



Valley Engineer Newsletter

February 2019

Compiled by: Alexa Rooney, EIT, JD

UPCOMING PROGRAMS

- March/April – Spring Tour
- May 16, 2019 at DeSales University starting at 5:30pm – Banquet of Officer Installation and Student Scholarship Awards
- September 19-20, 2019 at Sands Bethlehem Casino – PSPE Annual Conference



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**LEHIGH VALLEY CHAPTER
 (ORGANIZED 1935)**

CARBON, LEHIGH, MONROE, & NORTHAMPTON COUNTIES

MATHCOUNTS® 2019

Francee Fuller

Springhouse Middle School students Brandon Cai and Eric Zhang took first and second place honors at the 35th Annual Lehigh Valley MATHCOUNTS competition, held on Saturday, February 9th at Lower Macungie Middle School, organized by the Lehigh Valley Chapter of the Pennsylvania Society of Professional Engineers. An army of more than 50 volunteers from the engineering profession worked hard to make the event a success.



Members of the top team, Springhouse Middle School, with their coach, Kevin Hallman

In a gripping Jeopardy-style countdown round held before an audience of more than 500 on-lookers, 10 mathletes who earned top scores during a morning of written tests took to the stage to verbally answer questions. Brandon and Eric were among 265-plus students from 25 schools from Lehigh, Northampton, and Monroe Counties who participated in the regional "Olympics of Math" to win individual and team honors.

Continued on Page 2

All members of the top team, from Springhouse Middle School, coached by Kevin Hallman, will advance to the state competition in Harrisburg on March 15th and 16th. They will be joined by the third-place winner, Adam Plotka, an 8th grader at Eyer Middle School and fourth place winner Taha Mirrani, an 8th grader at Orefield Middle School. The PA Society of Professional Engineers will host the state competition.

Southern Lehigh Middle School, coached by Ronnette Mays, took second place team honors while Easton Area Middle School, coached by Eric and Alex Adams, placed third.

The four top state winners will move on to the 2019 National MATHCOUNTS Competition in Orlando, FL from May 11th to 14th, with Raytheon Corporation as the title sponsor. The National Society of Professional Engineers (NSPE) in partnership with state engineering societies is the founding sponsor of the event, geared to promote math proficiency among middle school students.

The students spent the morning taking written tests with questions like:

A set of distinct positive integers has a total of 11 digits, and all the digits are 1s. What is the smallest possible sum of the integers in the set?

Answer can be found on page 18

Tests were sent immediately to a scoring room for grading and ranking. The afternoon session featured the top ten ranking individuals paired in a lightning-round stage competition to determine final ranking. The top 10 individuals were:

1. Brandon Cai, 6th grade, Springhouse MS – also top 6th grader
2. Eric Zhang, 8th grade, Springhouse MS
3. Adam Plotka, 8th grade, Eyer MS
4. Taha Mirrani, 8th grade, Orefield MS
5. Dan Martinez, 8th grade, Pocono Mountain
6. Aditya Singhvi, 8th grade, Orefield MS
7. Sophie Wen, 8th grade, Southern Lehigh MS
8. Armaan Makwana, 8th grade, Easton Area MS
9. Alaina Patel, 8th grade, Southern Lehigh MS
10. Eric Welp, 8th grade, Eyer MS

The three top-scoring young women (Sophie Wen, Southern Lehigh Middle School; Alaina Patel, Southern Lehigh Middle School; and Emma Li, Easton Area Middle School) will receive a course in math or science at Cedar Crest College.

Moravian College, Lafayette College, Lehigh Carbon Community College and Northampton Community College also provided top winners with scholarships for mathematics courses. Nationwide approximately 40,000 students, representing more than 5,500 schools participate in the 2019 Mathcounts competition.

