SHOT PEENING RESEARCH

Continued

stresses in the sample, and that these effects are not completely reversible (i.e., when the hydrogen is removed a fraction of the reduction in stress remains). Therefore, peened parts being placed in hydrogen containing environments may suffer a degradation in their compressive stresses imposed from peening. Further work by researchers in Purdue's Center for Surface Engineering and Enhancement will continue to explore the interaction between hydrogen environments and peened materials.

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REFERENCES

- A. Dreano, M. Alnajjar, F. Salvatore, J. Rech, C. Bosch, K. Wolski, G. Kermouche, and F. Christien, "Effect of ballburnishing on hydrogen-assisted cracking of a martensitic stainless steel," Int J Hydrogen Energy, vol. 47, pp. 39654– 39665, 2022, doi: 10.1016/j.ijhydene.2022.09.110.
- 2. Y. Wang, X. Wu, and W. Wu, "Effect of α martensite content induced by tensile plastic prestrain on hydrogen transport and hydrogen embrittlement of 304L austenitic stainless steel," Metals, vol. 8, pp. 1–23, 2018, doi: 10.3390/ met8090660.
- 3. X. Li, J. Zhang, Y. Wang, M. Ma, S. Shen, and X. Song, "The dual role of shot peening in hydrogen-assisted cracking of PSB1080 high strength steel," Mater Des, vol. 110, pp. 602–615, 2016, doi: 10.1016/j.matdes.2016.07.121.
- 4. K. Makoto, U. Wataru, and Y. Satoshi, "Improved hydrogen embrittlement resistance of steel by shot peening and subsequent low-temperature annealing," ISIJ International, vol. 61, pp. 1159–1169, 2021, doi: 10.2355/isijinternational. ISIJINT-2020-463.
- 5. H. K. Birnbaum and P. Sofronis, "Hydrogen-enhanced localized plasticity-a mechanism for hydrogen-related fracture." Materials Science and Engineering, vol. 176, pp. 191–202, 1994.

Jack Champaigne Receives the Purdue College of Engineering 2025 Distinguished Engineering Alumni Award

The Distinguished Engineering Alumni/Alumnae Award for the Purdue College of Engineering is presented to men and women who have distinguished themselves in any field in ways that reflect favorably on Purdue University, the engineering profession, or society in general.



These alumni are engaged in engineering work and their record of accomplishments is indicated by their growth into positions of increasing responsibility.

This award is the highest honor bestowed by the College to its alumni and it recognizes those who have made outstanding contributions within their fields.

To mark this occasion, a celebration is set for Thursday, April 10, 2025, at 6:00 p.m. \bigcirc

