October 12, 2016 Meeting

The October, 2016 Waterloo Technical Society (WTS) meeting was called to order by Vice-President James Stevenson at 7:25 pm. President Dorhout was away on a family visit to his daughter and family in Texas.

A total of 30 were in attendance.

Treasurer's Report. Ken Friend reported the treasury had a beginning balance of $850.17 with $280 income from dues and expenses of September's speaker's dinners of $36 leaving a balance of $1,100.17. A total of 8 honorary and 34 paid members gave a membership roster of 42 members.

Old Business. The speakers for the remainder of the fiscal year have not all been identified. Suggestions are still being accepted from the membership. Vice-President Stevenson presented this lineup:
Speakers for the 2016-2017 Meeting Year (Year 103)

14 Sep 2016 - Dr. Donald Gurnett from U of I. Voyager Spacecraft
12 Oct 2016 – Tim Nagel – Sign Technology
9 Nov 2016 – Mr. Steve Crouse – Facilities Changes at PEC
14 Dec 2016 – No Meeting
11 Jan 2017 - Brian Keierleber – County Engineer, Independence – Ultra High Performance concrete properties
14 Feb 2017 --Tom Parsons – Current Concrete Road Paving Techniques
14 Mar 2017 -- Mr. Gomes – Waverly-using Ultralight for crop inspections-Tim
12 Apr 2017 -- WCF&N Railroad (Robert Levis) 319.233.4235 – by Gene Van Gorder
10 May 2017 -- Open

New Business. No new business was discussed.

Guest Speaker. Dr. Tom Nagle spoke on Technology of Signs. Tom Nagle is the Operations Director at Nagle Signs, Inc., Waterloo, Iowa. Tom obtained a BS in Civil Engineering from the University of Iowa in 1998, and MS and PhD degrees in Civil Engineering from the University of Illinois at Urbana-Champaign in 2003 and 2007. He is a registered Professional Engineer in the State of Illinois and has worked at Caterpillar in Peoria, IL as a Test Engineer in Powertrain Research and Development as well as working as a Research Assistant in the Newmark Laboratory at the University of Illinois Urbana-Champaign, and a Structural Engineer for Wiss, Janney, Elstner Associates, Inc. in Northbrook, IL.

Structural support of signs. Single pole supports are the simplest method of supporting signs. The poles are tapered sections welded together. Weld fractures are the common failure mode of these supports. Poles are 66 inches in diameter and 100 feet tall. The diameter tapers as the pole rises. Poles must support signs in 110-130 mile per hour wind speeds. High cycle fatigue is the most common failure mode. The International Sign Association has studied these failures and issued standards for construction. Dr. Nagle showed slides poles which failed and fell on vehicles parked underneath and nearby.

The ratio of the stiffness of the cap plate to the support pole of 1 is best. University of California at San Diego proposed the correct designs to withstand 25,000 cycles with a specified test load greater than the working load. The recommendation was to add gussets and remove continuous fillet welds and replace with stitch fillet

welds beneath the flange. This design is expected to survive 150,000 cycles to failure. A large volume of today's poles use tapered sections that survive 200,000 test cycles to failure.

Construction materials. Sign faces usually fail by blowing out of the frame. Acrylic panels cracked and broke up on impact. Polycarbonate panels replaced the acrylic so that they would not break if they blew out. These were hazardous to those below the sign, so flexible face material replaced the polycarbonate ones. Nagle's largest customer is Kum 'N Go and all sign faces are flexible.

Manufacturing Design and Advancements. Vector art work is sent directly to CNC tools today. Sign panels are painted using the vector art directly on canvas. Mounting holes on sign backing line up with studs on brackets using Computer Aided Design for the mounting brackets.

Lighting Technologies. Old signs were often neon in glass tubes. Glass tubes are bent for letters and a mask is provided to drill holes for mounting. This technology is now replaced by Light Emitting Diodes (LED) attached at the rear and covered with inserts to protect them (like a shoe box construction). Fluorescent tubes, neon tubes and now LEDs for the past 10 years have changed signs to capture attention. LED are more durable and also conserve power for the same light intensity. Neon had high voltage with protected, ground-fault, circuits. High Intensity Discharge (HID) lighting is now being replaced by LEDs. The weak link in the use of induction arc lights is the mechanism that excites the gas. LED uses 1/3 less power for the same light.

Electronic message centers. The major producers of video signs are located in Danville, IL (Watchfire) and Brookings, SD (Dactronics). Old style information lighting used 30 Watt bulbs with 5 inch spacing. Some used smaller bulbs at 3 inch spacing. LED message centers are spaced at 19 mm (3/4 inch) and 12 mm (1/2 inch) spacings that look like your TV screen from a distance. The newest sign at Carver Hawkeye Arena had 4 mm (3/16 inch) spacing in its interior signage.

Improvements in Construction Equipment. Lift buckets to bring the installer to the mounting on the support poles now provide 140 feet reach. These are needed for large signs along the interstate highways.

More information can be found at http://www.naglesigns.com.

Dr. Nagle concluded with a request for volunteers at the LEGO League on November 12, 8:00 am to 2:00 pm at Hawkeye Community College. Members will receive an email with more details.

Next Meeting. Our November 9, 2016 meeting features Mr. Steven Crouse, explaining recent improvements and expansion of test facilities at John Deere PEC.

Meeting adjourned at 9:15 pm.

Respectfully submitted,

James R. Stevenson, Vice President and Secretary