



KLAD Manufacturing Co. Versatile producer of clad piping components

Until a few years ago the material options for piping systems were more or less confined to solid corrosion-resistant alloys and carbon steel. Using clad piping material was not often considered a serious option because of availability problems and unfamiliarity with the material. But things have changed over the years, not in the least as a result of the development and marketing efforts that Houston based KLAD Manufacturing Company has put in clad piping components. The company is convinced that clad now offers the best of both worlds: corrosion resistance that equals solid CRAs and the high strength of a backing steel.

Together with the lower price compared to solid CRAs and improved availability, clad products are now a serious third piping material option. Stainless Steel World got in touch with President Dr Bhaven Chakravarti, VP Sales & Marketing Robert Jenkerson and VP Manufacturing Keith Oliver to learn more about KLAD's activities and the company's plans for the future.

It becomes clear early in the interview that KLAD has gone through quite a development since the last time we spoke with them, two years ago. At that time, the company was focussing heavily on working to gain acceptance of clad piping as an option for corrosive applications, and investing in research and development work. The marketplace responded positively to KLAD's marketing efforts and KLAD moved to a larger facility with more capabilities to properly respond to the market's needs ensuring that clad piping materials are available. Maintaining the versatility and flexibility of the production facilities is paramount for KLAD.



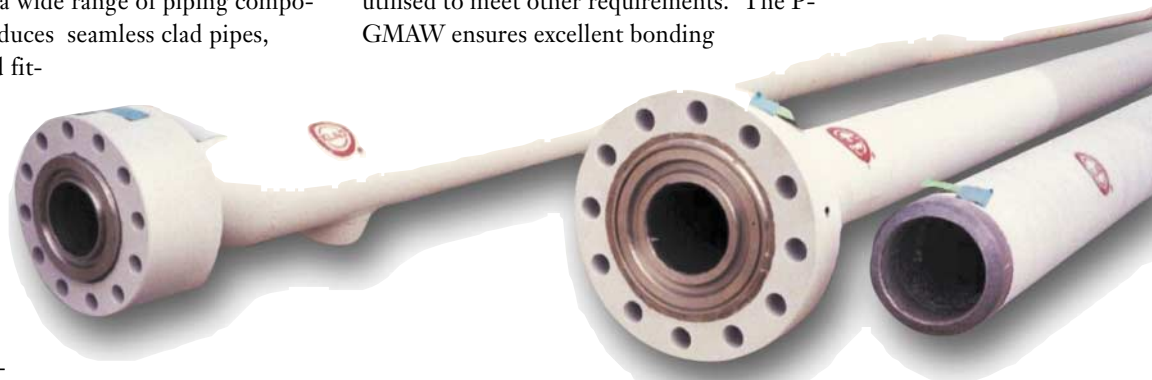
KLAD manufacturing shop for overlay and spool fabrication.

COMPLETE

Dr Chakravarti told us that in the beginning, before he started his company, lack of availability and technical difficulties caused by the unfamiliarity of most engineers with clad piping materials had often made clad products difficult to use. As a result it prevented the option from being accepted as a solution to a plant engineer's corrosion or erosion problems. In order to get the material accepted and to guarantee optimal service to the end user, the company had to master a variety of production techniques to manufacture a wide range of piping components. KLAD currently produces seamless clad pipes, seam-welded clad pipes and fittings from roll and explosion-bonded clad plates and weld-overlaid clad pipes, fittings, flanges, nozzles and other vessel components. Each of the techniques offers clients options, per the scope and schedule requirements of the project.

KLAD in alliance with Wyman Gordon in Houston produces the seamless clad pipes. Wyman Gordon, with its massive seamless production capabilities make supplying large clad piping projects for oil and gas production systems, refinery revamps and other large projects feasible.

Dr. Chakravarti pointed out that the KLAD weld overlay facility has grown immensely and considers the welding techniques utilised in the shop crucial to its success. While pulsed spray GMAW process is central to much of the overlay performed, other welding processes are also utilised to meet other requirements. The P-GMAW ensures excellent bonding



X65/SS309LMo overlaid subsea piping with TSA OD coating for GOM project.



Given the versatility of KLAD's production techniques and the range of capabilities that exist, KLAD actively works with client to solve their material performance problems.

with low-dilution, such that, KLAD routinely provides a single layer deposit meeting the wrought alloy chemistry. Mr Jenkerson adds: "We are able to break down a project and select the best production method for each of its constituent parts to meet the highest quality standards and economic criteria for the project. We are listening to our client's needs of a better product made less expensive"

