INDUSTRIAL ART

The Capital City Arts Initiative [CCAI] is delighted to present Industrial Art, *an exhibition featuring design by five area manufacturers at the CCAI Courthouse Gallery, June 9 - September 17, 2015. CCAI extends its sincere appreciations to American AVK, CGI Inc., Click Bond Inc., Silver State Stainless, Vineburg Machining Inc. Special thanks also to Northern Nevada Development Authority, Carson City Courthouse, and all those involved in the exhibition. In addition CCAI commissioned artist Chris Lanier to write the following essay.*

This exhibition showcases the work of several manufacturers in Carson City and Minden. The industrial products and parts on display serve different industries (ranging from aerospace to wine), and use different processes (ranging from hand welding to computer-controlled machining). Despite that, there are many common threads that run through these companies, which are part of the historic re-tooling of the US manufacturing sector in the wake of globalization and off-shoring. These companies have remained vital economic engines by focusing on customization, and cultivating a willingness to not just be suppliers but collaborative partners to their clients, able to prototype, test, and design to new specifications. They all share a pride in their ability to problem-solve, pride in preserving and maintaining manufacturing in the US, and pride in making things precisely and well. They all also happen to make objects that are both useful and beautiful. The following gives a small background to each company, and the products they have chosen to display.

SILVER STATE STAINLESS

Silver State Stainless produces stainless steel tanks, specializing in winery and brewery tanks. The tanks are assembled and welded by hand – the wine tank on display for the exhibit was custom-made for the show. The ability to make custom designs is a draw for brewers who like to tweak their process. "Everyone's got their little trick," Richard Sharke, owner of Silver State Stainless, told me. One brewery they work with asked for two extra feet of headspace for their tank, which makes for less "blow off" (the CO2 the yeast produces as a byproduct of fermentation). The most noticeable elements of tank design are related to function, driven by the science of fermentation. The distinctive dimpled surface of the outer jacket, for instance, helps make a conduit for uniform heating or cooling of the tanks – after fermentation, the brewery tanks are rapidly cooled (a process called "crashing the tank"), so that the "yeast gets sleepy," as Sharke put it. The yeast then settles to the conical base of the tank, where it can be easily and hygienically harvested for the next round of fermentation.

When I asked Sharke what it means to him to be a "manufacturer," he said: "We take raw materials and turn them into finished product. Our personnel – they're raw materials, too. We might hire someone who's done pizza delivery, or a Walmart greeter" – and they train them to be craftsmen. The company hosts a BBQ on-site every August, where the families of the workers can come and see the results of their labor. "A kid will look at the tanks and say, 'That's what my Dad does? My Dad made that?' I watch my workers, when they leave at the end of their work day, taking one last look at what they've done. It's

industrial, but it's art. If you buy five tanks from us, none of those tanks will be exactly the same – the human element is there."

AMERICAN AVK

American AVK produces valves and fire hydrants for use across the country and internationally (the morning I spoke to Jose Trujillo, Sales Executive for AVK, he'd been up well before sunrise, on the phone to Denmark and Saudi Arabia). The interior assemblage of valves and gaskets is common to all the hydrants they make, but there is choice in the design of the outer metal housing – the "Nostalgic" design, which has the classic concave arches set radially along the cap, and the "Modern" design, which is sleeker and more pared-down. Differences in the external details within these overarching styles stem from the lack of a uniform federal standard for hydrants. "It's gotten a lot better," Trujillo said, "But there was a time where there might be a fire in Tahoe, and if you wanted to send trucks from Carson City, it wouldn't do any good, because their hoses weren't the same thread." As it stands, different municipalities have different guidelines – some bases need six holes for bolts, some need eight – some of the nuts are pentagonal (which is an unusual shape for nuts, making the hydrants harder to open for unauthorized personnel), some are tetragonal (or square-shaped). Some cities require the nuts to open left, and some to open right (arrows can be incorporated to indicate which). Other variables have to do with the weather they have to contend with– the Alpine model is taller, allowing for easier access if there's snow on the ground – and the pipes have different depths, depending on the local ground freeze level (a Colorado Springs bury went as far as 15 feet).

The colors are applied as part of a corrosion-blocking powder coating. Most of the colors are bright, befitting something that needs to be located in an emergency, and that presents a potential obstacle to traffic (hydrants are "the icebergs of public infrastructure," as one commenter put it on a reddit thread devoted to them). Some colors are informational – purple identifies a hydrant that uses reclaimed water. Some colors are purely ornamental – by request, hydrants installed in Houston are painted white and baby blue, the team colors of the Houston Oilers (even though the Oilers moved to Nashville 17 years ago). The "Modern" style hydrant AVK produced for this show is keyed to the colors of the Nevada flag. It says something about the stolidity of fire hydrant design, and their place in popular mythology as a sort of gushing urban oasis during summertime, that objects usually painted in the shades of danger and alarm have a calming look about them – a feeling of bedrock safety, planted aside the asphalt.

