STEM Society Meeting, November 14, 2017

James Emery

Last Edit: 12/19/2017

Contents

1 About the STEM Society and the STEM Society Website

STEM is an abbreviation for Science, Technology, Engineering and Mathematics. The acronym STEM is commonly associated with K-12 education, but our use of the term is only slightly bound to this meaning. There are over one hundred people on the mailing list, although a much smaller group attends any one meeting. We meet on the second Tuesday of each month at the Trailside Center at 99th and Holmes in Kansas City, Missouri. The meetings are open to all. The start time is 6PM. We make presentations, have discussions, and have demonstration experiments. These relate to Science, the History of Science, Mathematics, Engineering, Philosophy and Technology at all levels. The topics have ranged from a technical discussion of the

Mathematics of General Relativity to scientific experiments for young students.

These meeting notes contain links to many other documents, which may be viewed or downloaded by clicking the link. A partial list of documents can be reached by clicking the heading **Documents**. The meeting notes may also be viewed in an archive file (archive.pdf), which is in the list of documents. Many of the documents are PDF files. They may be viewed or downloaded to the computer by clicking, provided Adobe Reader, or another program capable of reading PDF files, is present. There are many more documents available at the site than are listed under **Documents** because the documents.htm file is not at all up to date. The last time I checked, about March 2014, there were about 350 document files on the site. We are in the process of creating better techniques for finding documents and authors. The first meeting of the STEM Society was in November of 2006.

The web site is:

`http://www.stem2.org/`

Direct to the documents list:

`http://www.stem2.org/je/documents.htm`

Direct to the archive file:

`http://www.stem2.org/je/archive.pdf`

2 The November 14, 2017 Meeting Announcement

The November meeting of the STEM Society will take place on the second Tuesday of the month, November 14, 2017, at the Trailside Center at 99th and Holmes in Kansas City, Missouri. The starting time is 6PM. Also look at our website for past meeting notes:
The website is:

`http://www.stem2.org`

Topics and Discussions:

(a) Gary Gates will speak on the topic of "Spin Forming of Metal." He will show power point slides and some videos.

In the past I did attempt to get a local company that builds musical instruments to speak about using this process in making and repairing horns as I remember. I think I did talk about a presentation they made at one of the Maker Faires about them making a custom trombone for a well known jazz performer. I shall have to look this up in our notes.

(b) If there is left over time we can talk about other topics. So if you have a not so long subject bring it in.

3 Gary Gates: Spin Forming of Metal

Gary Gates was involved in spin forming for many years both in Kansas City and in California. His presentation was a Power Point presentation of 60 some slides and several videos. I have transformed the very large PP file into a much smaller PDF file. In the PDF file the videos show up only as a blank frame. However, most of these videos come from the internet perhaps as YouTube videos, and you should be able to view these videos or similar ones on the internet. See the section on Gary's Power Point Presentation.

From the introduction to the Wikipedia article titled **Metal Spinning**:

"*Metal spinning, also known as spin forming or spinning or metal turning most commonly, is a metalworking process by which a disc or tube of metal is rotated at high speed and formed into an axially symmetric part. Spinning can be performed by hand or by a CNC lathe. Metal spinning does not involve removal of material, as in conventional wood or metal turning, but forming (moulding) of sheet material over an existing shape. Metal spinning ranges from an artisan's specialty to the most advantageous way to form round metal parts for commercial applications. Artisans use the process to produce architectural detail, specialty lighting, decorative household goods and urns. Commercial applications include rocket nose cones, cookware, gas cylinders, brass instrument bells, and public waste receptacles. Virtually any ductile*

metal may be formed, from aluminum or stainless steel, to high-strength, high-temperature alloys including INX, Inconel, Grade 50 Corten, and Hastelloy. The diameter and depth of formed parts are limited only by the size of the equipment available."

These large machines for metal forming are very expensive. One of the major companies producing these machines is named DENN others are mentioned in the Gates preentation.

From the internet: "*The company behind the trade name DENN is Industrias Puigjaner, s.a., Polinya (Barcelona), Spain; which was founded in 1885 and has the oldest machine-tool manufacturer license in Spain. Over 95 percent of DENN machines are exported throughout the world. State-of-the-art technologies and materials are used to design and manufacture all machines. The procedures used by Industrias Puigjaner, s.a. - DENN are according to ISO-9001 standards.*

Commitment to research and development, use of the most modern CNC controls and software, as well as over 130 years of experience makes the DENN and Global Metal Spinning Solutions partnership a name our customers can trust."

Gary talked about a local company called **Weld Wheels** and successor companies. Bob Kessler's son Scott Kessler, who is now an Engineering Professor at a Colorado University, worked for one of these companies at one time.

4 Gary Gates Power Point Presentation

Gary's Power Point Slides have been converted to a pdf file. This is done to greatly reduce the storage required on our Website (from almost 400 Mbytes to 5 Mbytes,) and to allow those who don't have Power Point to view the slides.

