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# transfer

CONVEYING NEWS BUILDING RELATIONSHIPS DEFINING 

## ADVANCEMENTS OFFER IMPROVEMENTS FOR HIGH PURITY AND SANITARY APPLICATIONS

For several years stainless steel has been the workhorse processors have used in tough corrosive environments, and for the most part, it has performed well. However, when it comes to new installations, or even repairs to existing process lines, some of today's stainless steel doesn't perform as well in the same application as stainless steel of years past.

As with all industries, imports, competitive markets and technological advances have forced steel manufacturers to be more competitive in the steel making process. The most significant advancement in the steel industry was realized nearly 30 years ago with the introduction of argon-oxygen-decarburization (AOD) refining. This steel-making process allows precise control of alloying elements, enabling the mills to make a product to an exact chemical composition.

The ASTM specification shows the chemical composition of any alloy in ranges with minimum and maximum allowable limits to meet the requirements for the specific alloy. For example, the chemical composition for 316L stainless is shown in the table below.

316L	Chromium	Nickel	Molybdenum	Carbon	Iron
Minimum	16%	10%	2%		
Maximum	18%	14%	3%	0.035%	Balance

Today, when alloying 316L stainless steel by using the AOD method, the addition of alloying elements is very precise. This allows the elements to be controlled to the minimum range allowed for the specification.

**A more logical path forward is for end users to review their material requirements and introduce higher grade steels in their processes.**

However, in decades past when alloying 316L, the amounts of alloying elements were added with little control to achieve the minimum requirement, often pushing or exceeding the maximum requirements. The result was a product with corrosion resistance superior to 316L stainless steel that is manufactured using today's methods. Although corrosion resistance has been somewhat sacrificed, the resulting steel meets the requirements of the specification and allows the steel mills to

control costs by controlling the amount of alloying elements used.

Often 316L chemistry will vary from one producer to another, or one product form to another, and still be within range of the ASTM requirements. These ranges may cause significant differences in corrosion resistance due to differences in Cr and Mo. Higher alloyed grades of 316L typically require a special order of a full heat, which may be 80 tons and 20 weeks delivery or more, in comparison to the "off the shelf" commodity grade. For example, if the purchaser only requires 20 tons of the "special order" material, the producing mill will typically include the cost of over-alloying the *entire* melt into the purchase price of the required 20 tons. The remaining 60 tons, having had the over-alloying costs already paid for, will be put into distribution as typical 316L stainless steel. This can have a

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profound effect on the different levels of corrosion resistance, when this over-alloyed steel is then purchased in conjunction with standard “off the shelf” steel by the unknowing customer.

A more logical path forward—the one gaining momentum in all industries—is for end users to review their material requirements and introduce higher grade steels in their processes. The most common higher grades gaining acceptance and wide usage are AL-6XN<sup>®</sup>, Hastelloy<sup>®</sup> C-22<sup>®</sup> and Duplex 2205.

Determining the corrosion resistance of any alloy is always a challenging task. Varying service environments, aggressive cleaning and sterilization practices, and even multiple product forms of materials used in equipment fabrication can have a negative impact on corrosion resistance. Because of these ever-changing contributors, the best corrosion data available is often the service history of the system itself. In order to choose the correct materials of construction, material engineers should be involved in evaluating the solutions, compounds and operating conditions within the system.

When considering materials for construction of new systems, or modification of existing systems, use the following process to narrow down the alloy options:

1. Review chemical composition, temperature, pH, and velocity of the environment. Always assume the worst-case scenario. Use the corrosion rate tables in CSI’s Stainless Steel Selection Guide to determine those alloys with the best uniform corrosion resistance. If the solution is a single composition, selection will be rather easy. If it is a complex solution of two or more components, determine the corrosion rates in each component individually. Keep in mind the corrosion rates may be accelerated or slowed in each environment. Many complex solutions require the use of corrosion racks with different alloys exposed to a test environment to determine the best alloy.

2. Always determine if chlorides are present. If they are, select the best alloy for pitting resistance as a function of pH and chloride content.

3. Pick the proper alloy using its PRE (pitting resistance equivalent) number for the temperature based on crevice corrosion.

4. Determine the best carbon range to prevent intergranular corrosion, or use a low carbon grade as a general rule.

5. Pick the best alloy that will not stress corrosion crack.

6. Finally, consider the metallurgical and mechanical characteristics of each alloy candidate. If you are not familiar with each alloy and its limitations, contact a reputable and qualified material

producer or engineer for assistance. Many tests have been conducted in various environments, and a wealth of information is available.

The above guidelines with the corresponding reference tables can be found in CSI’s Stainless Steel Selection Guide online at [www.csidesigns.com](http://www.csidesigns.com), or request a hard copy by calling CSI at **800.654.5635**.

AL-6XN is registered trademark of ATI Inc. licensed to Allegheny Ludlum Corporation.

Hastelloy and C-22 are registered trademarks of Haynes International.



### About the Author

**Ken Kimbrel** is Product Manager for Corrosion Resistant Alloys at CSI. He has an extensive background in engineering and equipment manufacturing and is responsible for CSI’s corrosion resistant alloy product development, technical information, sales, and material evaluation.

Ken currently serves as chairman of the ASME BPE sub-committee on Metallic Materials of Construction and is a member of the sub-committee on Material Joining. He is also a NACE International Board Certified Corrosion Technician and a member of ISPE, ASM International and IMS.

For more information on material requirements or corrosion resistant alloys, give Ken a call at **800.654.5635** extension 110.

## CSI Seminar Heads to California

On Thursday, April 12, CSI will present the acclaimed seminar, **Understanding Corrosion in Hygienic Processes** at the Embassy Suites Anaheim-South in **Garden Grove, California**.

