

## **PULSE COMBUSTION – A SUMMARY**

Pulse Combustion produces much more intense and cleaner flames by a 'natural' recirculation of unburnt exhaust gases created by its pulsing effect. Produced by sound waves, the pulsing effect also reduces noxious emissions to levels far below the strictest environmental standards, particularly the various nitrogen oxides. The result is significantly greater heat production than in conventional systems and exhaust gas emissions become amongst the cleanest in the world. Zero levels of total hydrocarbon (THC) and carbon monoxide (CO) are attainable.

This resonant driving by the sound waves locks, what would be under normal combustion conditions a combustion instability, into a very stable repetitive pattern where the burner becomes self-aspirating and there may be no need for a fan to continuously supply the combustion air.

David Proctor has found a way to turn down the burning rate (the problem of decreasing the burn-rate without shutting down the burners) well beyond the 10% that has been achieved elsewhere. He has succeeded in turning it down 40%- an amount that makes it an extremely attractive proposition for industry. The essential breakthrough for the exceptional heat transfer has occurred in the innovative design of the pulse combustion system.

The main benefit of a pulse combustion system are overall heat transfer and mass transfer coefficients two orders of magnitude higher than conventional systems. The implications of this are that the size of the equipment can be reduced, ie: the heat transfer area can be substantially reduced to carry out the same duty as a forced convection conventional combustion system supplying heat to an industrial process.

Thermal efficiencies of the system can be as high as 97%, but it will depend on the process to which it is being applied. This includes parasitic energy, which in the case of pulse combustion is minimal and only occurs at start up. For other high efficiency combustion systems, forced convection via fans, is used to increase the efficiency.

Equipment using this system also tends to be self-cleaning. This results from the micro vibrations that are generated. Even if the transfer equipment is fouled, in some instances it can be cleaned as soon as pulse combustion starts.