FIRED HEATER OPTIMIZATION

Improved efficiencies through damper improvements

For the petrochemical industry, increased efficiency and lower maintenance costs increase your competitive advantage. The optimization of a fired heater is one area where key savings can be realized.

Bachmann Industries, Inc. has introduced a multi-step assessment program for the petrochemical industry to ensure the optimum performance of all damper and expansion joint equipment.

Field assessment

Bachmann's experienced team of field engineers conduct a thorough site inspection to determine the equipment's current state, where efficiencies can be found and where potential safety problems could arise. A comprehensive inspection report is generated to provide system owners with up to date information about all of their dampers and expansion joints.

Reliability and efficiency gains

Bachmann's experienced engineers will look at your system and suggest critical upgrades that will increase efficiency, reliability and repeatability while minimizing maintenance costs.

Project management

Onsite or prior to any equipment delivery, Bachmann's dedicated staff of project managers are available through the whole project. From helping with scheduling of outage requirements, to ensuring delivery of components, Bachmann is there to support you throughout the entire process.

Field installation and supervision

With Bachmann's construction services and service engineers, we are available to assist in all phases of the installation process. Supporting local contractors to complete installation and commissioning, we can support you when the equipment arrives at site.

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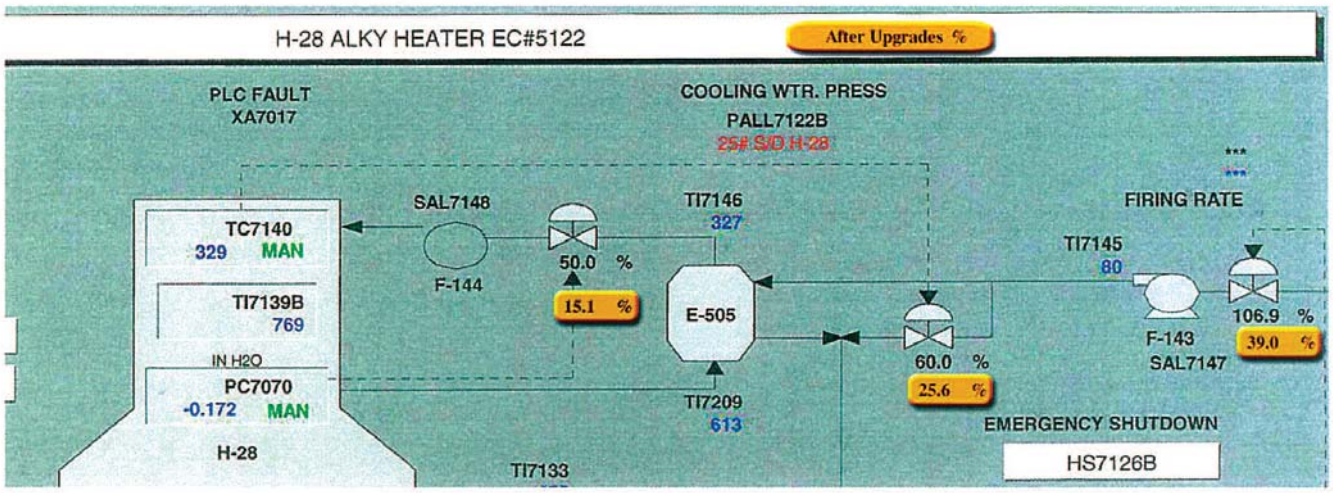
Actuator and controls upgrade to provide better precision to stack damper movements

Solutions

- Complete system walk downs and evaluations
- Modularized damper designs to utilize as many existing damper components as practical
- Regular and preventative maintenance programs specifically tailored to your refinery to optimize equipment performance
- Installation services and supervision to minimize outage duration
- Complete onsite project management to ensure schedules are maintained and work completed on time
- Extensive installation reference list with many large refineries across the United States



Damper operating conditions before and after upgrades. The damper was fine tuned to optimize the heater and control O_2 amounts coming out of the stack.

Bachmann is participating member of API 560 since 2009

energy API AMERICAN PETROLEUM INSTITUTE

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GUILLOTINES, BLANKING PLATES & SLIDE GATES

for all Power and Industrial Isolation Applications

The guillotine damper, also called a slide gate, is best-suited for isolation applications where low or zero leakage and low pressure drop are important. A guillotine is typically used in natural draft doors, flue gas desulphurization (FGD) systems, and in bypass ducts for isolation of air pollution control and heat recovery units. It is also used in "double block and bleed" applications in petrochemical systems. With over 40 years of application experience Bachmann is the world leader in guillotine damper technology.