VINEBURG MACHINING INC.

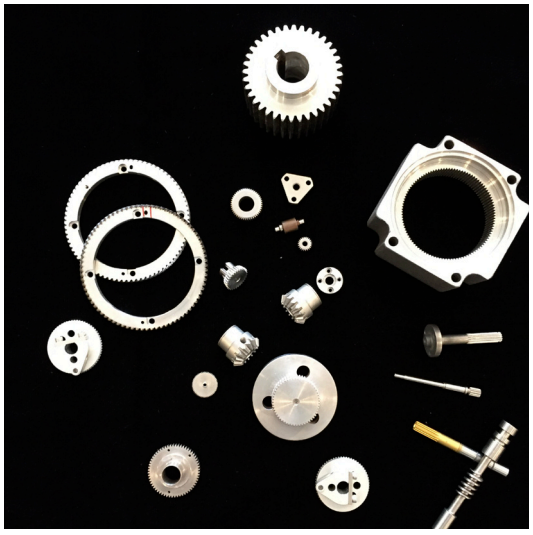
Vineburg Machining Inc. designs and manufactures precision machined parts – for this exhibition, they have provided prosthetic components, door lock hardware, and components for medical devices used on surgical tables. Vineburg typically starts with a "print" of the part the customer wants produced – that print can be a physical copy of the part made by the customer, or a digital file. Vineburg then reproduces the part, using state-of-the-art machining equipment, such as the 5-Axis Trunnion. 5-Axis Machining is a process by which a block of metal is attached to a fixture on a moveable table; those movements are programmable, and in tandem with the movements of the machining tools (like drill bits, cutting, and threading devices), the block or tools can move on five different axes at the same time. The process is one of highly dynamic motion, a precisely controlled dance between the metal and the tools, which increases efficiency by allowing complex parts to be created on one machine. Without that freedom of movement, a complicated part would otherwise have to be created in steps, on multiple machines.

Part of what Vineburg offers is guidance through the design process. Some customers might be able to create a prototype, but lack the capacity to mass-produce. Others might have a concept, but need help determining the specific dimensions – still others might have a 3D computer model of a part, but not having expertise in the machining process, have unachievable dimensions in the model. Just because a part can be modeled on 3D software doesn't mean it's actually machinable. Vineburg has been able to weather the shifts in American manufacturing by focusing on parts that are very complex, and not "one size fits all" (the mass production of less complicated parts – the type of machining where Vineburg established itself – has largely gone to China). The repetitive actions of the manufacturing process have been mostly given over to robotics and automation – Vineburg needs a workforce that is highly trained, able to use cutting-edge software and equipment. Toward that end, Management-level staff train through local colleges, in a modern approximation of the apprenticeship model. The high skill level of the work involved is reflected in the delicacy and precision of the parts they produce.

CGI INC.

Like Vineburg, CGI Inc. positions itself as a company that can guide their clients' needs from concept through production, with a focus on precision gears and gearboxes for robotics and automation, serving the semiconductor, medical, and defense industries. They have also designed tools that were engineered for use in the vacuum of space, for a repair mission to the Hubble Telescope. I talked to Lance Brown, a mechanical engineer at CGI who was a project designer for that assignment – CGI produced a gearbox for the telescope's solar array, and for a bolt breaker. Spacecraft create special problems for bolts – the extremes of hot and cold they are exposed to freeze nuts to bolts. A wrench is not an option – as Brown said, "An astronaut on a wrench is

just going to spin around in circles." The gearbox CGI designed was for a gun that could be applied to the nut to crack it loose. It was a modification of a standard product, but they had to use exotic materials for the space environment – materials that were resistant to extreme cold as well as being extremely light (every gram counts when it's part of a payload being shot into space), and a special lubricant that didn't outgas, as outgassing could degrade optics and electronics. "These are very uncommon materials," Brown said. "A thimbleful of the stuff might cost six hundred dollars."



The gear itself has a long history, traceable back to the 27th century B.C. in China as part of a chariot design, and predating Archimedes in the West – it can be counted as one of the simplest forms of a machine. There are still innovations to be made, however, in both the use of materials and in computerized machining. The commonly-used involute gear profile, in which the profiles of the gear teeth are involutes of a circle, was designed by Leonhard Euler in the 1700s, but it has yet to be perfected in reality – modern machining can get closer to a perfect involute curve, but it's still an ideal more platonic than actual. Gears are predicated on circular geometry, and extracted from the machinery they serve, it's hard not to be taken by the beauty and purity of a gear's circular form. The circle has probably fascinated humankind for as long as we've looked up at the sun and moon; to cycle it back to Hubble, gears have long had a place in our modeling of the solar system and other celestial bodies, driving orreries or planetaria. There's a reason why there was a fad for building intricate clocks with glass backplates – seeing gears in action, they give you the feeling that you're not just looking at how the machine works, you're looking at how the universe works.

