

Thielsch Engineering

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Responsiveness and Expertise: A Winning Combo! _____

At Thielsch, we understand the urgency of our clients' problems and the need to quickly apply our expertise and integrated services. Recently, one of the largest phosphate manufacturers in America was refurbishing a large drag line during their annual outage. The drag line resembles a large crane with a bucket in which two Suburban vans could fit. The refurbishing work started. As the work progressed, problems in the reconstruction and repair welding became overwhelming and were ultimately unsuccessful. Before contacting Thielsch, the phosphate manufacturer tried to implement weld repairs, but the repairs were not completed in a satisfactory manner. There was cracking on almost every weld. As a result of the extended equipment outage, the company was losing approximately \$150k per day in production. Already experiencing six weeks of delays with the attempted repairs, they needed immediate help.

Thielsch Engineering was contacted. Ara Nalbandian, P.E., and Peter Kennefick promptly assessed the failure and the extent of the existing damages. Thielsch engineers recommended and managed the field repairs. The client was hoping for a fourteen-day turnaround. Bob Smoske, Manager of the UES Ohio office, immediately responded to the urgency of the situation. He was joined by Rick Normandeau, P.E., Manager of the Austin, Texas office, and Doug Kieley, P.E., Senior Engineer, from Rhode Island. With the input, combined skill, and resources of Thielsch's integrated engineering staff, Bob assembled and supervised a crew of thirty welders per shift for two shifts a day. They worked around the clock to accomplish the repairs in eight days instead of the company's fourteen-day expectation. Six fewer days saved the company an additional \$900k+ in lost production.

This job was successful due to our engineers' knowledge of large scale weld repairs and their ability to immediately define and implement an action plan. In addition to the technical expertise, Thielsch brought the ability to coordinate a diverse group of over 50 welders into a cohesive, efficient team. It was a team that produced welds of the highest quality and shared in the satisfaction of a job well done. This is one example of how companies can rely on Thielsch to utilize our integrated engineering, laboratory expertise, and craft labor services to make sure their company's equipment can meet 24/7 demands to operate reliably and safely.

For more information about these services, please contact Peter Kennefick at: (401) 467-6454 or by e-mail at: pkennefick@thielsch.com or Robert (Bob) Smoske at: (440) 537-2840 or by e-mail at: rsmoske@thielsch.com.

Thielsch Engineering Celebrates 20th Anniversary _____

In 1984, Helmut Thielsch was the Vice President of RD&E at ITT Grinnell. He was directed to further reduce his already downsized department from 65 employees to 9. When he prepared the list of personnel to be let go, he put his own name at the top of the list. Deciding that he was too young to retire at age 62, Helmut founded Thielsch Engineering with 6 former Grinnell employees.

The original core company has branched out to serving not only utilities, but also the pulp and paper, process, chemical, petrochemical, pharmaceutical, insurance, and other industries. Through the acquisitions of ALCO, ESS Laboratory, RISE Engineering, BAL Laboratory, Water Management Services, James Chemical Engineering and now Gaskell Associates, an electrical engineering firm, Thielsch has expanded and become increasingly more diversified. Thielsch offers complementary and integrated services to a wide range of clients.

Helmut Thielsch, who possessed a character of excellence, vision, and dedication, instilled within the company his ideals and knowledge. Helmut believed "the people who work for you make the difference between success and failure". So as the company enters its 21st year, the employees of Thielsch Engineering can take pride in the company's many accomplishments, its financial soundness, and look toward the future with continued optimism. We would like to thank our customers for their confidence in our services and our judgement.



Weld engineers reviewing repair process of dragline base weld.

Timely, Safe, and Cost-Effective Repair of Vapor Recompressor Evaporator

Thielsch's Utility Engineering Services (UES) personnel were contacted this past Spring to inspect a Vapor Recompressor Evaporator, an advanced brine concentrator, that was in service for a power co-generation company in Florida. This evaporator is used to process cooling tower blowdown, boiler blowdown, and demineralizer waste. The process yields high-purity product water which is reused for boiler makeup, NO_x control, cooling tower makeup, and an adjacent juice making facility requiring pure water.