This one-day seminar will provide attendees with a basic knowledge of corrosion and the criteria that should be used when selecting material for use in hygienic applications. Expert panelists will address the following topics:

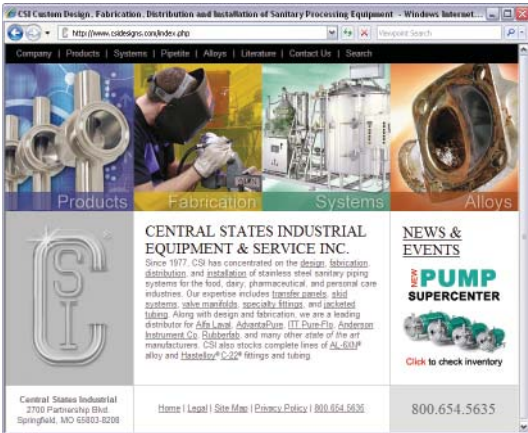
- Combating corrosion through materials selection
- Passivation of stainless alloys
- Electropolishing to enhance corrosion resistance
- Rust or rouging: What’s the difference?
- AL-6XN and Hastelloy C-22 fabrication, welding and surface finish

The open forum presentations are specifically designed to directly answer questions and address problems faced by end users.

Proven to be effective and beneficial, this is one day you won’t want to miss.

For more information about CSI’s seminars, or to register for this event, visit our website at [www.csidesigns.com](http://www.csidesigns.com) or call **800.654.5635**.

# CSI PUTS HANDY TOOL INTO CUSTOMERS HANDS



For hands-on help researching CSI's products and services, just click to the tools on CSI's website.

By offering a level of detail and versatility that far exceeds the norm, CSI's website has earned a reputation as one of the most convenient and informative sites in the industry.

Whether you're checking out our website for the first time or haven't visited in a while, just log on to [www.csidesigns.com](http://www.csidesigns.com) where there

are a number of helpful tools to provide information needed any time of day.

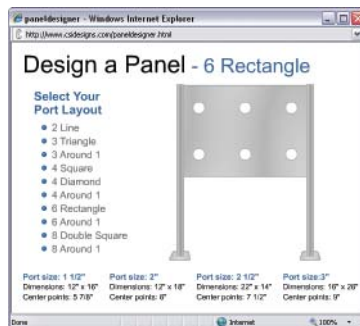
View everything from transfer panels to special fittings or valve manifolds and skid systems in our "Gallery" of product images.

Two popular clicks, "Request a Quote" and "Ask Us a Question" buttons, are conveniently located throughout the site to provide you with easy access to a CSI specialist that can answer your inquiries.

In addition, many of the technical products like pumps and valves contain PDF files of the current product data sheets, brochures, service and installation manuals, performance curves, and spare parts lists. These files are continually being updated and are available to you for viewing or printing any time.

If you're still in need of more information, you will also find several very advanced tools on our site, such as:

- **Service/Installation Videos** – Videos and animations illustrating service or installation procedures are available for a number of products such as 700 series valves, ARC and SRC valves, Unique 7000 valve, LKH and SolidC centrifugal pumps, and SRU positive displacement pumps.
- **Pump Inventory** – You can now view our entire pump inventory by using this tool on our Pumps web page. Part numbers, quantities on hand and quantities on order for all pumps are now available to you with just the click of a button.
- **Design A Panel** – This feature, located on our Flow Transfer Panel page, allows you to select a transfer panel port layout configuration, then view dimensional information for your specific port size and layout.
- **Savings Calculator** – Located on the Product Recovery page, this button takes you to an easy-to-use window that lets you calculate your cost savings when you use CSI's simple and efficient Product Recovery System. Just enter your application information into the fields and the calculator does all the work.



These, and many more, valuable tools are available by simply visiting us at [www.csidesigns.com](http://www.csidesigns.com). Log on today and let CSI provide you with the information you need. Of course, if you have further questions about our website or products, you can also contact a CSI representative personally at **800.654.5635**.

## Meet Amy Fedorczyk



With a strong background in public relations and strategic planning, **Amy Fedorczyk** is ready to take on her new position with Central States Industrial in California.

Recently hired as a Northern California Sales Representative, Amy describes northern California as a blank canvas. "It really hasn't been touched," she said. "There is a broad range of wineries as well as beverage, food, dairy, pharmaceutical, and personal care industries in the area. There's not just one main industry but a wide variety where CSI can fill a need."

Prior to joining CSI, Amy was an executive assistant for Pulte Homes in California and has fourteen years of experience with Harrington Plastics working in finance, purchasing and sales.

At CSI she will focus on distribution and fabrication. "I'm ready to build relationships and bring CSI to the forefront of the food, dairy, beverage, pharmaceutical, and personal care markets in northern California," she said.

And if starting a new job isn't exciting enough, Amy's future holds another exciting change; she will be getting married this fall.

She enjoys all California has to offer including wine tasting, traveling and entertaining. However, skiing with her fiancé and his ten-year-old son and three-year-old daughter is a weekend favorite.

Call Amy at **916.251.6922** to find out how she can help meet your needs.



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## A NOTE FROM OUR PRESIDENT

As I reflect on 2006 I want to take time to say thank you to our customers. CSI has experienced solid growth this last year that has been a blessing to us.

Some of our growth has come from our new location in California. I thank our West Coast customers for having confidence in our team, and we look forward to continuing to develop those relationships.

To all of our customers, new and old, I appreciate your continued faith in CSI. To say thanks is only a step. The CSI team will go the extra mile to provide you with the best products and the best services in the most friendly and professional manner.

We look forward to working with you for many years to come.

J. Mark Cook  
President