Radio Astronomy

Alfred Gruenke, PE

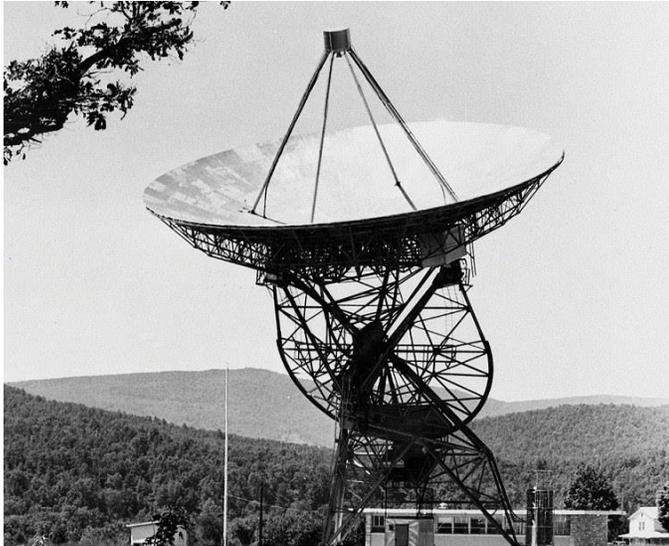
When I was a young lad back in the late 50s I had in my possessions an Allied Radio catalog. In it was a myriad of electronic parts and devices primarily aimed at ham radio operators, with a lot of receivers and transmitters, all beyond the pecuniary limits of a paper boy. The equipment I remember are still legend in amateur radio circles; Collins, Hallicrafters, National, General Radio.

However, what fascinated me and is still ingrained in my mind is the picture on the cover. It was an artist's rendition the parabolic radio telescope then under construction by the National Radio Astronomy Observatory in Green Bank, West Virginia. With the Milky Way galaxy in the background it was mysterious looking, and inspiring. I decided at that point to become a radio engineer, designing and building equipment that could listen to the music of the heavens. My interest in amateur radio also began at this time.

A few years later brutal reality hit me, and I changed careers. It was still electrical, but with an emphasis on 10,000 kVA transformers and 6.6 kV 4,000 kW wound rotor motors with liquid starters. But the fascination with radio astronomy never left me. My fantasies of radio telescopes rank right up there, along with Marilyn Monroe and flying an SR-71.

Continued on Page 3

Radio telescopes operate in the giga Hertz range, wavelengths 300 mm to 30 m. This is in the Wi-Fi range. By comparison, AM radio is around 300 meters.



85' diameter parabolic radio telescope National Radio Astronomy Observatory in Green Bank, West Virginia

When in Puerto Rico I toured the 1,000' diameter radio telescope at Arecibo. The parabolic reflectors are built on the ground, in a natural depression. It wasn't much of a tour. Some pictures, some informative placards; not what I wanted. I wanted to see the controls, the receiving equipment, but that was off limits. I bought a t-shirt.

In Northern California I came upon Hat Creek Radio Observatory, a radio array of 42 dish antennas, each maybe 10 meters in diameter. The primary function of this facility is SETI, the Search for Extra Terrestrial Intelligence. At that time, it was operated by the University of California, Berkeley. The setting seemed spooky. Huge structures standing silently, gazing off in the distance. They reminded me of Easter Island statues, always alert with unblinking eyes. It rekindled the fantasies of my youth.

A couple of years ago I was on assignment in Nogales, Arizona, to inspect some equipment to be shipped to Mexico. The equipment was damaged during shipment, and I was tasked with determining the amount of damage, and whether they could be shipped to the customer or returned.



An ear on the Universe



The Hat Creek Radio Observatory array. Each black dot is a parabolic antenna

Driving south from Tucson airport I saw a sign to Kitt Observatory, located about 50 miles southwest. If the opportunity presented itself, I decided to go there.

It was a short assignment, so I went.

I was particularly interested in the Kitt observatory radio astronomy antennas. These are huge structures, with 12 meter diameter parabolic reflectors. One can only guess at the various engineering disciplines required to build such a structure and control the antenna movement.

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Kitt Observatory radio astronomy parabolic antenna

Radio telescopes do not have to wait for darkness to be functional. Driving up to one of the antennas I noted a sign, "Private, Keep Out". Well, I wasn't a Private, I wasn't even in the Army, and the sign didn't say "Alfred Gruenke Keep Out", so it must be ok for me to enter!