The evaporator is designed to remove deposits and contaminants, resulting in 95% high-purity distillate. The remaining slurry is collected at the bottom of the vessel where it is then dried into a crystalline substance, cut into cubes, and buried in a protected landfill.

An inspection of the evaporator was prompted by evidence of leaks in the evaporator shell. Dariusz Raczkowski from UES in Cranston, RI was the lead engineer on this project.

The evaporator was fabricated using two materials, austenitic stainless steel for the upper section and duplex stainless steel for the lower section. The steam leaks were identified in the upper section of the evaporator.

Inspections and metallurgical analysis revealed severe levels of stress corrosion cracking. This type of cracking is an environmentally assisted cracking mechanism. It requires three factors to occur: a susceptible material, a corrosive environment, and applied and/or residual stresses. In this specific case, it was believed that stress corrosion cracking was due in part to the occasional use of well water versus treated water. The well water yielded high levels of chlorides, and the materials used to fabricate the upper levels of the vessel were susceptible to corrosion in the presence of these chlorides.

To test for other sources of chlorides and other vessel components, with the potential to result in stress corrosion cracking in austenitic stainless steels, the vessel's insulation was removed and sent to Thielsch's ESS Laboratory in Cranston, RI. The testing identified that corrosive contaminants were present in the insulation. It was observed that the steam leaks had helped to leach out any corrosive materials in the insulation. The insulation also acted as a sponge absorbing the contaminated steam and concentrating it on the exterior of the vessel. As a result, two causes were identified for the stress corrosion cracking problems: a) the use of well water, and b) corrosive materials that were either released in the insulation – or deposited in the insulation – due to the steam leaks. To ensure the continued safe operation of the evaporator, repairs by welding were performed on the cracks. The internal tie rods were fabricated and replaced using austenitic stainless steel.

Gaskell Associates Joins Thielsch Engineering

Thielsch Engineering is pleased to announce the acquisition of Gaskell Associates, Ltd., a consulting engineering firm specializing in the design of electrical systems for buildings. Gaskell has relocated to our Cranston, RI office complex. Their new address is: Gaskell Associates, 1341 Elmwood Avenue, Cranston, RI 02910.

Gaskell Associates, Ltd. is one of the oldest and largest electrical engineering firms in Rhode Island. The company has been in business for 33 years and designs over 150 systems per year. It has received two Illuminating Engineering Society design awards. Its President, John ("Jack") D. Gaskell, P.E., has been named "Engineer of the Year" by the Rhode Island Society of Professional Engineers, and has received the "Freeman Award" from the Providence Engineering Society. Jack is a member of the Building Code Standards Committee and Sub-Chairman for Electrical. Jack's committee is currently reviewing the 2005 electrical code for adoption.



Building the tower framework with bumpers for the Evaporator.

The UES engineers also suspected that the same conditions might exist in a second similar vessel. The examination of the sister vessel revealed more significant deterioration. The extensive cracking in the evaporator presented another problem in addition to the leaks.

There was a potential that the vessels, structurally weakened by the cracking, could collapse in the event of high winds as Florida was experiencing a record breaking number of hurricanes.

A prompt repair was required to mitigate the potential for the vessels to collapse. Tower frameworks with bumpers were encased around the vessels for support. The bumpers allowed protection for the vessel sides and served as added cushions for any shifting that might occur. They also reduced the possibility of any further cracking of the tanks.

The estimated cost to replace the two units was approximately \$10,000,000. The Utility Engineering Services personnel made the repairs for a small fraction of that amount with a remaining life estimate of seven years. To make sure the repairs were effective, re-inspections were recommended every three years.

Our client now has time to plan for the eventual replacement of the vessels. More importantly, they now know what caused the corrosion on the upper levels of the vessels. When the new vessels are constructed, a different type of stainless steel will be used. Finally, by understanding the metallurgy within the materials, a timely, safe, and cost-effective solution was achieved.

