feeding the gaseous mixture through a non-conventional device into the hot zone of a continuous heat treating furnace, converting residual oxygen to an acceptable form such as moisture, a mixture of moisture and carbon dioxide, or a mixture of moisture, hydrogen, carbon monoxide and carbon dioxide, and using the resultant gaseous mixture for annealing and heat treating metals and alloys, brazing metals and ceramics, sintering metal and ceramic powders, and sealing glass to metals.