

# Milwaukee Chapter

Since 1919

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## HPDC Alloys that Will Allow the Die Caster to Compete for PM Applications

*Dr. Raymond J. Donahue (Mercury Marine)*

Event Sponsor:

**REXNORD****Date:** Tuesday | November 15, 2016 **\*NOTE: THIRD TUESDAY****Time:** 5:30 - Social | 6:00 - Dinner | 7:00 - Presentation**Location:** Klemmers Banquet Center  
10401 W. Oklahoma Ave., Milwaukee WI**Cost:** **\$30** Members | **\$35** Nonmembers | **\$15** Retirees and Life Members  
**Free** to Students, Members between jobs, Gold sustaining member reps  
and Meeting sponsor (2 attendees)**RSVP by:** Friday | November 11  
Register online at [asm.milwaukee.org](http://asm.milwaukee.org) or contact Jim Schwaegler  
jschwaegler@toolsinc.com | (262) 246.3400, Ext. 217**Technical Chairs:** Dr. Ray Donahue, Mercury Marine (ray.donahue@mercmarine.com)  
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Dr. Ray Donahue is a Senior Fellow at Mercury/Brunswick Corporation, and an ASM Fellow. Dr. Donahue has 60 U.S. and foreign patents and has been recognized by various metallurgical societies (American Foundry Society, Steel Founders of America, and the North American Die Casting Association [NADCA] and the U.S. Department of Energy [as a member of the Industrial Advisory Board created to make the US foundry industry more competitive]).

Dr. Donahue's most prestigious awards are, the John A. Penton Gold Medal in 2005, the highest honor from AFS, and the Herman H. Doehler Award in 2016, the highest honor from NADCA. Dr Donahue is currently chairman of the NADCA R&D Committee and just delivered at the 2016 Die Casting Congress & Tabletop in Columbus four papers and one of those papers was awarded the "Paper of the Year."

Dr. Donahue's talk will illustrate that manganese is the most importance element in any die casting alloy. This is because the manganese level determines the iron level below which primary precipitation of Mn/Fe intermetallics do not precipitate. Using these results, an evaluation of the structural aluminum die casting alloys Silafont-36, Aural 2/3 and the Mercalloy alloys is made for the primary precipitation of intermetallics. This analysis will show that all of these alloys are not equal in their impact resistance for good reasons related to the primary precipitation of intermetallics. This same analysis will be extended to a new class of high performance die casting alloys, free of the primary precipitation of intermetallics, containing 0.4% max Fe, and made from A360, D380, 381, A383 and C384 because the "other each" is unspecified. Two of these new alloys B360-T6 with a UTS of 53 ksi, Yield of 41 ksi, Elongation of 5.8% and Quality Index of 480 MPa, and F380-&6 with a UTS of 61 ksi, Yield of 49 ksi, Elongation of 2.9% and Quality Index of 490 MPa, will be compared with the best permanent mold mechanical properties.