Benefits

- Excellent isolation, including zero-leak used in man-safe applications
- Negligible pressure drop
- Smooth opening and closing
- Durable construction for trouble-free operation
- Long-term operational cost savings

The basic mechanical elements of the guillotine damper are a blade, peripheral seal system, external support members and a drive to move the blade steadily and continuously into an open or closed position.

The blade (gate) must have enough strength and stiffness to stand up to its most demanding load, and it is critical that the equipment be properly designed and well-constructed to prevent seal failure or a jammed blade.

Bachmann Iso-Flex Zero-Leakage Guillotine

The Bachmann Iso-Flex Guillotine provides tight shut-off (up to 99.9% without seal air and 100% with seal air). A convex seat in the damper body makes this an ideal damper for rough and dust-laden applications.

The ISO-Flex Guillotine is actuated by a rack and pinion drive system where the rack is installed directly on the blade in order to reduce the dampers overall external footprint.

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The Bachmann ISO-Flex blade is a single membrane having double edges with a flexible seal on the blade periphery that provides an integral backup seal. The Iso-Flex Guillotine requires seal air only during isolation. This is the ideal design for hot duct applications.

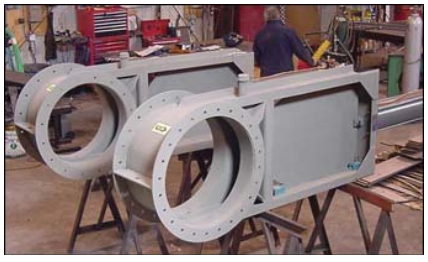
A bonnet (with optional heat tracing for corrosive applications) provides a gas tight enclosure for the blade while in the retracted position and is a convenient location for the seal air system. In high temperature configurations, it also provides a remote location for the actuator and gearboxes away from the heat source.

This basic "solid seat" guillotine relies on a metal-to-metal labyrinth seal arrangement created by the blade and guide track. A seal air system can be used in conjunction with flexible seal caps to provide 100% isolation.

Bachmann Iso-Spade Guillotine

The Bachmann Iso-Spade Guillotine features a single thickness, solid plate blade. Standard configurations of the Bachmann Iso-Spade guillotine and seal arrangements include options for low-leak, tight shut-off and zero-leak, depending on system and customer requirements. It is suitable where "knifing" through medium encrustments is desired, but it, like all flat plate knife gate designs on the market, should be limited to lower temperature applications.

The Bachmann Iso-Spade is designed to maximize initial economics and to address certain specific applications. It may be used in rectangular or round, small or medium, ducts. Bachmann guillotine dampers are recognized for sound engineering and durable construction that deliver safe, reliable performance over long years of service.



