

## **2006-2668: THE METAL HOUR: WE DON'T JUST PLAY HEAVY METAL MUSIC - WE ALSO TALK ABOUT METALLURGY**

### **Patrick Ferro, Rose-Hulman Institute of Technology**

Patrick Ferro is an Assistant Professor of Mechanical Engineering at Rose-Hulman Institute of Technology. He earned his PhD in Metallurgical and Materials Engineering from the Colorado School of Mines in 1994. He has worked as a Process Engineer in the investment casting, silicon wafer manufacturing and alternative energy industries.

# **The Metal Hour: We Don't Just Play Heavy Metal Music-- We Also Talk About Metallurgy**

## **Abstract**

A weekly radio program is broadcast from a campus studio with the purposes of providing materials engineering instruction and entertainment to the local community. Faculty and students that organize and create each weekly show are students and fans of both materials topics and music. The format of the show includes music that ranges up to the extreme metal genre. Discussions are held between blocks of songs, and include a variety of topics. Past discussion topics include the environment, manufacturing, atomic level processes in materials and extraterrestrial visitors. A project exercise in a Materials Engineering course allows students to create a music CD that incorporates a discussion of a materials related topic. Learning evaluation criteria are being developed.

## **Background**

The Metal Hour concept was originated in 2000 at Washington State University-Vancouver. The campus radio station, CougarRF was new and under development. Several Metal Hour broadcast attempts were made during 2000 and 2001, but were never aired due to lack of a transmitter.

The Metal Hour restarted in September 2005 at Rose-Hulman Institute of Technology. The show is broadcast once a week during a regular time slot and can be heard on the radio at FM 90.7 in the Terre Haute listening area. The show can also be heard on the internet at [www.wmhdradio.org](http://www.wmhdradio.org). The radio station at Rose-Hulman Institute of Technology, FM 90.7 'The Monkey', has a wide and regular audience, and strong campus support.

The objective of the Metal Hour is to develop interest in Metallurgy and Materials. The show includes materials-related topics in a musical entertainment format, and exposes large numbers of radio and internet listeners to different aspects of materials. The show is also a good vehicle for introducing different materials topics to engineering students in an entertaining manner.

## **Format and Features**

The format of the Metal Hour is music, followed by discussions about materials-related topics. There is generally no link between the music that is played and the discussions that follow. The first fifteen minutes of a given show are spent playing two or three tracks from recognizable bands. After the last track in the initial set, a short discussion about a featured topic is presented. Typical featured topics include strengthening of metals, welding, failure, aircraft, the environment, etc. The initial discussion lasts approximately five minutes, and serves as a general introduction. The featured topic will be discussed approximately two more times during a given show.

The next block of songs may go longer than the initial block, and generally stops at the top or bottom of the hour. Station protocol requires public service announcements (PSAs), weather reports and station identification at the top and/or bottom of each hour according to a set schedule. Sometimes a caller will request information about a certain topic, and often the top or bottom of the hour is a good time to answer the request and to also make a general solicitation to all listeners for additional requests.

### **Incorporation of the Metal Hour in a Materials Engineering Course**

Mechanical Engineering students at Rose-Hulman Institute of Technology are required to take an introductory Materials Engineering course. Most students take the course during their sophomore or junior years. Course grading is based on quizzes (54% of the course grade), a final exam (30%) and completion of a project (16%). The project grade component is based on a poster or website that student teams complete. The poster and/or website must address a materials-selection problem. Student teams that create each poster or website must evaluate other posters or websites. Also, student teams must submit a list of their resources and references used in creation of the poster and indicate the relative value of each cited source.

In Winter Quarter 2005-06, students in the Materials Engineering (ME328) course were given the option of creating a Metal Hour-style CD (aka 'podcast') in lieu of a poster or website project. CDs that student teams created were required to include a minimum of 45 minutes of content, of which at least ten minutes must be students conversing about a materials topic. The students were asked to select a materials topic that they are interested in, and spend approximately three hours researching the topic. The students were asked to make sure that the spoken discussion includes the results of the research and be delivered in an informative and entertaining tone. Personal opinions and judgments were encouraged. Students could do the CD podcast as an individual or as part of a two- or three-person team.

Podcast participants were also asked to create a short list of topics that they discussed and a playlist of their musical selections. The topic list could be bulleted, and not necessarily in complete sentence format.

### **Feedback**

All project participants (poster, website, podcast) were asked to participate in an anonymous poll. The poll asked the students how much time was spent on the project, and how effective they felt the project was in contributing to their personal learning.