CLICK BOND

Click Bond, which produces fastener products for the aerospace, marine, transit, and defense industries, has provided an array of sleeved nutplates for the exhibition. Nutplates are used as fasteners – a hole is drilled into a surface, and then the nutplate is set into the hole, providing an internally threaded tube into which bolts can be inserted. A common technique for affixing nutplates to surfaces is using two rivets; Click Bond produces a variety of rivetless nutplates. By avoiding rivets, installation time can be shortened, and the structural integrity of the surface is preserved. The sleeved nutplates use an adhesive in place of rivets – the adhesive is applied, and the nut plate is drawn through the hole, using the colored elastic fixture to pull

the plate against the surface. Once the adhesive has cured, the elastic fixture (which protects the internal threads from the adhesive during curing) is pulled out, leaving the nutplate fastened in place.

The bright, almost candy-colored elastic fixtures are given their distinct colors to differentiate the size of the fasteners. The vividness of the colors is also to help ensure no elastics are unintentionally left behind as foreign object debris. Some of the elastic fixtures Click Bond produces are actually fluorescent, designed so that inspections for foreign object debris can be done under black light. This attention to detail is crucial for parts that are meant to withstand the harsh conditions of the ocean, the upper atmosphere – and even outer space. Click Bond's reach can be described, without hyperbole, as interplanetary: their fasteners were used on NASA's Curiosity Rover, still in operation on the surface of Mars.

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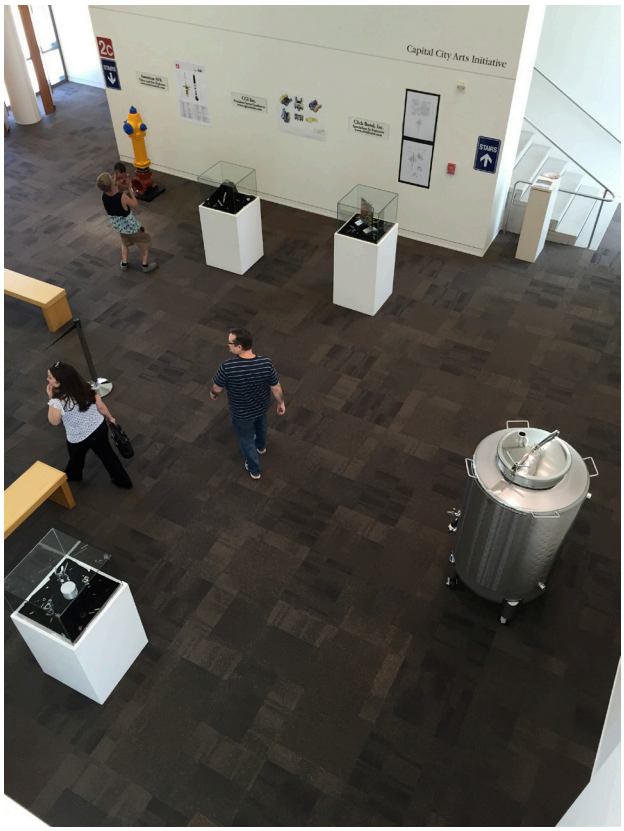
The aesthetics of these industrial products are driven by their function. They are the aesthetics of efficiency, physics, chemistry – and the aesthetics of what might be called the "human interface," design choices made to create parts that are accessible to our hands, our eyes, our understanding – for instance, using color so that we can "read" objects the way we might read a map. Form follows function, and function produces its own beauty. In isolating these products from their function, this exhibition is an invitation to look at these pieces as sculpture – to rescue them from the invisibility of utility.



Elizabeth Bishop, in her poem "12 O'Clock News," makes an itinerary of the sorts of ordinary objects a writer might find around her desk – a lamp, a pile of papers, an eraser. But she describes them as if she were taking an aerial view of a vast landscape, misconstruing their character and purpose. An ashtray becomes a shell-crater, with the stubbed-out cigarettes appearing as crumpled soldiers. Typewriter keys become an imposing system of terraces – "What endless labor those small, peculiarly shaped terraces represent! And yet, on them the welfare of this tiny principality depends." In the poem, she invites the reader to contemplate the strangeness and visual potency of things that are both the result, and the engine, of labor. Hopefully this exhibition, in shifting the context of these industrial objects from one of use to one of design, accomplishes the same task.

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For taking the time to talk.

Chris Lanier
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