



HARDNESS AND CHARPY IMPACT VALUES IN DIE STEELS



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Article Takeaways:

1. Importance of hardness levels in die longevity
2. Overall consistency delivers a higher quality part

When it comes to steels used in the die cast industry, one of the key factors that die casters are looking for is consistency. Consistency can come in many forms. We can have consistency in quality, pricing, hardness levels, and many more. One of the main consistencies that need to be maintained in order to achieve longer die life is mechanical properties. In particular “Charpy Impact Strength”.

These mechanical properties will determine the life of the die. In large dies as well as dies that require large production runs, die casters will usually change from the old standby “Premium H-13” and look to other materials listed on

the NADCA chart to find a material that will give them the properties required.

The emergence of higher strength materials has given die casters the toughness they have been looking for over the regular H-13 materials. These higher strength steel types generally last longer in hard to cast product lines. One such material that is starting to work its way into the die cast market is DH31-EX which is certified to NADCA spec Grade C. It is an H-11 ESR type material and what separates this type of material from the rest of the Grade “C” types is its higher hardenability. This produces higher charpy’s throughout the die.

As you can see in the charts, both the 2367-Modified and the DH31-EX have similar hardness levels from surface to core. However, when you look at the Charpy Impact Values of both steels, the values on the outside surface of the blocks are quite similar. However, the values in the center of the blocks vary quite a bit. What does this mean to the die caster? It means better heat check resistance from surface to core. It also means less of a chance of gross cracking. Therefore the die makers can move cooling lines closer to the cavity surface. Thus increasing heat removal from the die and faster cooling times for the part.

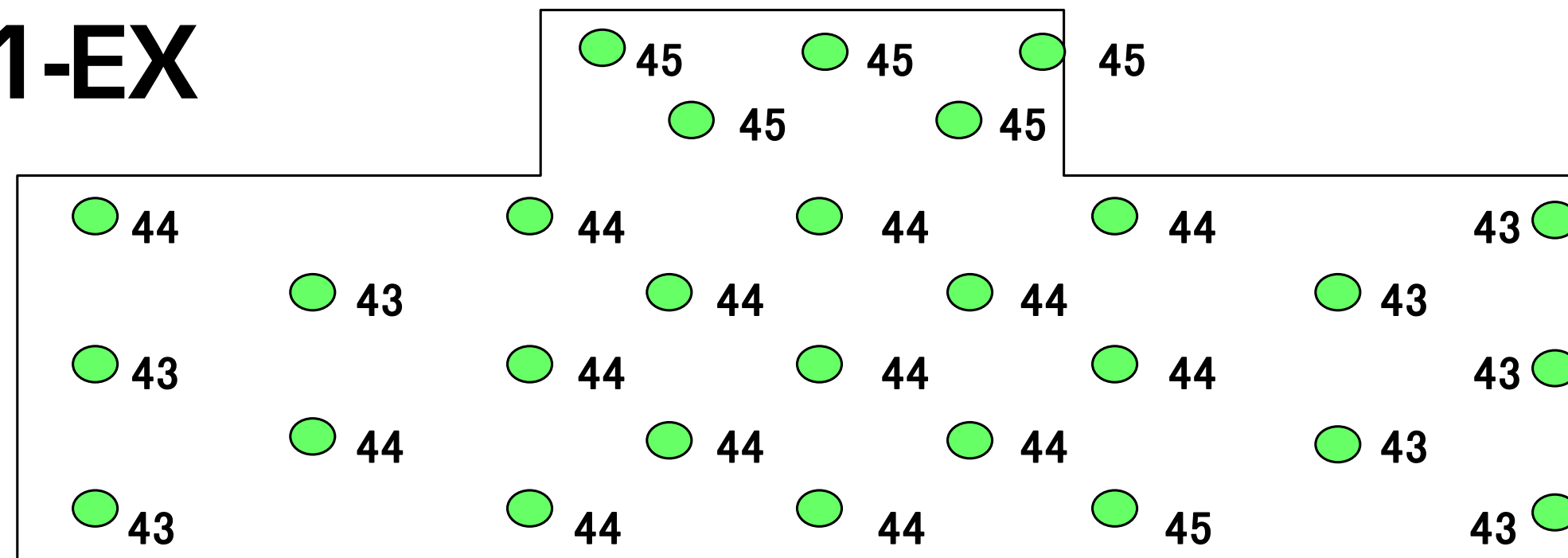
As the charts show, one material has consistencies in both hardness and charpy impact values. The results of this are longer die life and better parts.