THIRD OPTION

But how have things been in the past two years? Dr Chakravarti: "We have made 'clad' a practical, third piping material option, covering the full range of materials, sizes and at improved availability. We have made it easy for the industry to work with clad, so it now is a much more accepted product than it was a few years ago. It has truly found its way in the minds of people. I think that that is one of the most

important developments we have seen. End users have started to realise that clad allows them to combine high strength with corrosion resistance and provides them with material solutions opportunities not available previously. For example, the oil and gas industry is now drilling for deep-water wells, requiring essential material strength to withstand collapse and corrosion resistance. Due to their relatively lower strength, CRAs are cost and design prohibitive, but clad now gives them the opportunity to combine high-strength steel with corrosion-resistant cladding, in the sizes and quantities required to make the project viable. From a cost point of view, clad is the attractive alternative, making it substantially more economic for projects to go ahead." According to Dr Chakravarti, this has led to a clear move within the market from CRAs and carbon steel piping equipment to clad materials, and he thinks there are tremendous growth opportunities: "Everyone is reducing costs, driving the maintenance world to upgrade their piping materials. Clad has become an important parameter in people's considerations. When you look at the total piping market, the vast majority consists of carbon steel. Only a small part is made of CRAs, and what we have really done is create a third piping material option to choose from, which is clad." The market growth means that KLAD has to grow as well if the company wants to service all its clients. Dr Chakravarti explained that the company's production facilities are quite well adapted to this development: "In the past few years we have expanded our production capacity tremendously. The fact that we are now able to manufacture every piping component, from weld overlay to seamless pipe has been the most important development in our company recently.

THREE TECHNIQUES

Mr Oliver continues: "Our organisational structure has given us tremendous flexibility in



Fabrication of X60/alloy 625 3D bend gooseneck.



1. SS304L KLAD nuclear plant feedwater heater shell replacements.
2. Alloy C276 KLAD safety valve relief header.
3. Fabrication of alloy 825 KLAD piping for sour gas plant.

our production procedures and enables us to comply with the fluctuations in market demand. Whether someone asks for ten feet of pipe or five thousand feet of pipe we can handle it. In order to do so we have three different production techniques that are interchangeable: manufacturing clad piping components from clad plates, or by weld overlaying seamless carbon or low alloy steel components and from seamless clad pipe. The weld overlay capacity gives us the flexibility to adjust to market demand." Mr Jenkerson added that this sets KLAD apart from its competitors because they mostly concentrate on one production technique. According to Mr Jenkerson, KLAD is probably the only company to manufacture clad piping systems through all of the production techniques: "Our clad and overlay stations are very versatile. They can be broken down in a pipe welding station, a pipe overlay station and a fitting station, and once the components have been made they enter into the fabrication part of our facilities. From here we can supply one or two parts or a complete spool, as well as a complete piping project. Given the versatility of KLAD's production techniques and the range of capabilities that exist, KLAD actively works with client to solve their material performance problems. For example, here is a case where working with a large OEM valve supplier, we helped develop a product line, that made the product possible." Mr Jenkerson described where KLAD weld overlaid the entire low alloy valve body with HASTELLOY® Alloy C22. It would have been impractical from a design and cost point of view to make the body from a solid C22. Mr Jenkerson: "We worked hand in hand with them in the manufacture of the valve, which eventually improved their process and will keep costs down. That's the direction we're moving into: giving end users the opportunity to look at their plant designs and help them improve it." Building up a long-term relationship with plant engineers and maintenance managers is one of the most important ways for KLAD to do business. They are the ones who

know what's going on in their plants and who can get in touch with KLAD to discuss problems. The company then develops the most cost-effective solution for that particular problem. Developing solutions to critical corrosion problems is KLAD's core business. As a matter of fact, the company is now working on a number of clad applications for high-temperature corrosive environments and chemical plants as well as a number of other areas that will bring advantages to the engineering community in the field of costs and performance. A solution to erosion problems is another area that KLAD has started work. As there are many piping systems that can benefit from applying a wear-resistant material. That's what we're working on right now." And that ended our interview. Asked about KLAD's future expectations, Dr Chakravarti replied that their goal now is to make KLAD synonymous for clad piping systems and to make clad, the third piping material option, commonplace in the industry. For KLAD, the sky is the limit when it comes to clad applications and combined with the ongoing maintenance cost reductions and carbon steel upgrades in the industry it looks like the company is heading for a bright future. ◀

FACTS & FIGURES

Name:	KLAD Manufacturing Company, Ltd.
Founded:	1995
Products:	KLAD is a single-source supplier of metallurgically bonded clad pipe, clad fittings and weld overlaid piping components, flanges, nozzles, and pressure vessel components. Additionally, KLAD fabricates clad piping spools.
Location:	KLAD is located in Houston, Texas..
Methods:	Pipe and fittings made from roll bond and explosion bonded clad plates Seamless co-extruded clad piping Low-dilution weld overlay clad pipe, fittings, flanges and valves Induction bending of clad pipes Hot formed heavy wall clad fittings
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 6Mo, Nickel alloys 200, 400, 625 and C276 and wear-resistant grades.
Markets:	Refining, Oil & Gas Production, Nuclear Power, Environmental, Chemical Process Industries