

Fast Thermal Cutting of Metallic Materials by SHS Type of Reactions

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Different materials were tested in order to optimize the performance of the thermal cutting lance. An iron lance exhibited a stable self-propagate burning and was superior in performance to a Ti-based lance. The aluminum lance was difficult to ignite and the burning regime was highly unstable; a combination of iron wires and aluminum jacket turned out to be a lance that outperformed the iron lance at a low supply of oxygen flow. A novel lance, Sharp-Fire (O)TM was developed, and this lance is iron based with a special jacket that focuses lance flame and oxygen flow. Experimental data indicate that the Sharp-Fire (O)TM lance produced a highly convergent stream of cutting oxygen and did not suffer from major radial leakage of cutting oxygen typical of commercial thermal lances. This lance outperformed the original lance and the cutting of iron and steel was economical. The cutting data revealed that the savings could be in the range of \$1-10/ft (\$0.33-3.3/m) of material cut.