

## Vacuum Heat Treating for Space Exploration

Describing Solar Atmospheres as performing only vacuum heat treating falls short of its full capabilities. Solar specializes in all forms of thermochemical processing in a vacuum chamber. In some instances, materials are exposed to various reactive gases at elevated temperatures to alter the chemical or mechanical properties of the material.

Conditions on the planets in our solar system present challenges capable of being met in vacuum furnaces. Each planet is unique in terms of its atmospheric contents, atmospheric pressures, and temperatures. One planet with unique atmospheric conditions is Venus.

Romans named the planet after Venus, their goddess of love and beauty, but conditions on the planet are anything but lovely and beautiful. Venus is the hottest planet in our solar system at a constant 895°F with an atmospheric pressure 90 times higher than the air pressure on Earth.



One planet recently in the media for robotic exploration is Mars. Given conditions on Venus, one can recognize the extreme difficulties involved in sending robotic spacecraft to Venus for scientific experiments. That is just what one company is trying to do.

Honeybee Robotics, with three locations in the USA, received NASA funding awards to contribute to developing future planetary exploration, space mining and in-situ resource utilization. One of the projects is the High Temperature Venus Drill and Sample Delivery System to provide drilling and sampling operations in the challenging environmental conditions of the planet Venus.

Honeybee Robotics selected Solar Atmospheres to provide heat treating for the robotic explorer on drive train components comprised of a specialized alloy called Ferrium C61. The alloy is designed as a high strength, high fracture toughness carburizing grade steel capable of high temperature applications in corrosive environments.

Solar was tasked to develop the difficult processing conditions required to optimize the properties for the specialty alloy and satisfy the demanding heat treat requirements. The drive train components are vacuum carburized at 1825°F, high-pressure nitrogen gas quenched, frozen at -150°F, and tempered in a vacuum at 900°F. Given the severe conditions used to process the alloy, one can understand why it was selected for the Venus drilling application.

When considering Solar Atmospheres for processing materials, do not think of vacuum heat treating alone but the numerous conditions our vacuum furnaces are capable of providing and the expertise of the personnel to consult with for challenging projects for Earth and beyond!

<http://www.honeybeerobotics.com/2015-nasa-sbir/>

## Solar Atmospheres Southeast Vacuum Furnace Capacity



Solar Atmospheres newest facility in Greenville, South Carolina has a wide range of vacuum processing capacity now available. From furnaces suited for small lots and development cycles to a 24 foot long vacuum chamber capable of processing up to 50,000 lbs at 2650°F. All backed by AS9100 and Nadcap quality systems to provide the assurance that your product is being processed as it should be.

A sampling of the processing capability offered at the Greenville, SC location:

- Current vacuum furnace capability:

Hot Zone Dimensions	Max Temp.	Max Load (lbs)
24" wide x 24" high x 36" deep (10 bar)	2650°F / 1454°C	1,500
36" wide x 36" high x 48" deep (2 bar)	2500°F / 1370°C	5,000
36" wide X 36" high X 48" deep (10 bar)	2500°F / 1370°C	5,000
54" wide X 54" high X 288" deep (2 bar)	2650°F / 1454°C	50,000

- Wide range of processing options including vacuum carburizing and cryogenic processing
- Metallurgical testing laboratory to provide product and process validation from surface hardness testing to microstructure evaluation

President Steve Prout states, "the US Southeast continues to grow and attract manufacturers supporting a broad range of market sectors. We are proud to be a supplier that is positioned to support this growth and we are excited to find ways to help our customers achieve their goals and contribute toward their success."

## Solar Hermitage is Growing



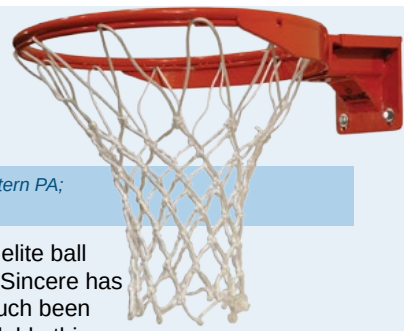
Within a short period of 2½ months from breaking ground, Solar Atmospheres of Western PA's construction project to house the largest commercial vacuum furnace in the world is progressing on time. Aided by an unseasonably warm winter, the new 18,000 square foot building was fully enclosed by the end of January. The new 20 ton crane is installed and the floor is poured, the building is ready to accept delivery of the massive chambers in mid-March from Youngberg Industries located in Belvidere, Illinois.

Due to the magnitude of the project, the vacuum furnace will be cooperatively built on site by both Solar Manufacturing and Solar Atmospheres of Western PA employees. Bob Hill, President of Solar Atmospheres of Western PA, states "We are all anxiously waiting to roll up our sleeves to build this one of a kind furnace. We continue to accept deliveries of all of the major components from our sister company Solar Manufacturing. Our warehouse next door is filling up fast with these critical items. It will be extremely exciting to assemble and ultimately place into production this one of a kind vacuum furnace which is primarily earmarked to serve the needs of the aerospace and nuclear markets around the world."



## The Bekelja's: Making Solon basketball a family affair

*Kevin Bekelja is the VP of Operations at Solar Atmospheres of Western PA; Article originally printed in the Cleveland Examiner*



The Bekelja family of Solon, OH were well represented in March when it comes to basketball, attending a regional semi-final game on the 9th, and a state final four game on the 11th. They have already attended four regional games, and even a state semi-final when the Solon girls team got there last season.

