ASM - Atlanta

Newsletter of the Atlanta Chapter of ASM International
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The Atlanta Chapter of ASM
***Tuesday* Evening, March 20, 2001**

PROGRAM

Tour of the Wm. L. Bonnell Aluminum Extrusion Plant in Newnan, GA

The Atlanta Chapter of ASM is again offering an opportunity to visit another materials related plant within the Atlanta area for both members and friends to learn about these industries. You will see aluminum casting, large extrusion presses and anodizing processes in operation – all explained by the skilled personnel of the Newnan Bonnell facilities.

Bonnell produces aluminum extrusions (mostly 6000 series alloys) for residential and commercial construction, auto after-market, transportation, electrical distribution and consumer durable markets. The Newnan Plant has 12 acres under roof and employs approximately 700 people. The plant produces between 1.0 and 1.3 million pounds of finished extrusions per week. Production operations include secondary casting, six extrusion presses, 2 anodizing lines and a vertical wet paint line. Two capital projects totaling 19 million dollars have been implemented over the last 4 years in the extrusion department to automate existing extrusion presses.
The Wm. L. Bonnell Company is a subsidiary of Tredegar Industries located in Richmond Va. (NYSE: TG).

The tour will begin at 6 PM and will be completed by 7:15 or 7:30 PM. We will then go to the Cracker Barrel restaurant, at 527 Bullsboro Dr. (Hwy 34) in Newnan, for dinner. Dress Casual for the plant tour.

Car Pooling from Georgia Tech: Those who desire to car pool should come to GA Tech no later than 4:30pm. We will assemble in front of the Baker Building, 925 Dalney Street. At that time we will decide how many cars are necessary to transport the group down to Newnan. Parking will be free after 4:30pm. We leave from GA Tech no later than 4:45 PM. It takes 45 minutes to 1hr, depending upon traffic, to reach Newnan from GA Tech. Concerning the car pooling and specifics of the tour, contact **Gautam Patel** at 404-894-3460 (gautam.patel@gtri.gatech.edu) or Dr. Thadhani at 404-894-2651.

Directions to the Wm. L. Bonnell plant:

- From Atlanta take **I-85 South** to **exit 47** (Rt. 34)
- Turn right onto **Rt. 34 West**.
- Go 1/2 miles to 2nd traffic light (KFC on right) and turn right onto Farmer Industrial Blvd (Rt. 34 bypass).

- Go to the 4th traffic light and turn left onto Hwy. 16/ Alt. 27 South.
- Go to 2nd traffic light and turn right onto Bonnell Street.
- Cross the railroad tracks and check in at Security on the right.

Reservations: RSVP to Marlene White, Tel: (404) 894-2850, Fax: (404) 294-9140, marlene.white@mse.gatech.ed

ASM Materials Camp Application Deadline Extended to March 20, 2001

Materials Week West opened to Atlanta Chapter candidates due to early school starts

by Kim Spinsby

You read in last month's ASM-Atlanta that the Chapter invites all members for assistance in identifying as candidates, junior or senior high school students, who are interested in attending the Materials Science Camp, from **13-19 August, 2001**, held at ASM's new $3 million Training Center in Materials Park, OH. ASM International HQ extended their deadline so that the **Atlanta Chapter can now accept applications until March 20**.

Recognizing many GA applicants could not attend due to early school starts, ASM International Foundation opened Materials Camp West, at the University of WA, Seattle**, July 30th - August 5, 2001** to GA applicants as an alternative. Please contact me, should you have any questions or need more information about the Materials Camp, or need an application form (see page 7 of the February issue of ASM-Atlanta). A chapter committee will then review all applications and submit their nominee to ASM International. **Time is short!**

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Atlanta ASM Chairman's Message

by John L. Mihelich

Your Atlanta Chapter Executive Committee approved a $1000 donation to support the Atlanta regional, hands-on, science museum, SciTrek, in its time of dire need. With matching funds of 25% coming from a local Foundation, this money will go toward keeping SciTrek doors open to students and continue to bring the message that science and technology can be interesting and challenging to the youngsters in our community.

We have done it again! Our Georgia Industry Night on 20 February drew upwards of 32 attendees many of who were students. We all learned more about materials oriented activities from our presenters representing Southwire, Consolidated Engineering, Chromalloy Georgia and Siemens.

In March, we have a tour to an aluminum extrusion facility, Bonnell in Newnan. So be prepared for another interesting and educational event.