For further information, please contact Peter Kennefick at: (401) 467-6454 or by e-mail at: pkennefick@thielsch.com or Dariusz Raczkowski at: (401) 467-6454 or by e-mail at: draczkowski@thielsch.com.

Jack will continue to manage the staff of 11 people. His electrical engineering business principally services architects and building owners. Their specialties include power distribution, lighting, emergency power, fire alarm systems, communications infrastructure, security systems, computer power, UPS Systems, power quality studies, forensic investigations, and litigation support.

Gaskell's design and engineering personnel will enhance Thielsch's reputation for quality and service while expanding the breadth of engineering and testing services available from the company's personnel.

To find out more about Gaskell Associates and their electrical design services, please contact Jack Gaskell at: (401) 781-4000, ext. 3904 or by e-mail at: jgaskell@thielsch.com.

Business Trends 2005

Where does Thielsch Engineering fit into the larger engineering community, and even more broadly, in today's business environment? President Thomas E. Lent addressed those questions in an interview for Alexander Haig's program, "World Business Review", which aired early last year. Asked how he would distinguish Thielsch Engineering from a long list of companies with "Engineering" in their name, Tom replied that the "Engineering in our name identifies our role in a manufacturing process". He stressed that it didn't matter whether the customer was a real estate developer, a large integrated pulp and paper mill, a power generating facility, a refinery, or a small manufacturer with a corrosion problem, "they all have common needs". They need to keep their assets operating "safely and in an environmentally friendly manner, at a minimum cost, with minimum disruption to ongoing operations". He went on to say that Thielsch's integrated engineering approach "allows us to understand the basics of a production process and marshal a variety of technical skills to solve the problems on a 24/7 basis".

In gathering information for articles in this newsletter, we saw the needs Tom spoke about popping up repeatedly in the types of jobs our engineers are performing for clients. As you will see, Thielsch engineers are called upon not only to assess problems but also to come up with cost-effective ways of extending the life span of equipment.

"Our aim is to provide the best possible and most cost-effective service. If we can make a customer successful, we are successful. Our goal is to make more profitable and successful customers."

Helmut Thielsch, Founder and President of Thielsch Engineering, Inc., in an interview with the Providence Business News after winning the 2002 Business Excellence Awards in Business Leadership: October 21, 2002.

Headache Solutions for a Pharmaceutical Company

Ed Guardado, Design Manager and Quality Assurance Engineer for Process Equipment Fabrication (PEF), has been working on the evaluation of underground storage tanks for a major pharmaceutical company utilizing Finite Element Analysis (FEA) software. There was some urgency to do this job. After 15 years of service, the company needed a thorough analysis of the tanks to determine their structural integrity.

What was the problem? A failure occurred in a compartment partition at the weld attached to a support. This caused an internal chemical leak from one compartment to another. Thielsch determined the failure was due to mechanical fatigue. A stress analysis was done, and the results identified all stress points for four separate designs. PEF also found certain deficiencies within the construction code referenced for these tanks. Ed's job was not only to evaluate, but to design structural solutions to reinforce the tanks so they could remain in service. The other alternative to excavate and replace the tanks was far more time consuming and costly.

Ed submitted plans to stabilize the structural design of the tanks which would also increase the lifespan of the tanks. This solution allowed the company a period of time to effect replacements. The repairs were 10% to 15% of the cost of a new tank, and the repairs allowed for minimum down time. For a company with over a dozen tanks, the price tag for a new tank is approximately \$85,000 plus additional costs for excavation and installation. Thielsch supplied a cost-saving and timely solution.

For more information about all of these services, please contact Ed Guardado at: (401) 467-6454 or by e-mail at: eguardado@thielsch.com.