As I entered the building no alarms went off, there was no thumping of jackboots heading my way, just a group of people who greeted me warmly while continuing doing what they were doing. I explained that I was an amateur radio operator and that I've always been fascinated with radio astronomy. As I suspected, people who work in highly specialized fields just love to talk to outsiders about what they do.

As I was meandering about, I heard one of the scientists counting - "one, two, three, four..." on his fingers! Here was a person who probably took all those way-out math courses in college and enjoyed them! So much for high math. A stark contrast to the high tech work they were doing.

There were racks of equipment and blinking lights. I was told that the radio amplifiers were immersed in liquid helium to reduce intrinsic noise. That made sense to me. I talked to a "customer" from England, who explained the procedure. He applied to have access to the facility six months previously and was given the specifications for the equipment and a schedule of availability. He then submitted a description of his research project and desired procedures. There was some negotiation, and he came to the observatory to supervise the operation. The subject of payment never came up.

His project was the prevalence of carbon monoxide near some star system. He explained the frequencies (somehow, 1.25 GHz sticks in my mind) and what he was looking for. He had a strip chart and a smile on his face, so he must have had results that he was hoping for.

An altogether pleasant and informative trip. My radio astronomy fantasy was not fulfilled, but at least I was able to take a close-up look at it.

The Search for Extra-Terrestrial Intelligence has entered the amateur world. There are now available receivers that can operate well into the giga Hertz range. The receivers are not that expensive, around \$2,500.00 or so, but the associated equipment can be expensive, and bulky. Having a ten meter parabolic in the backyard is not everyone's dream of suburban living. I've considered it but the dedication in time and money is beyond my interests. I'm quite satisfied with my present amateur radio equipment. Besides, searching for extraterrestrial intelligence should be secondary to the search for terrestrial intelligence! Both can be fleeting.

All the photos in this article are from the internet. Sorry. When I toured these various sites I did not consider the possibility that I would someday be writing an article in the Valley Engineer!

I took a family vacation to Arizona a few years after and took the official tour. The radio observatory was not part of the tour. Interesting, but not as inspiring as my unofficial visit.

Triple Sun Spirits

Alfred Gruenke, PE

Around a dozen members and guests of the Lehigh Valley Chapter, Pennsylvania Society of Professional Engineers gathered on a pleasant January evening to tour a remarkable facility. Located at 518 Bank Street near the center of Emmaus PA, inside a storage area with a protective fence, is the Triple Sun Spirits Company. It is housed in the same building as the Yergey Brewing Company, separated by an explosion-proof wall.

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SCHOLARSHIP SPONSORS

A great way to be involved in the LVPSPE Chapter is to contribute to the **LVPSPE SCHOLARSHIP FUND**. Please Contact the Valley Engineer Editor to sponsor scholarships for the remainder of the calendar year.

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Or, you may also contribute via the LVPSPE website <http://www.lvpspe.org/Donations>.

Scholarship application is at <http://www.lvpspe.org/Scholarships>. Any questions regarding scholarships can be directed to

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In 2011 the Pennsylvania legislature passed Act 113, legalizing small distilleries to produce up to 100,000 gallons of distillate per year in Pennsylvania. Subsequent legislation over the years refined the original intent. In 2015 master distiller Kristofer Kwant started Triple Sun Spirits Company and opened the present site in 2016. Kris previously was a brew master for twenty years so he was familiar with the production and sale of alcohol products. The name Triple Sun commemorates his three sons.

Triple Sun uses corn, rye and barley, grinding them to the consistency of coarse sand, before adding hot water to turn the starch into sugar. After cooling, yeast is added and the mixture is allowed to ferment. When fermentation is complete the mixture is distilled in a still to concentrate the alcohol. Triple Sun uses a batch distilling process that can distill about twenty gallons at a time in each of up to four pot stills. These "stripping" stills have pipes and condensers fabricated from copper which is used to bind impurities and cleanse the output distillate. The apparatus is reminiscent of fractional distillation columns as used in the cryogenic and petrochemical industries, though on a smaller scale.