`http://www.stem2.org/je/metalspinning.pdf`

There are several videos, which will appear as empty frames, but the sources and descriptions of these YouTube videos are given here. To view a slide, paste the source http tag into your browser:

slide 9, Light Reflector video
Source: http://www.youtube.com/watch?v=nU7r2UMiDqM
Spinning a light reflector with nylon roller, blank
centering device and backup plate
Notice that the blank was manually crimped out of the
field of view to add rigidity to prevent wrinkling.
The part ID takes on the surface finish of the mandrel.
Lighting companies will use a polished mandrel and special
grade aluminum with a very goo surface finish.
Reductions are usually less than the roller radius
They have a trimming unit and a beading unit attached to the head stock.
This is a MJC machine with a two roller change and backup,
trimming and beading units.
All of these auxiliary units can be purchased
for the NSC machine

slide 10, cooking pot video
Source: http://www.youtube.com/watch?v=5R6Zvp3DEh0
Free spinning a straight walled pot
Blank centering device is CNC controlled.
Blank trimming device removes the ears that
form due to grain directionality and its
effect on material flow
Duraspin rollers (longer life than Nylon) provide
better surface finish and reduce thinning
Auto lubrication in front of the roller,
Mandrel is likely manually light oil lubricated.
Roller change to flange cutting tools.

slide 15 electrical cup video
Source: http://www.youtube.com/watch?v=wcse0FdvWTs
This is a DENN video and machine
Notice that the starting preform is a cylinder cup
This adds rigidity and makes on one spinning pass possible.
Additional preform contouring is likely required if a
constant wall thickness is required.

slide 25, Filter - Internal Flange video
Source: http://www.youtube.com/watch?v=poW0CxMe70A
Omera is an Italian build trimming and beading machine.
Shows spinning of an ID flange
Provides complementary forming operations for pressed or spun parts.
A trimming and beading machine is PLC controlled
Much less expensive than a CNC spinning machine, at least 1/3 the price.

slide 26 Roll Forming Video
Source: http://www.youtube.com/watch?v=DnBBu-S9unI
Part #1 outward flanging top and bottom
Part #2 Trimming operation
Part #3 Gas tank lock seam joint preparation
Part #4 Rolled bottom edge and formed top flange
Part #5 Rolled pizza pan edge

```
slide 30,  Single Pulley video
Source: http://www.youtube.com/watch?v=jcLxH5TXWc4
This is a double spindle single V T&B machine
The splitting roller also forms the desired contour
For this reason a T&B machine is built like a press
A lot of force is required to support the forming loads
to produce the desired contour.
Spinning machines tailstocks do not typically
have enough force, therefore locking tooling must be used.

slide 31,  Poly - V Pulley Video
Figure Source: http://www.youtube.com/watch?v=8_jg5ZWTp0c
Pressed cup is roll formed and then poly V formed

slide 47, Rotary Forging Video
Source: http://www.youtube.com/watch?v=poW0CxMe70A
This is a DENN machine, SMS Wagner Banning, MJC
Engineering are also manufacturers of rotary forge machines
```

5 Scott Kessler on the Weld Racing Company

Bob Kessler's email to his son Scott Kessler concerning the **Weld Racing Company**.

```
On Nov 17, 2017, at 7:27 AM, Robert Kessler bobkessler2@mac.com wrote:

Scott,

We had a speaker at our last STEM2 meeting presenting information on spin machines.
He mentioned working with the wheel company across the street from the old
Leeds Chevrolet plant.  That brought back memories of you working with them...and
also you working with a friend of yours at the Chevrolet plant...before he
moved his plant to Mexico.  What was the name of the wheel company?...
who did you know there?...and are they still around?

If I remember correctly your friend was going to return to the U.S.
when his kids were old enough to start school...and he also had a brother
that was a friend of yours...maybe went to school together with you.
What was the guys name?  Did he come back?  Do you still communicate with
him?...his brother?

What was the technical aspects of what you were doing back then?
Ever run into Gary Gates?...he is the guy that gave the STEM2
presentation...he worked at Bendix at one time..

Sorry for all the questions...but my memory is getting worse...
```

Scott Kessler's reply to the Bob Kessler email.

From: Scott Kessler kestek@me.com

Date: November 18, 2017 at 11:18:19 AM CST

To: Bob Kessler's Mini bobkessler2@mac.com
Subject: Re: Memory

Dad,

Weld Racing is the name of the wheel company. They still owed me a few thousand dollars when they went bankrupt and were bought by American Racing, which still owns them and uses the Weld Racing name. I mostly looked at failed wheels for them, along with a few failed machine tools used in production. Dont think I still know anyone that works there. The young engineer I worked with was working at Honeywell last I knew.

I dont really know what David Polich is up to now. His brother, Mike, is in KC, but havent seen him in awhile. Dan Andersen still sees Mike from time to time, I believe.

Never really knew Gary Gates.

Scott