March 1997

ISSN 1069-2010

THE SHOT PEENER

Spring 1997 ☑
Summer 1997 ☐
Fall 1997 ☐
Winter 1997 ☐

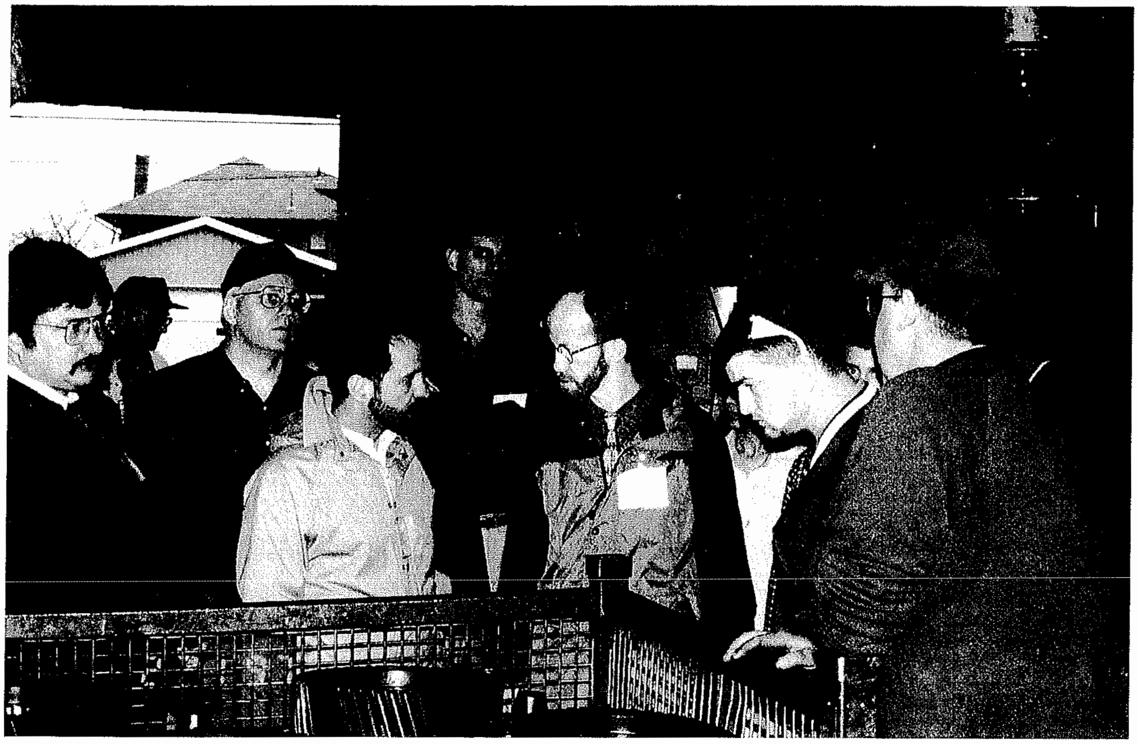
International Newsletter for Shot Peening-Surface Finishing Industry Volume 11, Issue 1

1997072

IN THIS ISSUE:

And much, much more!

Purdue University Students Visit Mishawaka

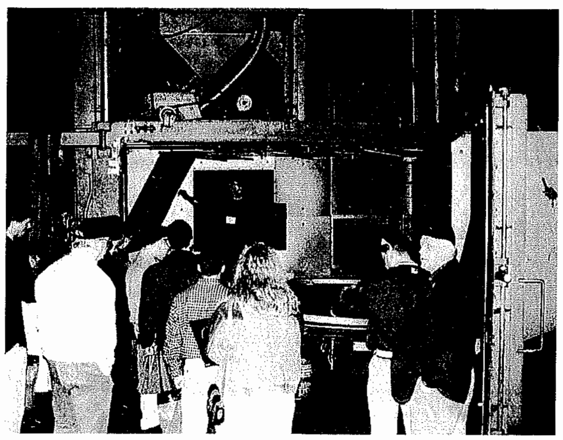


Jack Champaigne, Editor of *The Shot Peener* and alumni of Purdue University in West Lafayette, Indiana, invited students of a Materials Engineering course at Purdue to tour a local shot peening facility.

In the photo above, the students and professors are viewing peened gears at EMI Inc. (Engineered Metal Improvement). EMI is the home of the test stand for the MagnaValve, made by Electronics Inc. in Mishawaka, Indiana.

Jack is part of an effort to establish a shot peening center at Purdue University. Several companies have indicated a willingness to contribute money or equipment and the National Science Foundation may offer matching grants. More information is available at the Shot Peening Universe web site: www. shotpeener.com.

See page 11 for more photos of the students' visit. ❍



Stephen Gillis, of EMI Inc., shows the group the inside of a large peening cabinet.

goal of shot peening is increased fatigue life at low cost. No matter how effective peening may be in increasing fatigue life, it will not be generally accepted unless the cost of the operation is sufficiently low that it will more than pay its own way.

I am more confident now than I ever was that peening can far more than pay its own way, provided the requirements of low cost are recognized. To my knowledge, the largest single factor controlling the ultimate costs of peening is uniformity of the intensity of the blast.