Kris explained the intricacies of the whiskey making process with the eloquence and ease of a college professor lecturing on a course in organic chemistry. I have not heard "Alcohol and acid combine to form esters, which is an aromatic component" since my chemistry classes at Lafayette College many years ago.



Kris Kwant explaining the intricacies of his "hillbilly" pot still.

The mixture is heated in the still to 80°C. The first product of the distilling process is called the Foreshot and represents less than 1% of the output. It contains a lot of undesirable elements such as methanol and acetone. All Foreshots are discarded to improve quality.

The second product to come out of the still is called the Head, which contains various flavors and aromas. The Master Distiller tastes it, and decides if, and how much, goes into the end product. This is more of an art than a science and takes many years to master.

Continued on Page 17

The third product is the Heart, the most important part of the distillate, and the most desirable as it represents the highest purity of ethanol. All of the Heart is utilized.

The last component of the distillate is the Tail which contains various flavors and aromas. As with the Heads, the Master Distiller tastes it, and decides if, and how much, goes into the end product.

All spirits come out of the still crystal-clear. Depending on the product being produced this may reach as high as 190 proof, or 95% alcohol by volume. An Internal Revenue Service approved and tested hydrometer is used to measure proof for excise tax purposes. Filtered local water is added to the distillate to bring the alcohol level to more reasonable levels for bottling or barreling. Depending on the treatment during and after distillation, any grain-based alcohol can become vodka, gin, or whiskey. Triple Sun produces gin by adding herbs and spices in the chamber on top of the distillation column (called the gin basket). Spirits such as whiskey and brandy get their color from subsequent barrel aging.

Kris went into depth explaining the production of that All American Whiskey, bourbon.



Full Whiskey barrels waiting to be harvested

Bourbon was the whiskey of choice among the pioneers. In 1791, farmers in Western Pennsylvania were angered by a federal tax on rye whiskey, an important cash crop. The whiskey was made from rye and barley grain.

Whiskey is grain concentrated, much easier to ship to markets, and much more profitable. It was a simple case of value-added. To ship a bushel of grain from the frontier was time consuming and expensive. However, if the grain was concentrated to whiskey, shipping costs were greatly reduced, and the product became more profitable. A show of force by President George Washington ended all thoughts of insurrection, and so the excise tax remains to this day.

The term bourbon is reserved for American-made whiskey, made from at least 51% corn, and, most important, must be aged in new oak barrels that have been charred on the inside. The aging period depends on the manufacturer; Triple Sun ages its bourbon a minimum of two years (known as Straight Bourbon). The barrels may be used only once. Fortunately, there is a market for used whiskey barrels. Wineries, breweries, and suburban home owners looking for that "trendy" look are a ready market for used barrels.

Triple Sun also produces rum. The process is similar to whiskey, except the raw material is molasses made from sugar cane.

The final spirits are bottled on the premises. Triple Sun can produce up to 2,000 bottles a week, though 300 – 400 bottles a week is more common. Kris also has a contract to produce vodka for Weyerbacher Brewing Company, Easton, PA.



Adrianna Rivera, at the business end of the business

Continued on Page 18

As one may imagine, whiskey distilling is a highly regulated and taxed industry. Today, there are inspectors from the Pennsylvania Liquor Control Board, Bureau of Alcohol Tobacco and Firearms, Internal Revenue Service, and Food and Drug Administration to ensure a quality product that is fully tax paid.

Kris sells his products on-site, and on-line. The bar is open Thursday 4:00-11:00 PM, Friday 4:00-11:00 PM, Saturday 2:00-11:00 PM, and Sunday 2:00-7:00 PM.

The LVPSPE attendees were treated to six ¼ ounce "shots" of the various spirits. Kris explained that the law allows up to 1 ½ ounces of complimentary tasting per person, which was appreciated by everyone. We received a branded shot glass as a memento.

We thank Kris for an interesting tour, and skillfully guiding us though the intricacies of an industry which few of us are familiar.



Triple Sun Spirits Company

Answer to MATHCOUNTS Question on Page 2
11,234

Give a man a fish and he will eat for a day. Teach him how to fish, and he will sit in a boat and drink beer all day.

