

KLAD offers the clad option

For many years cladding has been an efficient material option to combat corrosion. However, plant engineers have often been deterred from considering clad as a serious option for piping by lack of availability and unfamiliarity with the peculiarities of clad products. *Stainless Steel World* travelled to Houston, USA, to visit the company that has set out to change all that and to make clad the third piping material option next to carbon steel and solid corrosion-resistant alloys. KLAD LPP has developed a structure enabling it to supply total clad solutions, whether for new projects or simple modification.

The concept of cladding a backing steel with a corrosion or erosion-resistant alloy has been around for many years. Lack of availability and technical difficulties caused by the unfamiliarity of most engineers with clad piping materials have often made clad products difficult to use and have prevented the option from being accepted as an easy solution to a plant engineer's corrosion or erosion problems. The lack of availability of fittings has been an especially serious barrier to the effective use of clad piping products. But times have changed: KLAD LLP, based in Houston, USA, has dedicated itself to making clad piping easier to obtain and projects using the material easier to execute. *Stainless Steel World* spoke to President & Technical Director Dr Bhaven Chakravarti,

FACTS & FIGURES

Name: KLAD LLP.
Founded: 1995.
Production: KLAD and its alliance partners have several locations in the Houston area.
Products: metallurgically bonded clad pipes, clad fittings, and weld-overlaid flanges, nozzles; piping and pressure vessel components.
Grades: KLAD offers an extensive range of backing materials such as carbon steels, chrome moly grades and high yield grades combined with a wide range of corrosion-resistant cladding alloys including 300 series Stainless Steels, Alloys 825 and 6 Mo, Nickel Alloys 200, 400, 625 and C276 and Wear-Resistant Grades.
Markets: Refining, Oil & Gas Production, Nuclear Power, Environmental, Chemical Process Industries.

VP Sales & Marketing Mr Robert Jenkerson and VP Manufacturing Mr Keith Oliver. We visited their facilities to hear more about the company that is dedicated to making clad materials a generally accepted third option in piping products next to carbon steels and high alloy materials.

"KLAD started in 1990 from a necessity that came about at that time," Dr Chakravarti says. "The US nuclear power industry was then faced with flow-accelerated corrosion (FAC) that corroded the carbon-steel pipes. In fact there were a number of accidents here in the US where people were severely injured as a result of FAC. So there was an urgent demand to replace the carbon-steel pipes with a corrosion-resistant material that would solve the problem. Stainless seemed to be the obvious choice, but this would have called for significant redesign of the plants, which was expensive and complicated. So I suggested the idea of using

clad to the engineering company that I worked for at the time. By selecting clad materials as the material of choice the combination of corrosion resistance and mechanical strength would be satisfied at the same time. All in all it turned out to be a highly effective solution both from the corrosion and the economic points of view," Dr Chakravarti says. He adds, "From that start, KLAD has extended the applications of clad piping systems to the refinery, oil and gas production and other plants applications, providing numerous economical and technical advantages over present materials."

Mr. Jenkerson explains, "Our products have been highly successful in improving performance and life expectancy in the refineries for crude tower overhead lines, vacuum tower transfer lines, high pressure reactor effluent and air cooler effluent lines and other such lines that condense corrosive fluids. The material advantages are obvious to the refineries and other plants; the real challenge has been explaining there are no struggles procuring the entire piping system because of the structure KLAD has created."

NEW-AGE

KLAD is most certainly an exceptionally structured company, as Mr Jenkerson explains. "From the start it was clear that in order to guarantee optimal service to the end-user we would have to master a wide range of production techniques. So we created a number of non-competitive alliances with selected manufacturers. In these alliances KLAD provided materials expertise, specifications and techniques, and project managed the execution of the jobs, while the manufactures and its own shop provided production capacity and abilities. KLAD filled their partners' shops with work they did not previously have and everyone benefited: the alliance partners gained access to a previously untapped market, while KLAD, through its access to nearly USD 300 million worth of equipment, could guarantee virtually unlimited and highly flexible production capacity."