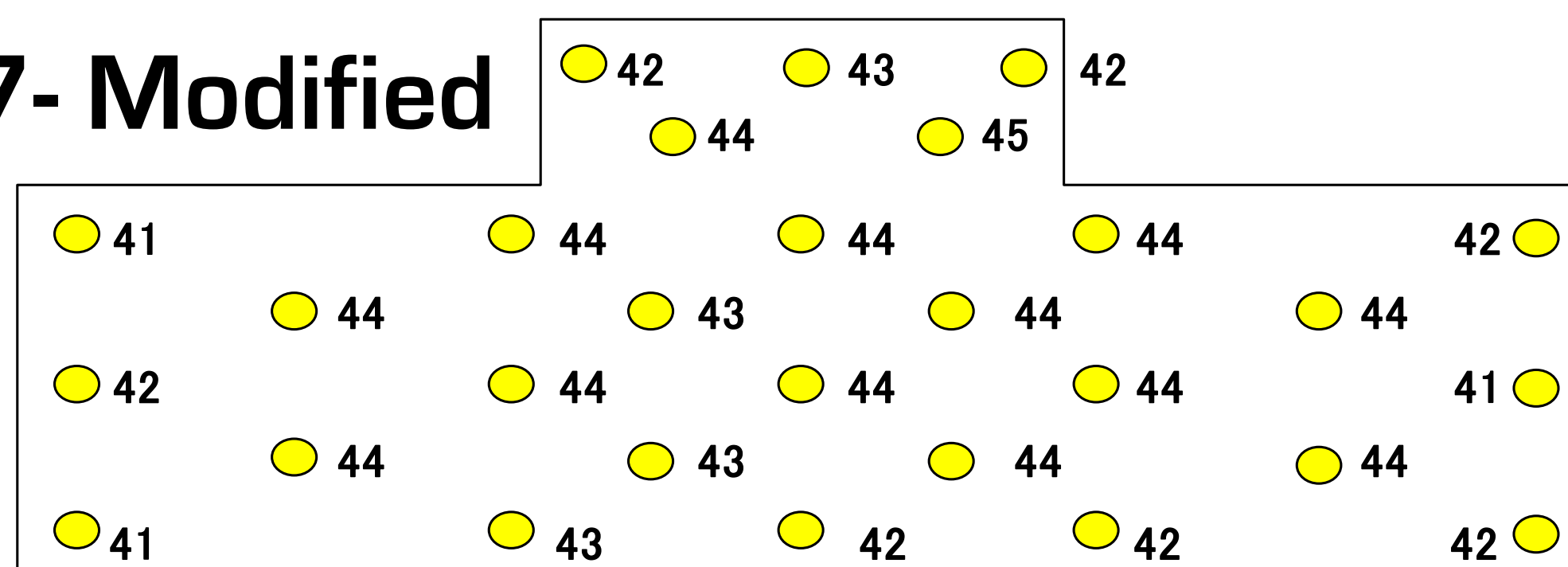
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Hardenability & Charpy Impact Values