The April meeting will have Dr. Subi Dinda of DaimlerChrysler here to talk to us about his views of materials trends in the automotive industry and update us on what is happening at ASM National. Subi is a trustee of ASM and a long time, active member of the Detroit Chapter. Come and hear his comments on what's happening in a major materials consuming industry and have the opportunity to network with your peers on the local scene.

ASM is becoming a "web-centric" organization, that is, going more to providing contact and information through the Internet. For example, you can review and update your contact information and profile by going to the web site, http://www.asminternational.org and selecting the Members Only area. (Those without Internet access can call 800 336 5152 and ask for Membership Services.) The ASM web site also offers access to reference literature including articles from recent AM&P issues. You can get contact details for other ASM members that can be most helpful to your networking for information useful in your work. Plans are to continue to offer, through the Internet, more information of value to ASM members.

Please remember that we want to keep our meeting attendance up to a level of 30 or more on a consistent basis. The Georgia Industry Night, our Lucent tour and our Holiday Bash all met this challenge. Many of us have found that our meetings and tours offer an excellent opportunity to network with peers in the materials field. Great way to stay on top of what is happening in your field and on the local scene. Why not bring a colleague along too, to share in the experience of ASM Atlanta!

Atlanta Chapter Sustaining Memberships

The Atlanta Chapter of ASM is strongly encouraging companies and other organizations having materials related interests to sign up with the Chapter's Sustaining Membership program. Contact **Subu Shanmugham** MicroCoating Technologies, 5315 Peachtree Industrial Blvd., Chamblee, GA 30341 678-287-2417V; subu@microcoating.com

ASM Trustee Visit

April 17, 2001

Dr. Subi Dinda, of Daimler Chrysler and an ASM International Trustee, will visit the Atlanta and GT Student Chapters on April 17. He will make a presentation at the regular chapter meeting on that evening entitled: "**Material Challenges – 21st Century"**

Dr. Subi Dinda is senior manager of Advanced Manufacturing Technology Development in the Liberty and Technical Affairs Department of Vehicle Engineering, Daimler Chrysler Corporation. He is responsible for the major advanced materials and manufacturing process development programs for the corporation. He is the current chairman of the corporate Aluminum Tech Club.

White Iron Technology and Applications

by Harry H. Tian

Manager, Metallurgical R&D
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5000 Wrightsboro Road, Grovetown, GA 30813

Editor's Note: Dr. Harry Tian is a member of the Atlanta Chapter of ASM who lives in the Augusta area. We enjoy seeing him when he is able to attend the Chapter meetings in Atlanta. GIW has been a significant native born Georgia company for many decades producing the special iron alloys described in this article.

White iron is normally referred to a cast iron that is essentially free of graphite, and most of its carbon content is present in the form of hard carbides. White iron exhibits a white, crystalline fracture surface because fracture occurs along the iron carbide platelets. Although the history of white iron goes back many centuries, the true development of high alloy white iron as science and technology did not start until about 100 years ago. For example, the high-chromium white irons and the nickel-chromium white irons were introduced in the 1910s and 1920s respectively.

Due to poor mechanical properties and limited hardenability, unalloyed and even low-alloy white irons (containing less than 4% alloy elements) are seldom used today. The high-alloy white irons can be classified into chromium-nickel or NiHard (with 2-11%Cr and 4-7%Ni), chromium-molybdenum (11-23%Cr and up to 3%Mo), high-chromium (23-30%Cr) and specialty white irons. The first three groups of high-alloy white irons are covered by ASTM A532/ A532M -93a under Class I, II and III. Specialty white irons are currently non-standard materials that are mostly for special applications such as extreme wear and corrosion-abrasion services.

High-alloy white cast irons are primarily used as wear resistant materials for slurry pump wet-end parts and for other equipment/components in some tough conditions such as mining, crushing, grinding, and handling of abrasive materials. These applications occur in many industries, including mining, dredging, power generating, chemical processing and other industries. Major white iron producers, GIW Industries for instance, make a broad variety of high-alloy white irons and castings. GIW (Georgia Iron Works), a KSB America company, is a leading slurry pump designer and manufacturer. Founded in 1891 in Augusta, Georgia, GIW has been producing slurry pumps and white iron castings for more than eight decades. GIW makes a wide range of slurry pump parts and white iron castings, some of which are very large (e.g. a pump with an impeller exceeding 110" in diameter and a casting with more than 20 tons in pour weight).

