

# SMART STACK DAMPER

Furnace Improvements has developed a new type of damper operation for controlling draft in the fired heaters. FIS patent pending damper design has multiple pneumatic operators for controlling the damper.

Typically, two operators will cover most of the range but in some very large dampers, we may recommend installing 3 operators.

## Need to Adjust Stack Damper

- ✓ Operators need to adjust stack damper to control draft in fired heaters.
- ✓ 90% of fired heaters in US are natural draft heaters.
- ✓ Tramp air is directly dependent on the draft inside the fired heater.
- ✓ Stacks are generally oversized, draft in natural draft heaters varies with ambient air temperature.
- ✓ Stack dampers need to be adjusted at least twice a day to optimize the heater operation.

## Safe and Reliable Damper Control System (SRDCS)

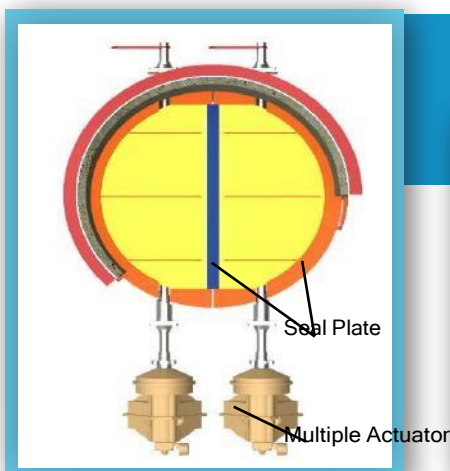
- ✓ Area surrounding the dampers is sealed to prevent flue gas leakage.
- ✓ Multiple pneumatic actuators provided to operate damper blades individually.
- ✓ Operator friendly, better controlling characteristics.
- ✓ Avoid tramp air leakage.
- ✓ Can be controlled from control room.

## Conventional Damper Design

- ✓ Single actuator to operate blades in parallel or opposed mode.
- ✓ Operated either manually or pneumatically.



## Smart Stack Damper



- ✓ With change in heater load and ambient temperature, draft available across the damper will change.
- ✓ Lower the ambient temperature, more will be the available draft across damper.
- ✓ Damper blades need to be closed with decreasing heater load and decreasing ambient temperature.

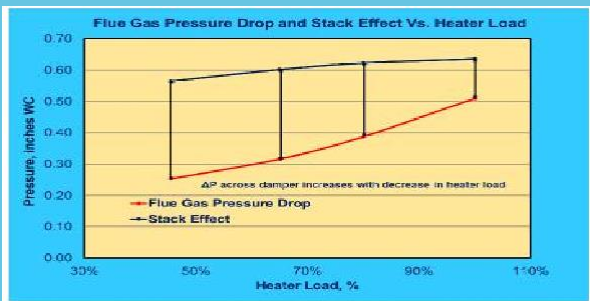
**SRDCS Operating Philosophy:**

Adjusting each damper blade individually



- ✓ Below table shows comparison of damper blade angles for conventional and SRDCS system.
- ✓ Lower damper open angles need to be used for conventional damper system.
- ✓ Even for lower heater loads (~50%) SRDCS has higher open angle for damper
- ✓ SRDCS provides flexible operation of blades leading to efficient and reliable control of draft in the fired heater

- ✓ For conventional design parallel and opposed blade operation is considered, all blades move at same angle.
- ✓ For SRDCS dual damper blades are operated independently at different openings.



**Comparison of Damper Openings**

Flue gas flow rate	ΔP Across Damper	Parallel	Opposed	SRDCS	
lb/hr	inches WC	θ	θ	θ <sub>1</sub>	θ <sub>2</sub>
183,587 (100%)	0.126	58°	60°	67.5°	67.5°
145,493 (80%)	0.236	42°	49°	54°	54°
116,116 (65%)	0.286	33°	42°	0°	75°
79,881 (45.5%)	0.312	19°	30°	0°	52°



**Furnace Improvements Services**

Uniform Heat Transfer in Fired Heaters

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