Mr Oliver continues: "Through these alliances and its own shop capabili-

ties, KLAD is able to supply seamless clad pipes, seam welded clad pipes and fittings produced from roll and explosion bonded clad plates and weld overlaid clad pipes, fittings, flanges, nozzles and other vessel components. These large 75,000+ sq. ft. facilities carry the ASME certification and some ISO 9002 certification also. We can respond efficiently to an order for two-pipe spool or flange or can take on a large LNG or deepwater project that may need



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2000 pipe spools and six miles of pipe.

In all these cases KLAD provide the specifications and our own QA programme as modified by the client's requirements is integrated in the manufacturers' production programme."

The overlay facility, which does some fabrication, is operated by KLAD, as it considers welding techniques utilised in the shop crucial to its success. For basic overlay welding, KLAD uses pulsed spray GMAW process to ensure excellent bonding and low-dilution that guarantees the proper chemistry and high quality of the weld overlay. KLAD has developed a technique that allows it to deposit a

single layer and meet the chemistry requirements of various clients simply by controlling dilution.

KLAD feels that the true beneficiary of their alliances is the end-user. While a more traditionally structured company will try to produce everything with one technology simply in order to fill its shop, without regard to cost or lead-times, KLAD tries to find the most cost-effective way to produce a complete package. Having all techniques in

reach means no order is too small or too large and the best production method is always close at hand, Mr Jenkerson emphasises. Weld overlay, manufacturing from clad plates large or small quantities of seam-welded pipes and fittings and seamless pipes manufacturing all have different production cycles and require



Alloy C276 KLAD® Safety Valve Relief Header.

a different approach with respect to lead-time, responsiveness and cost. For an upcoming E&P job, for instance, Mr Oliver expects that the heavy-walled pipes will be seamless, the pipes that can be produced from plates will be so produced, and some fittings will be done by weld overlay. In this way the demands of quality and cost will be reconciled. The company is in a position to break down a project and select the best production methods for each of its constituent parts so as to meet the highest qualitative and econom-



Alloy 825 KLAD fabricated pipe spools.



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ic criteria. This is the essence of the KLAD method, which KLAD's management believes to be unique.

GOAL

One of KLAD's primary goals is to emphasise to the materials community the cost advantages of clad.

Mr Jenkerson says: "Compared to clad products other materials tend to have higher costs. Lower alloys such as carbon steel require more maintenance and continuous monitoring, while stainless steels and higher alloys have huge up-front costs. Clad products

Weld Overlaid Flanges.



will in most cases be the real economic choice, as they have the lowest ownership costs, satisfy the initial budget and require little maintenance and no monitoring. We feel it is a big gain for operators, metallurgists and plant management alike."

Unfamiliarity with clad products on the part of corrosion professionals and problems with sourcing the materials meant KLAD had to start from scratch when developing its markets. Dr Chakravarti: "We've followed an industry-by-industry application approach and most of our work is the result of solving specific problems. We develop a solution and convince the materials people of the effectiveness of the clad option. They are usually the first to realise the benefit of clad products, after which they become the prime movers for considering clad for any project that comes about. When an actual project is being considered it is up to us again to convince the project and procurement people of the viability of the concept. In fact it's not so much a difficult way to do business as it is a long one. We have to make a long-term commitment to execute all stages of a particular job."

An example of an application that KLAD is now focussing on is Oil and Gas production, where the potential for clad is considerable. Clad products offer substantial potential both in solving corrosion problems and in



X65/825 Extrusion Billets for KLAD seamless pipe.

meeting mechanical requirements. For this application metallurgically bonded products are often the material of choice and KLAD is particularly involved in supplying products for critical service areas such as manifolds and risers where metallurgically bonded products provide the integrity needed.

Dr Chakravarti expects that the refining, oil and gas, nuclear power and other industrial applications to continue, fields in which KLAD has already proven itself.

Even so, the priority now lies in spreading the word about clad. As Dr Chakravarti says: "In the past few years we've been focussing on the techniques and technologies to produce an effective product and have developed competitive solutions for a wide range of applications. The time has now come for us to focus on the marketing end of things and show the world all that clad has to offer."