Such an approach exactly reflects the priorities of our clients. It is no secret that American businesses are starting to put their toes back in the spending waters, but they are not necessarily looking to swim in the oceans of capital equipment investment. As businesses are gearing up to hire and produce more, they are looking less at new equipment and more at keeping their existing capital equipment fighting trim. At this point, the economic mood is best defined by: It is better to repair rather than to replace. That doesn't mean companies will never want to replace equipment – particularly with more efficient and productive equipment or with equipment that offers a higher production rate. Right now, however, the more prevalent view is to keep existing equipment operating for an extended period. It buys some time to plan and project optimum capital spending investments, and allows the company to realize the maximum value from previous equipment investments.

As the year unfolds, we will continue our proactive engineering mission to meet the needs of our new and existing clients in facing the challenging economic times ahead.

To view The World Business Review program – or – to find out more about our company's services, please visit our website at: www.thielsch.com or contact Tom Lent at: (401) 467-6454 or by e-mail at: tlent@thielsch.com.

New Personnel at Thielsch Engineering

Darlene Capuano has joined Thielsch Engineering, Inc. as the Director of the BAL Laboratory. She is responsible for maintaining the appropriate certifications and operational control of the laboratory while marketing the current services and developing new capabilities. Darlene worked for the Pawtucket Water Supply Board and Earth Tech. She graduated from Rhode Island College with a Bachelor of Arts degree in Chemistry. She holds professional memberships in the American Water Works Association and the New England Water Works Association.

Roger Kalikian, P.E., has joined Thielsch Engineering, Inc. in the Professional Engineering Division as a Senior Metallurgical Engineer. He is responsible for conducting failure analysis and investigative projects related to machinery and equipment and analyzing material failures for various industries including utilities, pulp and process, refineries, mining, waterworks, etc. He has a Bachelor of Science degree in Metallurgical Engineering from the Polytechnic Institute of New York. He is a licensed professional engineer in Delaware. He worked as a mechanical engineer for the New York City Department of Environmental Protection in the Quality Assurance Division.

David LaMarco has joined Thielsch Engineering, Inc. in the Utility Engineering Services Division as a Project Engineer. He is involved with inspections of power piping and pressure vessels in utilities, power plants, hospitals, and institutional facilities, focusing on condition assessments and remaining life analyses. David recently received a Bachelor of Science degree in Facilities and Environmental Engineering from the Massachusetts Maritime Academy. He interned at Gillette Stadium in Foxboro, MA and at American Ref-Fuel Company of SEMASS.

Jesse Stallions has joined Thielsch Engineering, Inc. in the Utility Engineering Services Division as a Project Engineer. He is involved with inspections of power piping and boilers in utilities, power plants, hospitals, and institutional facilities, focusing on condition assessments and remaining life analyses. He graduated from the Massachusetts Maritime Academy with a Bachelor of Science degree in Facilities and Environmental Engineering. Jesse had internships with George T. Wilkerson Company and Ocean Spray Cranberry, Inc.

Thielsch Attends Electric Utility Environmental Conference

Tom Lavery, Vice President, presented a paper entitled "Regional Haze and PM2.5 Aerosols in the Upper Midwest" at the Electric Utility Environmental Conference in February in Tucson, AZ. The topic is a timely one as there is a strong possibility that regional haze regulations will be put into effect as early as Spring 2005. This is an issue that affects most utility companies. The paper was coauthored by Chris Rogers of MACTEC Engineering and Consulting, Inc. The work was sponsored by the Lake Michigan Area Air Directors Consortium (LADCO). The study was designed to estimate baseline air quality and regional haze conditions in the upper Midwest, in particular near tribal lands and national parks. The study showed that regional air quality in the northern regions of Minnesota, Wisconsin, and Michigan and southern Ontario was generally good with occasional hazy days.

The study (summarized in the report) concludes the primary chemical constituents of fine particle (PM2.5) concentrations that form haze were sulfate and organic carbon. Sulfate exists in the atmosphere primarily as ammonium sulfate and is produced by anthropogenic SO₂ emissions. Organic carbon is produced by fires and combustion sources. On the other hand, the major constituents of the PM2.5 on hazy days with poor visibility were sulfate and nitrate. Organic carbon was a minor constituent. Nitrate is produced by industrial and transportation NO_x emissions.