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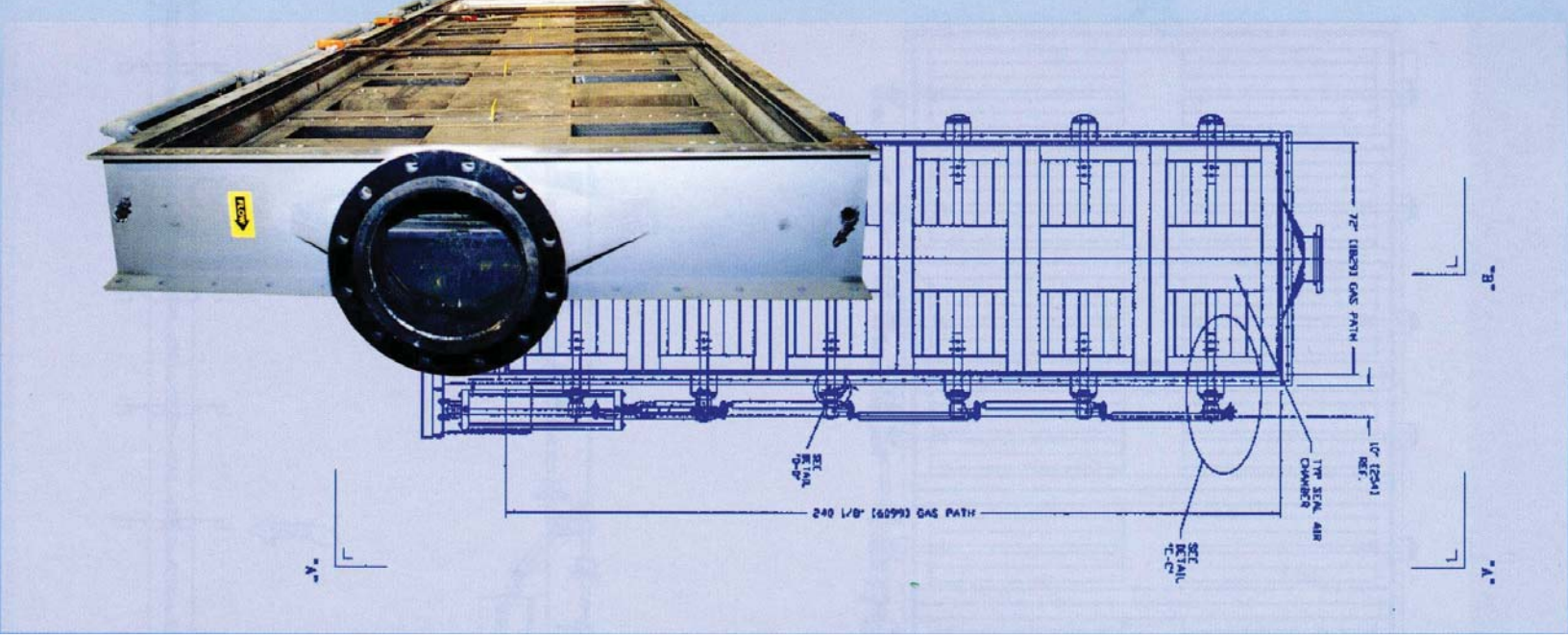

ISO-FLOW™ LOUVER DAMPER

Providing 100% Isolation With a Single Bank of Blades

The Bachmann ISO-FLOW Louver damper is the ideal technology for 100% isolation in applications where duct space is limited. This damper was developed to replace the typical two-bank double louver.

Our single blade, dual seal design allows for greater sealing efficiencies, greater performance and reliability and significantly less maintenance requirements by compared with traditional double louver dampers.

Used in many industries, the Bachmann ISO-FLOW louver dampers are durable and can be constructed of any variety of materials from carbon steels to super alloys for the corrosive environments.

Bachmann's patented ISO-FLOW louver design is being used in critical applications around the world at power plants, refineries and other process industries where 100% isolation is a must. Our patented sealing arrangement will provide unparalleled sealing efficiency with the use of seal air.

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Bachmann ISO-FLOW Features and Benefits:

- Reduced initial and operation costs
- Substantially greater mechanical reliability as compared with either traditional double louver or guillotine dampers
- High and low temperature configurations with single membrane blade
- Reduced space; ideal for tight fit applications
- Each damper custom engineered for Application Optimization
- Reduced maintenance
- Linkage custom designed to fit all drive / actuation types
- Actuation in seconds, if desired
- Self-cleaning metallic seals for 100% isolation even with sticky medium

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POPPET DAMPER

Cost-Effective Gas Flow Isolation

Bachmann's Poppet Damper provides an economical solution for simple on-off isolation of a single gas stream.

Consisting of a shaft and multi-layer disk assembly, the poppet's compact design and fast cycling make it a popular choice for fabric filter (baghouse) isolation applications due to the general configuration and space considerations of typical baghouse assemblies.

The practical and straightforward design, incorporating proven Bachmann® technology, results in reliable performance and low-maintenance over the life of the equipment.

The damper housings support all related controls, operators, and drive mechanisms. Further, the entire poppet assembly is supported through the damper flanges. Housings are engineered to withstand all forces and pressures imposed by the ductwork system, incuding effects of induced draft.

For ease of maintenance, all operating components of the poppet are replaceable without removing the damper housing from the duct. All items which may require maintenance are readily accessible.

Features

- High-speed opening and closing with pneumatic cylinder actuation
- Self-adjusting, self-aligning seal disc assures proper alignment
- Convenient access for ease of maintenance
- Positive mechanical lockout safety devices for both open and closed positions
- Adjustable disc deflection for optimal sealing efficiency

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POPPET DAMPER

Cost-Effective Gas Flow Isolation

Locking Feature

A locking mechanism firmly secures the disk in either the full open or full closed position, preventing any movement due to internal pressure force, vibration or actuator operation. A common padlock secures the mechanism in place, allowing removal of the actuator while maintaining an opened or closed status.

