Radiography in Modern Industry

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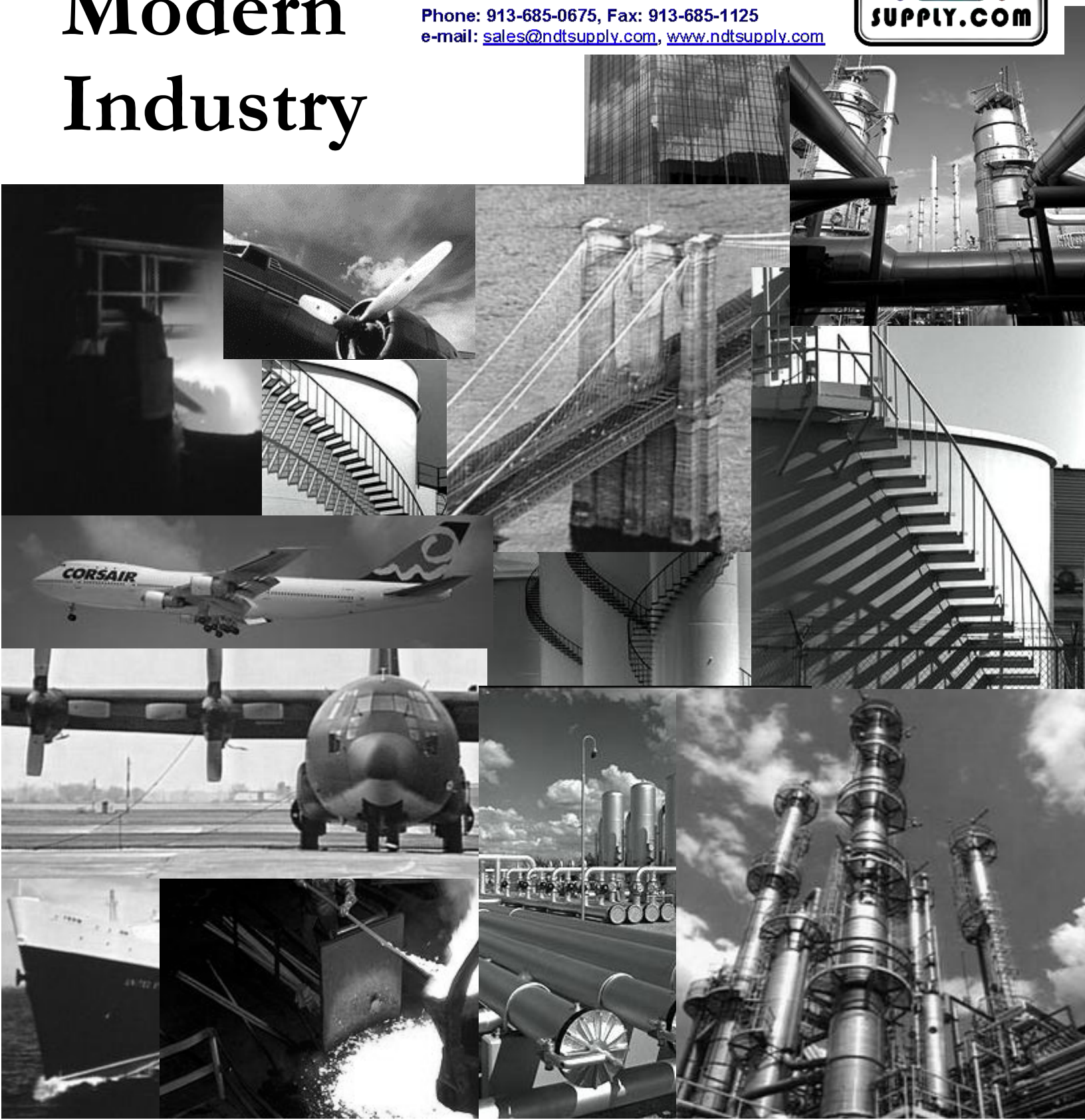

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Introduction

Many of the spectacular scientific and engineering achievements of the past few years can be traced to nondestructive testing methods, which--by determining internal soundness without destroying product usefulness--assure the satisfactory performance for which the product was intended.

Radiography today is one of the most important, most versatile, of all the nondestructive test methods used by modern industry. Employing highly penetrating x-rays, gamma rays, and other forms of radiation that do not damage the part itself, radiography provides a permanent visible film record of internal conditions, containing the basic information by which soundness can be determined. In the past decade alone, the evidence from millions of film records, or radiographs, has enabled industry to assure product reliability; has provided the informational means of preventing accidents and saving lives; and has been beneficial for the user.

Since economic justification is a major criterion for any testing method, the value of radiography lies to some extent in its ability to make a profit for its user. This value is apparent in machining operations where only pieces known to be sound are permitted on the production lines. It is equally apparent in cost reductions when less expensive materials or fabricating methods can be employed instead of costlier ones in which soundness is only an estimated quality. The information gained from the use of radiography also assists the engineer in designing better products and protects the company by maintaining a uniform, high level of quality in its products. In total, these advantages can help to provide customer satisfaction and promote the manufacturers reputation for excellence.

Industrial radiography is tremendously versatile. Objects radiographed range in size from micro-miniature electronic parts to mammoth missile components; in product composition through virtually every known material; and in manufactured form over an enormously wide variety of castings, weldments, and assemblies. Radiographic examination has been applied to organic and inorganic materials, and to solids, liquids, and even gases. An industry's production of radiographs may vary from the occasional examination of one or several pieces to the examination of hundreds of specimens per hour. This wide range of applications has resulted in the establishment of independent, professional x-ray laboratories as well as of radiographic departments within manufacturing plants themselves. The radiographic inspection performed by industry is frequently monitored for quality by its customers -- other manufacturers or governmental agencies -- who use, for the basis of monitoring, applicable specifications or codes, mutually agreed to by contract, and provided by several technical societies or other regulatory groups.

To meet the growing and changing demands of industry, research and development in the field of radiography are continually producing new sources of radiation such as neutron generators and radioactive isotopes; lighter, more powerful, more portable x-ray equipment as well as multimillion-volt x-ray machines designed to produce highly penetrating radiation; new and improved x-ray films and automatic film processors; and improved or specialized radiographic techniques. These factors, plus the activities of many dedicated people, extend radiography's usefulness to industry.

It is not surprising then, that radiography, the first of the modern sophisticated methods of non-destructive testing (dating back to 1895), has led hundreds of industries to put great confidence in the information that it supplies. The list is growing year after year as industry's management, designers, engineers, production men, inspectors, and everyone concerned with sound practices, dependable products, high yields, and reasonable profits discover the value of radiography in modern industry.