In the analysis of what constitutes the intensity of the blast, there are three major elements involved:

1. Velocity of the shot. This does not represent a serious problem from the standpoint of uniformity. It is unlikely that in a peening operation the shot velocity, in a given blast, would be subject to much more that 10% variation.
2. Hardness of the shot. Uniformity in this case is not a serious problem. If the shot is harder than the work, then any variation in shot hardness would have no more than a slight influence, if any, on the results; if the elastic limit is not exceeded in peening, it makes little difference how nearly the elastic limit is approached.
3. Size and weight of the individual particle. Uniformity in this case, appears to be the greatest problem of the three. Actually, the present specifications for peening shot allow a variation in size of almost 20%. This does not include the allowance for oversized and undersized shot relative to the nominal size.

For equivalent fatigue life, peening with whole shot of uniform size is unquestionably more economical than peening with shot having a wide range of size. As mentioned, this is not always easy to demonstrate without comprehensive fatigue testing, but in cases where such tests can be made, the result is always the same.

To stabilize a peening machine, (to obtain a high percentage of whole shot in continuous operation), it is necessary to remove the broken shot continuously. If, in replacing the broken shot, the new shot which is added has a wide range of size, then in removing broken shot, the smaller size of the new shot will be removed from the machine without actually having been used in the peening operation.

Approaching the problem from another standpoint, assume that a shot is broken in half. The weight of each broken particle will then be half of that of the original pellet. This half would be equivalent in weight to a whole pellet whose diameter is the cube root of .5, or approximately 80% of the diameter of the original pellet. Therefore, it allows that whole shot, whose diameter is less than 80% of that of the large pellets, would be equivalent to broken shot and, would be of no value relative to the large size.

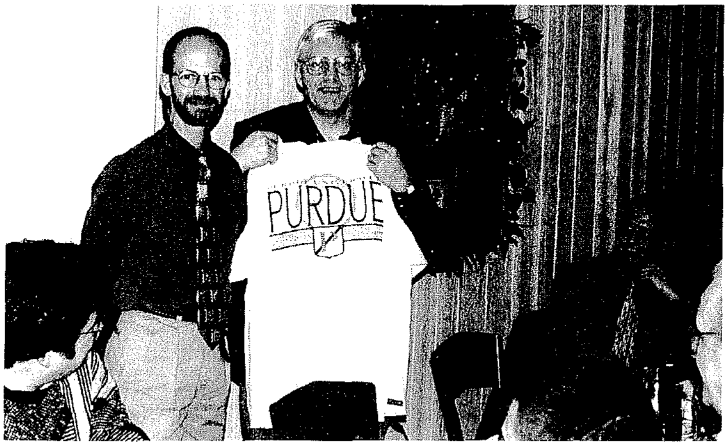
On this basis, it appears that for peening, the range of shot size should be as close as practical to a range of from 100% to 80%. It is interesting to note that this tolerance is quite close to the present SAE specifications for peening shot.

I do want to make myself clear that the above considerations are based on the assumption that the peening machine is to be operated in a stabilized condition. If this is not the case, then any attempt to restrict the shot size would be obviously to no avail. But as time goes on it becomes more and more apparent that broken shot in a peening machine will be tolerated less and less because of its uselessness relative to the whole shot. In all of the fatigue tests which we have run, as well as the results of other tests which have been reported in the literature, we have found not evidence of any conflict whatsoever that uniformity of the blast is of utmost importance.

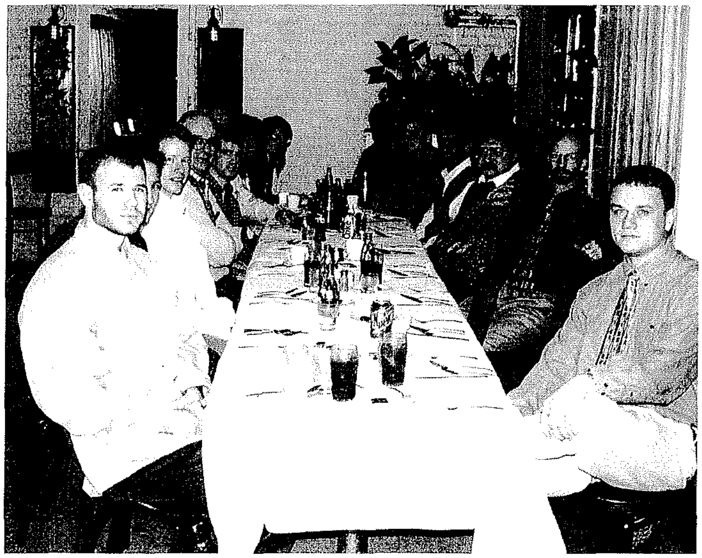
Since uniformity of shot size appears to be such a vital factor in blast uniformity, I believe that every effort should be made to obtain peening shot with the minimum practicable variation in size. ❍

Figure 1 is on page 12

Purdue Students Visit *continued*



Jack Champaigne receives a t-shirt from Professor Mike Magill. The other visiting professors were Mark Pagano and Craig Evers. The students were Leon Bogucki, Michelle Bowman, Scott Carlberg, Elizabeth Clever, James Kanter, Chad Mark, Lucas Reader, Alexander Socha, and Barry Vanderhoek.



Students never pass up a meal and they enjoyed a feast at an Italian restaurant.