- George Carlin

Most of us miss out on life's big prizes. The Pulitzer. The Nobel. Oscars. Tonys. Emmys. But we're all eligible for life's small pleasures. A pat on the back. A kiss behind the ear. A four-pound bass. A full moon. An empty parking space. A crackling fire. A great meal. A glorious sunset. Hot soup. And the all rewarding: Cold beer.

- Anonymous

February is such a dreary month. It's cold, dark, dank, and depressing. January at least has the afterglow of Christmas, and March is the harbinger of happier climes, but February has little to offer. Football season is over, the promise of baseball is over a month away, and activities which could liven us up and save us from the doldrums are few and far between. True, there are winter festivals featuring moose chip throwing contests and the like, but these are regional events only.

Let's face it. Other than an occasional Super Bowl game, President's Day, and my birthday, February has little to offer. I believe God allowed February so that even people who don't drink can know what a hangover is like.

Ok, maybe Groundhog Day and Valentine's Day, but these are mere blips in an otherwise bleak and sorry scene.



An attempt was made to eliminate February and spare mankind its trials and tribulations, but the denizens of doom, gloom, and damnation won a partial victory by giving up only a few days instead of the whole month. Well, I, for one, am in favor of going from January directly to March, skipping the doldrums.

Is there anyone who would disagree with me?
- Samuel Johnson (1755)



**Lehigh Valley Chapter
Pennsylvania Society of Professional Engineers
Lehigh, Northampton, Monroe and Carbon Counties**

Minutes for the February 11, 2019 BOARD OF DIRECTORS MEETING
6:00 pm at the Office of Liberty Property Trust 400 Boulder Drive, Suite 200,
Breinigsville, PA 18031

Attendees: Brian Kutz, Al Dezubay, Ray Szczucki, Chris Williams, Mary Rooney and Frank Walsh

I. Call to Order: Brian Kutz called the meeting to order at 6:03 PM

II. Programs

- Activities – Al Dezubay
 - February: MATHCOUNTS went well. Had 24 schools, about 265 students.
 - February 22: Engineer’s Week Banquet, registration is open. Ben Franklin Tech Ventures to give presentation. We have EOY (Charley Myers) and YEOY (Elizabeth Hesel). Brian will bring proclamations to banquet and will order plaques.
 - March/April: Possibly St. Luke’s, East Penn Manufacturing or Dorney Park
 - May: Banquet for installation of officers and scholarships. May 16th at 5:30pm at DeSales University.

III. New business

- Newsletter – Alexa Rooney
 - The board discussed setting a publishing schedule of every other month. May also be beneficial to draft a template outlining what items we might want to highlight in each newsletter – events from past two months, upcoming events (MATHCOUNTS, Engineers Week, etc.). Could include board member profiles in upcoming newsletters.
- Fundraising
 - \$10,000 pledged so far compared to \$13,000 received last year.
 - ASCE is interested in getting involved with scholarships.
- Scholarships – Al Dezubay
 - Received two applications already.
 - 2nd Sunday of March is application deadline.
 - Scholarship committee: Al Dezubay, Chris Williams, Angelika Forndran and Don Kohn

IV. Treasurer

- Treasurer Report – Ray Szczucki
 - Reviewed checks received/deposited and invoices paid.
 - \$1,065.67 checking \$11,403.95 savings
 - Wild Apricot – need to decide if we renew their contract before April 2nd
 - Frank made a motion to donate \$250 to Dream Big, Chris seconded, all in favor.

V. State Director

- State Director Report – Kevin Campbell; no report

VI. Past President

- Past President Report – Al Gruenke
 - Brian reported that Al is working on officer nominations for next year.

VII. Old Business/New Business

- Mike Basta is working with state conference organizing committee. Event being held at the Sands Casino, September 19-21.

- Upcoming Board of Directors meetings:
 - March 11th
 - April 8th
 - May TBD – LVPSPE Scholarships and Installation of Officers Banquet

VIII. Adjournment

- Motion by Al, seconded by Mary, all in favor to adjourn at 7:11.