Shaft Design

The shaft is designed to limit disc deflection and eliminate buckling at the design temperature and pressure. Extension shafts are typically heavy-wall pipe. The shaft is vertical in the center of port, guided to maintain alignment and prevent shaft rotation.

Tight Sealing

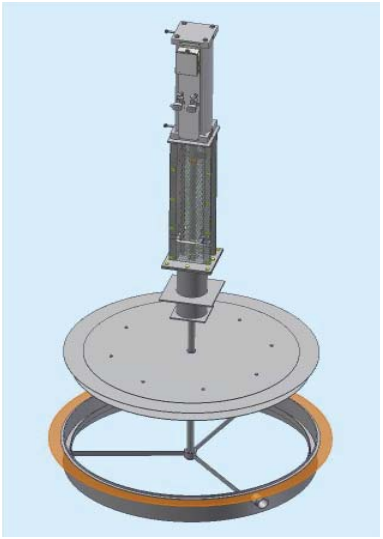
To prevent the escape of flue gas or the ingress of ambient air, the damper housing is sealed with asbestos-free, adjustable packing glands continuously welded to the damper box at the shaft penetration. An assembly of compressed rings provide tight sealing to or from the atmosphere for up to 5-psi differential.

Actuators and Controls

Double-acting, heavy-duty pneumatic actuators conform to the latest JIC, ANSI, and NFPA standards. Each actuator is sized to function with a specified margin of safety factor at the operating differential pressure. Assembled to the damper frame, the actuator is easy to access for calibration and servicing.

Benefit

- Low-cost solution
- Compact design for tight spaces
- High efficiency sealing
- Low maintenance
- Reliable performance



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STACK/WEATHER DAMPER

for GT exhaust and bypass stacks

The Bachmann Industries stack damper, also known as a weather damper, is the ideal solution for closure and isolation of heat recovery steam generator (HRSG) exhaust and bypass stacks.

This damper serves a dual purpose by preventing heat loss from the HRSG while preventing moisture from entering it. When used on a bypass stack, moisture is prevented from entering the diverter.

Bachmann's state-of-the-art equipment incorporates proven technology, ensuring the top performing product on the market today.

Custom-engineered to meet each project's specific requirements, the damper frame is constructed from either structural angle for flange attachment, or formed plate for seal welding to the stack.

The frame material and thickness are carefully selected to match that of the stack. internal or external insulation can also be used to match the stack's insulation.

The Bachmann stack damper is designed with rain gutters attached to the inside or outside the frame and sloped damper blades that allow water to flow into the gutters for drainage away from the stack.

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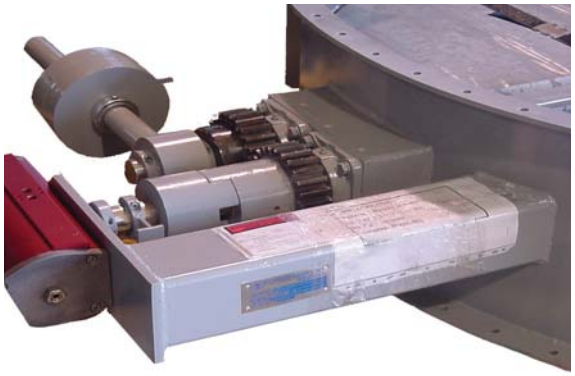
STACK/WEATHER DAMPER

Positive Closure to Keep Heat In, Moisture Out

Actuation and Settings

To minimize actuation torque, the damper blades are balanced and fabricated from plate with reinforcing ribs or corrugations as required. When automatic pressure relief is required, the shafts are offset and adjustment weights are provided to set the required relief pressure.



The damper is operated by electric or pneumatic actuation designed with appropriate torque margin.

Fail settings can be designed for the open, close, or last position. Additionally, the blades may be set to automatically open, should the gas turbine be started prior to opening the Stack Damper. Every Stack Damper is equipped with shaft-mounted limit switches.

Benefits

- Faster boiler startup
- Increased plant efficiency and cost savings
- Proven Bachmann™ technology
- Reliable, high performance operation
- Quality construction for long service life

When the damper is located at the top of the stack, the actuator is shielded from the exhaust gases. If located in the stack or duct after the boiler (as in the case of most smaller stacks), Auma actuators are typically used to simplify installation.

Local and/or remote control panels are offered.

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