All white cast irons have one thing in common, carbides in their microstructure. Depending on chemistry, solidification, heat treating and cooling conditions, the microstructure of a high-alloy white iron may contain different types and a different amount of carbides such as $M(Fe,Cr,...)_3C$, M_7C_3 and/or $M_{23}C_6$. These carbides are very hard (1200-1600HV), which makes white irons rather wear resistant. The matrix in microstructure of white irons can also vary, to a large extent, with the above mentioned conditions. For maximum wear resistance, martensitic matrix is preferred. Sometimes, other type of matrices, such as martensitic-austenitic, fully austenitic, fully ferritic or ferritic-austenitic matrix, may be required to achieve higher strength, toughness or corrosion resistance. Therefore, a white iron may have a hardness of 400-1000HV.

With the development of casting technology, better materials and equipment have become available for white iron production. Electric melting furnaces, such as induction furnaces, are widely used for better control in chemistry and temperature. Furnace and/or ladle treatment is normally applied to refine microstructure of white irons. For optimal wear and other properties, white iron castings are regularly treated at a high or cryogenic temperature. Due to a relatively high cracking tendency, white iron castings often require special procedures during manufacturing and handling.

Typically containing 25-35 (volume) % carbides, high-alloy white irons have excellent wear resistance, good strength and moderate corrosion toughness. Some specialty white irons have been developed to handle severe conditions. For example, through special refining and adjustment of microstructure, an ultra-high tensile strength at 110-150 KSI can be achieved in white irons for high pressure/impact wear services. On the other hand, the carbide volume fraction of a white iron can be increased to 40-70% for extreme wear applications. For severe corrosion-wear conditions, super-alloy ("stainless") white irons are also available. With comparable corrosion property and much higher wear resistance, super-alloy

white irons outperform stainless steels by 300% or more in many corrosion-wear services such as phosphoric acid processing. Since wear and corrosion are two of the most common problems encountered in industries and everyday life, the existing and future high-alloy white irons will continue to play an important role in many applications.

"Living In a Material World"
$500 Grants for K-12 Teachers

A new program has been announced by the ASM International Foundation, "Living in A Material World" Program. Beginning in 2001, the ASM International Foundation is sponsoring 10 awards at $500.00 each for those science teachers chosen from the participants.

The ASM International Foundation's mission is to excite young people worldwide in materials careers. Members of the affiliated professional society, ASM International (www.asminternational.org), visit schools and frequently observe that students are fascinated by materials but rarely have an opportunity to learn anything about them. To help teachers bring the "real world" of materials science into the classroom, the ASM International Foundation is awarding 10 grants of $500 each to teachers, K-12.

Proposals may be submitted electronically by May 25 of each year to jdeather@asminternational.org, or by mail to: ASM International Foundation, Attn: "Living In a Material World" Program, Materials Park, OH 44073-0002. Be sure to include appropriate school name and address, teacher's name, grade(s) taught, and the school telephone number. Awards will be made in August.

Scholarships Available
ASM International Foundation

A. **Undergraduate Scholarships**
1) George A. Roberts Scholarships 10 awards at $6,000 each
2) William P. Woodside Founder's Scholarship - 1 year full tuition of up to $10,000
3) Nicholas J. Grant Scholarship -- 1 year full tuition
4) Outstanding Scholars -- 3 awards at $2,000 each
5) Foundation Scholarships -- 12 awards at $1,000 each

B. **Technical and Community College Scholarships** -- 10 awards at $500 each

Available to student members who are attending technical or community colleges, & are training to be technicians in various engineering fields. **NOTE**: **These awards may be offered/awarded to students from traditional schools (i.e., universities), if the number of applications received under this category is not sufficient.**

DEADLINE for Application: 1 May

For more information and to get a copy of an application form, please visit the ASM Foundation website at: www.asminternational.org/foundation. Click on "Undergraduate Scholarships".
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Nominations for ASM-Atlanta Chapter Officers

The election of all Chapter officers and Standing Committee Chairs to the Executive Committee will take place during the May meeting of the Chapter.

Please make your suggestions for next year's Chapter officers and standing committee chairs to the Nominating Committee Chairman, **Prof. Naresh Thadhani**. Or, if more convenient, give your suggestions to one of the other two members of the nominating committee, **Jim Hubbard** and **Bill Livesay**. The back page of this Newsletter gives you several ways to reach each of these people. The strength and usefulness of your chapter is strongly affected by the leadership that you elect. If you have good ideas for a better chapter, put these ideas into action by suggesting for an office either yourself or others who will work & lead.