Who is affected?

Electric utility and industrial facilities will have to deal with emerging regional haze regulations which will drive reductions in pollutant emissions over the next several decades. The regulations will affect new plants and a particular class of older plants that affect visibility in national parks and monuments (called Class I areas). Older plants built before 1977 will be subject to Best Available Retrofit Technology (BART) to reduce emissions. Tom is an expert on regional air quality and regulatory issues and would welcome the opportunity to discuss the emerging regional haze rules and how these environmental issues might affect your plant. To find out more about his presentation at the Electric Utility Environmental Conference, please contact Tom Lavery. He can be reached at: (401) 467-6454 or by e-mail at: tlavery@thielsch.com.

New Accreditations

RENEWAL OF THE "R" STAMP PROGRAM

The Process Equipment Fabrication Group is pleased to announce the recertification of the American Society of Mechanical Engineering (ASME) "R" and "U" Stamp program for the fabrication and repair of ASME pressure vessels for Thielsch Engineering. The recertification is valid through January 2008.

For more information about these services, please contact Ed Guardado at: (401) 467-6454 or by e-mail at: eguardado@thielsch.com.

NEW A2LA ACCREDITATION

The Materials Testing Laboratory recently completed an A2LA surveillance audit. As a result of the audit, significant additions were made to the Scope of the Accreditation.

The new additions are:

- Bend testing - ASTM D522, A370, ASME Section IX
- Preparation of Samples - ASTM E3
- Microetching - ASTM E407
- Macroetching - ASTM E340

Photomicrography - ASTM E883

Replication - ASTM E1351

Weld Testing - ASME Section IX; AWS C1.4, D1.1, D1.2; API 1104; ABS Rules for Welding Part 2

Failure Analysis including SEM/EDS - ASM Handbook

The Laboratory can perform Failure Analysis using the test methods listed above, referencing ASM Handbook, ASTM E620, E678, E860, & E1188

Brinell Testing - ASTM E10

In addition, we maintained:

Room Temperature Tensile Testing - ASTM E8, A48, A370, B557

Charpy Impact Testing - ASTM E23

Rockwell Hardness (A, B, C, 15N, 30N, 15T, 30T) - ASTM E18

Microhardness (Knoop and Vickers) - ASTM E384

OES Analysis of Low Carbon/Alloy Steels - ASTM E415

Salt Spray - ASTM B117

As a result of this audit, the Scope of Accreditation now acknowledges a greater depth of proficiency for the Materials Testing Laboratory and more accurately reflects the Laboratory's capabilities for failure analysis and metallurgical testing. We expect to serve as a value-added asset for manufacturers and their metallurgical problem solving needs.

For more information about the Laboratory's services, please contact John Goetz at: (401) 467-6454 or by e-mail at: jgoetz@thielsch.com.

Thielsch & MACTEC Gauge Trends in Air Quality

Thielsch Engineering, Inc. is working as a team member with MACTEC Engineering and Consulting, Inc. on the EPA-sponsored Clean Air Status and Trends Network (CASTNET). CASTNET is a nationwide monitoring network that collects information on concentrations of sulfur and nitrogen pollutants in the atmosphere in order to establish trends and to define the geographic distribution of pollutants. Thielsch's work is managed by Tom Lavery who is responsible for analysis and interpretation of the CASTNET air quality measurements. The network has been collecting air quality and meteorological measurements since 1987. The CASTNET data collected over the last 15 years show a significant decline in sulfur pollutants (SO₂ and sulfate) in the atmosphere and more recent declines in atmospheric nitrate and ozone concentrations. Ozone is the principal constituent of smog.

For more information on the project, please contact Tom Lavery at: (401) 467-6454 or by e-mail at: tlavery@thielsch.com.