Coaches always say "I'll be happy when he (or she) is gone so I don't have to play against them anymore". While one of the Bekelja players may be out of area coaches hairs for now, the bad news is:

There are three more coming, and all three will be back again next season . . . *"Something that I admire about all of them is the hard work they have put in and the sacrifices they have made to do the best they can on the court and in the classroom. I really can't ask for anything more than that"* . . . Kevin Bekelja, VP of Operations at Solar Atmospheres of Western PA.

Jordan Bekelja is the oldest of the clan, graduated Solon High School last year. A four year starter at point guard, and a two year captain, Jordan finished 3rd all-time in school history in steals, and is 5th in three pointers made. Under her leadership, the Comets won four straight conference championships, four straight district championships, and a regional championship, which led to a state final four appearance last season. A two time 1st team all-conference selection, her Solon teams finished with a four year record of 96-16. As a freshman at Clarion University, she averaged a whopping 34 minutes a game, averaging 10.5 points and 3.5 assists per game.

Dee Bekelja comes next. Dee is currently a junior at Solon, and, like her sister, will be a four year starter. She led the Comets in scoring last year as a sophomore at 15.7 points a game, and has increased that to 17.5 points a game this season. In her three years starting for the Comets, her teams have reached three regionals finals, and will make their second straight trip to the state final four. She is on track to become the Comets all-time leading scorer when her four years are complete. She has already verbally committed to play at Division I DePaul University when her high school career is over.

Sincere Carry is the Bekelja's adopted son, and maybe comes with the most hype. So far, the sophomore has lived up

to it. An elite ball handler, Sincere has pretty much been un-guardable this season, especially this post season, where he has had somewhat of a coming out party. At 6'0" tall and built like a running back, he uses his strength to drive through contact and complete plays, as he did in the Comets district final win over Mentor, as he led the Comets with 22 points. He can also step out and hit the three. Sincere led the Comets into their regional semi-final game against St. Ignatius on the March 9th at the Wolstein Center at Cleveland State University.

Mike Bekelja is the so-called baby of the family, but he has the game of an adult. A part time starter as a freshman, Mike has shown glimpses of being a real potential pain for opposing coaches to prepare for. He is improving rapidly, and become a bigger part of Solon's success as the year moves on. He is well known on the AAU circuit, and may have put his name on the Cleveland area radar during this tournament. He was a key contributor, knocking down two big threes in the district final game against Mentor. already a knockdown three point shooter, he can also swing and play the point when his brother needs a breather. He will definitely be a player to watch in the Cleveland area over the next three seasons.

Imagine that....one kid playing collegiately and three kids playing on the high school teams. One in a state semi-final, and the other two in a regional semi-final. The best part? They all come back next year, and the parents can go ahead and do the same thing again. All four of the Bekelja kids have different styles in the way they play. Has to be fun watching, doesn't it?



# Solar California Expansion



Solar Atmospheres of California, Inc. (SCA) is pleased to announce the expansion of its Fontana facility, located 40 miles east of Los Angeles. The \$5M investment is part of a long term corporate strategy to increase its west coast development and commercial capacity to meet the increasing demands of SCA's customers.

The expansion will add an additional 25,000 sq. ft. to the current 25,000 sq. ft. facility, effectively doubling the size of the plant. It will introduce multiple innovative vacuum furnaces specifically designed and manufactured to meet the growing needs of SCA's diverse customer base. All vacuum furnaces will be manufactured by SCA sister company, Solar Manufacturing, Inc. (SAMI) located in Souderton, PA. In addition to vacuum processing, SCA is planning on installing a state-of-the-art SCAQMD compliant cleaning line.

Construction on the new expansion will commence in the beginning of the 2nd quarter of 2016 and is expected to be fully operational by the end of the year.

Derek Dennis, President of Solar Atmospheres of CA, Inc. states "Expanding our presence in Southern California highlights our commitment to current customers that want to manufacture their parts locally, and to support the development needs of our ever-increasing customer base. The additional capacity will give us more flexibility and make us more agile to deal with our customers' increasing pressure to reduce lead times and increase throughput. SCA has experienced exponential growth since opening our facility in 2011 and this expansion will help equip us for continued expected growth. This expansion pays tribute to the excellent work that the SCA Team has accomplished to create vibrant business in Southern California."

# Solar Sales Summit

The first annual Sales and Marketing Summit was held on February 1st and 2nd at Solar's newest facility in Greenville, SC. With Solar Atmospheres now operating at four locations, sales and marketing wanted to gather together to evaluate the markets and sales techniques being utilized at each location.

The day started off with a tour of the 57,000 square foot facility by host Steve Prout, president of Solar Atmospheres, Southeast. Each facility then gave a presentation showcasing new technologies and/or processes being developed, and what is happening at their facility in the coming year – such as a 48 foot long vacuum furnace being installed at our Hermitage facility, an expansion project at our California facility, and the titanium brazing process development. Other topics were corporate synergy and strategy, as well as streamlining business functions across the four locations.

It was a nice kickoff to 2016 as we continue to work on adding significant value to our customer's operations by thermally treating parts, principally in a vacuum environment, with an unwavering commitment to honesty in all relationships.



## Upcoming Trade Shows



**MFG4**  
May 3-5, 2016  
Hartford, CT



**AEROMAT 2016**  
May 24-26, 2016  
Bellevue, WA



**MD&M East**  
June 14-16, 2016  
New York, NY



**D2P Raleigh**  
June 15-16, 2016  
Raleigh, NC

This newsletter is published by Solar Atmospheres, a leader in world-class vacuum heat treating services.

**Lori Atkinson** Editor  
**Keith Reim** Corporate Marketing Manager

[solaratm.com](http://solaratm.com)  
 [1-855-WE-HEAT-IT](tel:1-855-WE-HEAT-IT)



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# the SPOTLIGHT

Spring 2016



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