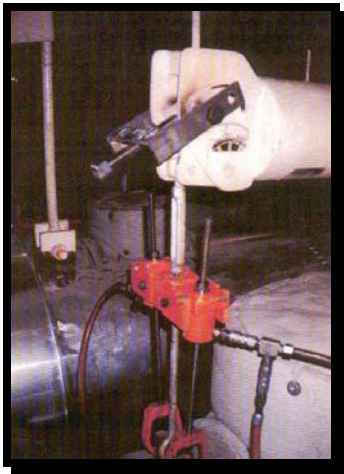




HIGH PRESSURE PIPEWORK AND PIPE SUPPORTS

HOW IT WORKS



Bolting The World's Critical Joints

1-800-779-2658

WWW.INTEGRATECHNOLOGIES.COM

INTRODUCTION

The primary purpose of Pipe Supports and Hangers is distribution of the dead weight of piping systems and related components into suitably placed structures.

Accommodation of expansion and movement of the supported components calls for flexible type supports. In addition to allowing the use of massive and complicated piping systems, the supports provide the means to monitor the performance of piping systems and the function of connected equipment.

POWER, MAY 1989

There are a variety of reasons that can cause Pipe Supports to perform in a different way to which their original design was intended. This can lead to spring supports breaking or effectively becoming solid supports. As inspection of Pipe Support Units is not normally part of the maintenance program, there may not be any obvious physical damage until failure occurs.

Failure of the Supports due to aspects such as bottoming out, shearing, corrosion, dust build-up, etc., can cause damage not only to support equipment and structures, but more dangerously can result in Pipe Wall failure, causing damage and lack of pressure containment. Therefore, the structural integrity of the plant is at stake.

The likelihood of such failures can be controlled, and carrying out both Pipe Hanger Analysis and Pipe Stress Analysis can optimize the life expectancy of the plant.

The information provided below gives insight into Piping Systems, their associated problems, and solutions to those problems. INTEGRA Technologies' services are explained, and the extent of skills required to properly carry out these services in order that **Structural Integrity** can be quantified and maintained are explained.

A TYPICAL HANGER SURVEY COULD INCLUDE ANY OR ALL OF THE FOLLOWING:

- **Maintenance Survey – Reporting the extent of:**
 - Corrosion
 - Seizure
 - Misalignment
 - Buckling of Sling Rods
 - Broken Sling Rods
 - Bottomed or Topped –Out Hangers

- **Refurbishment of Constant Load Supports including:**
 - Removal, Inspection, and Report
 - Replacement of Worn / Broken Components
 - Reassembly and Calibration
 - Re-Tension On-Site to Design Conditions

- **In-Situ Analysis of Constant Load Supports including:**
 - Load Checks – Hot & Cold Conditions
 - Displacement Checks – Hot & Cold Conditions
 - Hysteretic Checks
 - Fine Tuning of Supports after Initial Installation
 - Report on “As-Is” Condition or Complete Pipe Run
 - Recommendation of Replacement Units or Redesign Hangers
 - Referral to Pipe Stress Department

OVERVIEW OF PIPING SYSTEMS, SUPPORTS AND ASSOCIATED PROBLEMS

Sometimes hangers get out of adjustment or require servicing. The most serious consequence is an increase in stress in various sections of the Piping System. A worst-case condition is through wall cracking from high bending moments.

As a general rule, a well designed, fabricated and installed Pipe Support System operating properly should not need adjustment. The need for adjustment is often a signal of an underlying problem that should be determined and eliminated.

Often “creep” taken to mean a slow gradual distortion of piping, gets the blame for support maladjustment, when really the distortion results from stresses that should not be present in properly designed, supported, operated and maintained systems. Both adjustment and servicing should be based on a process of reasoning. “Blind” adjustment can easily make matters worse.

Design philosophies for the Piping System can affect support behavior. In previous years, the free-floating system without rigid points between terminal connections was popular, but it depended upon correct Support Loading and Spring Hanger performance in general. As a rule, a Piping System or Section that is more dependant on supports, rather than on its’ own stiffness, is more likely to develop Hanger problems.

Also in the Design Category is the actual Engineering. Although outright flaws involving loading are rare, they can occur in design. A common error is failure to acknowledge the weight of lower components and to increase the hangers support force accordingly. Even with today’s computer design techniques, support loadings depend on accurately input information. Use of incorrect weight of piping, insulation, etc., will obviously result in improper support, regardless of a program’s capabilities.

Was information unavailable or inaccurate in the Design Phase?

This can influence results. For example, the supply piping may have been somewhat heavier than anticipated, or forged fittings may have been installed at locations where calculations assumed only piping weight.

Service conditions can also have a large effect on performance and integrity of supports. Shock loading and extensive pipe displacements are abnormal operating occurrences. One must recognize that large displacements can occur at various points in the piping system even if stress levels are relatively low. The displacements will not injure the pipe, but can overstress critical elements of hangers by out of plane bending. This is true of predicted steam and water hammer and of one-time incidents.

The service environment can have an impact on integrity and overall performance. Outdoor installations or exposure to corrosive atmosphere can raise failure rate for constant supports or variable spring hangers to as much as 40%, involving spring fracture and failure of critical components.

Continuous operation of a Power Plant, including its' duct and piping systems, for months on end can cause stationary components associated with hangers to wear from constant vibration. Undesirable travel and load characteristics result from the hangers. In addition, the undesirable travel and load characteristics inherent in some of the earlier constant support hanger scan be amplified by operation in unvarying position. Ironically, cycling lets the supports flex and works some of the more strategic components, benefiting them somewhat.

Installation requires proper coordination. Fine-tuning of supports after initial start-up is advisable, but rare. Especially in high temperature, a true test of support design involves a thermal cycle through service, followed by cooling. After start-up, little if any attention goes to the performance of supports. Often it is necessary to fine tune or de-bug supports after initial use. If this was never done, there may be cause for future concern.

Support and hanger inspections, and pipe examinations often call for an engineering study before the less obvious decisions can be made. Determination of the initial cause of a discrepancy allows the type and amount of adjustment to be calculated, or other solutions to be considered. Even an apparently clear-cut choice as "replacement" may involve engineering and revision of a support or hanger design.

Bolting The World's Critical Joints

1-800-779-2658

WWW.INTEGRATECHNOLOGIES.COM