Participation in the podcast project required listening to another team's podcast and critiquing it. Podcast project participants were given a short questionnaire to complete. Podcast participants were asked what they learned as a result of participating in the project, and what new questions they had as a result of listening..

The podcasts were uploaded to a common directory, and all students in the course were encouraged to listen and give feedback. Thirty two students provided podcast feedback, including some poster and website participants.

Website participants were required to view the other websites and complete an evaluation form. All students in the course were encouraged to view the websites and complete the same evaluation form. Eighteen website evaluation forms were received. Website participants were also required to complete a short questionnaire, which asked why they selected the website as a project option.

## **Results**

There were fifty six students enrolled in two sections of ME328. Twenty five selected the podcast, seventeen selected the poster and fifteen selected the Website option for their course project.

The results of an anonymous poll show that most students recommend keeping the Podcast as an available project option. For all project participants, forty four out of fifty two thought that the project was a good use of time from a learning perspective. The typical amount of time spent on the project was between three to six hours. The results of the anonymous poll are summarized in Table 1.

Table 1. Anonymous Poll Results for ME328 students

Poll question			
Since the podcast project is new, do you think it should be kept, changed or dropped from next year's project option list?	47 replied 'keep it'	4 replied 'change it'	1 replied 'drop it'
Was the project (Podcast, Poster, Website) a good use of your time, from a learning perspective?	44 replied 'yes'	8 replied 'no'	
Approximately how much time did you spend on the project?	6 replied '< 3 hrs'	25 replied '3 to 6 hrs'	21 replied '> 6 hrs'

Podcast participants, in general, gave feedback that they thought the podcast was more fun and entertaining than the other project options. Most of the participants appeared to enjoy public speaking and oral presentations. Some of the podcast participants indicated that they enjoyed listening to music and were grateful for the new project option.

The course evaluations from ME328 were generally positive. Many students expressed their appreciation for the podcast project, and none gave any negative feedback. Some students indicated that they thought that the project idea, in general, could be improved or made to count less toward their course grade.

Website participants were asked 'Why did you select the website and not the poster or podcast?'. Many website participants selected this option because they could work on the project at any convenient time that they chose, and not just when the other group members were present. Also, many website participants indicated that they did not enjoy public speaking and/or did not know how to create and work with audio files. Some students replied that they enjoyed creating websites.

### **Proposed Evaluation Criteria for the Metal Hour**

The Metal Hour concept strives to be effective at communicating materials-related topics to large and diverse audiences. The Metal Hour concept also appears to be useful as a template for project work in a Materials Engineering course. Success of the Metal Hour concept in each of the two areas may be determined by generating evaluation criteria. The proposed evaluation criteria should measure improvement in each of the two areas.

Evaluating the improvement in the Metal Hour can be done with at least the following suggested evaluation criteria:

#### **1. Call-in (and email-in) requests during broadcast**

One way to judge the relative success of the Metal Hour is by monitoring the number of listeners. One quantitative measure is the number of call-in and email-in requests. Evaluation criteria based on this may include: Are requests increasing or decreasing? Are the requests musical or technical topic in nature? Do listeners want the ratio of music:technical topic changed?

#### **2. Application to grant agencies and exposure**

The author has written two proposals for Metal Hour sponsorship. One method for judging the relative merit of the Metal Hour may be how it is perceived by peers and by grant approving agencies. Evaluation criteria may include: Are grants for equipment (e.g. iPods, music, technical website access) approved or denied? Is exposure in the media increasing? Are applications to engineering education conferences, based on Metal Hour research, approved or denied?

#### **3 Student course evaluations and questionnaires**

Students have several ways to indicate their opinion about the Metal Hour, including questionnaires, anonymous polls and course evaluations. Evaluation of the Metal Hour, based on student feedback, may include: Do students like the idea of the Metal Hour? Do they think it helps them learn?

#### **4. Faculty discussions**

Faculty will usually provide feedback one way or the other about a new idea in education. Evaluation based on faculty opinions may include: Do other faculty think that the Metal Hour is

a good use of students' and faculty time? Does the Metal Hour reflect well on the institution and on students and faculty associated with it?

### **Summary**

The Metal Hour has recently been started as an initiative for stimulating student interest in Materials, and for communicating materials-related topics to the radio and internet listening audience. A Materials Engineering course at Rose-Hulman Institute of Technology uses the Metal Hour as a project option. Evaluation criteria are being developed and will be used to determine if the Metal Hour is useful and if it is improving.