Chapter Bylaws Review

The bylaws, or "Rules", of the Atlanta chapter have been under review by the Executive Committee. This effort has resulted in a number of suggestions for modifications that should make our bylaws more relevant to the current, and future, work of the Chapter. The procedures for adoption of such changes are:
Section 2 – ***Adoption:*** *Amendments to these Rules may be adopted by a two-thirds affirmative vote of the total membership of the Executive Committee, at a regular or special meeting of the Executive Committee, or by letter ballot, provided that the proposed changes shall have been announced at a prior Atlanta Chapter meeting and that notice of the vote on the amendment shall have been given at least six (6) days in advance of the Executive Committee meeting at which action is to be taken or of the date fixed for return of the letter ballots.* Finally, approval is required by ASM HQ & distribution of the new bylaws to the Chapter membership.

The changes to our current bylaws are primarily directed towards being specific on a number of points. For example, each member of the Executive Committee will have specific responsibility for conducting defined tasks for the chapter. Also, there will be three Chapter Vice-Chairs (1. Programs, 2. Industry Relations & 3. Academic Affairs). A brief description of the duties of each officer and standing committee chair has been written for inclusion in the new bylaws. In addition, as recommended by ASM-International HQ, a newly elected Executive Committee will assume responsibilities of the Chapter on June 1, which is as soon as is practical following the May elections.

At the February meeting, Chapter Chair, Dr. John Mihelich announced that the bylaws were being revised and it was intended to present these changes at the March meeting – which turns out to be a tour. In any case, the

change announcements can be made (or repeated) at the April meeting. It is planned to have all of the approvals completed in time for the new chapter leadership.

The Southwire High Temperature Superconducting Power Delivery System

by David Lindsay

Development Engineer
Southwire Company
Carrollton, GA

Editor's Note: David Lindsay described Southwire's HTS at the February Chapter meeting and later agreed to share his topic with the entire membership by contributing a brief article for this issue of ASM-Atlanta.

Southwire Company has designed, built, installed, tested and is operating the first real-world application of a high-temperature superconducting (HTS) power delivery system at its headquarters in Carrollton, GA. The cable is powering three Southwire manufacturing plants, marking the first time a company has successfully made the difficult transition from laboratory to practical field application of an HTS cable. These cables are exposed to line faults, lightning strikes, power failures and other anomalies that cannot be simulated in a laboratory environment. The cables are rated at 12.4-kV, 1250-A, 60 Hz and are cooled with pressurized liquid nitrogen (LN_2) at temperatures from 70-80 K and pressures up to 10 bars. Project elements included design and proof testing of the cable geometry, dielectric material, manufacturing equipment to build cables, and terminations. This project was done in partnership with the Oak Ridge National Lab (ORNL), sponsored by the US Department of Energy's Superconductivity Partnership Initiative. This was a three-year project begun in 1997. The cables were energized on January 6, 2000 for on-line testing and operation and, by the end of February 2001, had provided 100% of the customer load for more than 6,200 hours.

Design of the cables began with 1-m hand-made cables to learn cable properties and to optimize the design for low AC losses. Fourteen hand-made cables were produced, followed by two 5-m prototypes. The 5-m cables were manufactured with the same geometry and on the same equipment to be used for making the final 30-m cables. The prototype cables and terminations were tested extensively at ORNL for voltage and current integrity. Mechanical bending tests were also performed. The cable design used is a cryogenic dielectric design with two coaxial layers of HTS tapes. The inner layer serves as the phase conductor while the outer layer is the neutral conductor. This results in a fully shielded cable with zero EMF. A proprietary dielectric material called Cryoflex™, which must operate at LN_2 temperature and elevated system pressures, separates the HTS tapes.

After the testing of the prototypes was completed, three 30-m cables were built and installed at Southwire headquarters in Carrollton, GA. Six terminations were assembled on-site while the cryogenics system was installed and commissioned. Installation and commission testing was performed between September and December 2000. When the cables were first energized on Jan. 6, 2000, using line voltage and current, the goal of having the first operational HTS power delivery system by the beginning of 2000 was met. The project was completed on time and under budget.

Editor's Note: A Photograph of the Southwire High Temperature Superconductor power transmission lines and cryogenic facilities has been removed from this version of ASM-Atlanta due to the digital size (1.3 MB) of the photograph. Contact the editor at b.livesay@gtri.gatech.edu (during this week) if you wish to receive the photo via email – and if you don't mind a 1.3 MB file coming into your computer. The photo is printed in B&W for the normal mailing of the newsletter.

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