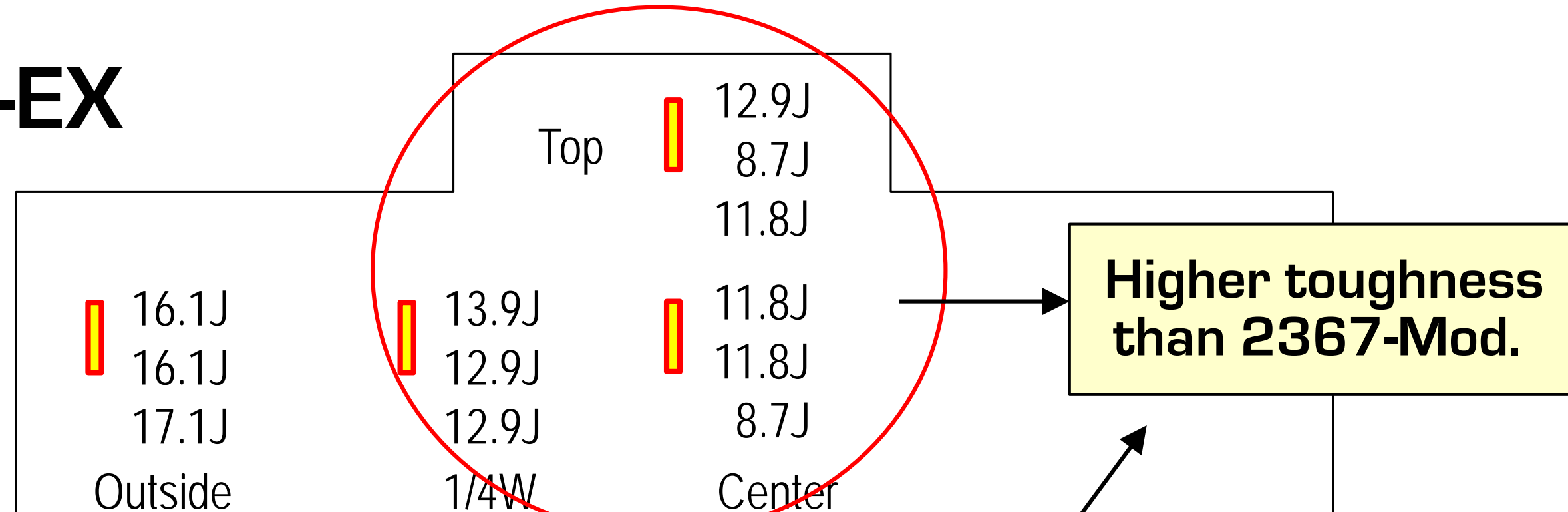
DH31-EX



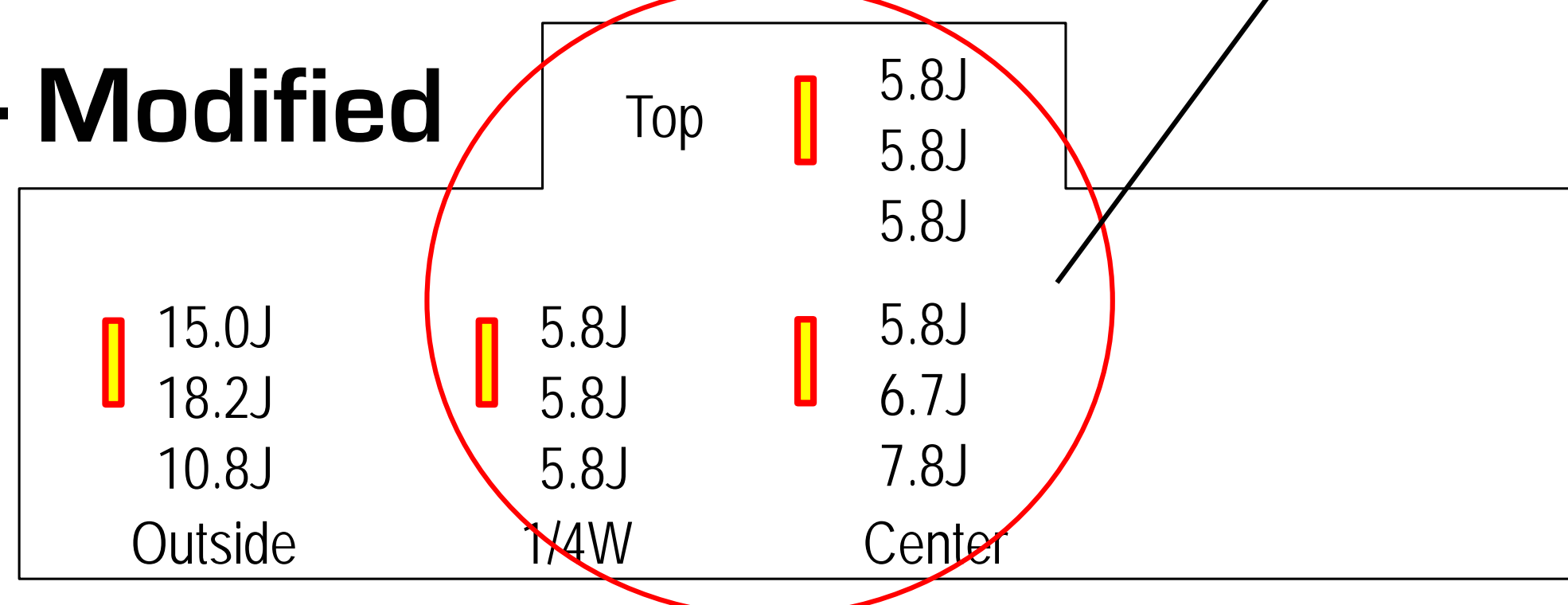
2367- Modified



DH31-EX



2367- Modified



* Have a question? Go to the [Moderated Die Casting Forum](#). All questions are answered quickly!



The Hot Work Line Up from International Mold Steel



Production dies for motor scooter piston made from Toolox 44.



Die Casting of Components Covering the Cutting Blade in a Lawn Mower. Dies were made with Toolox 44.

DHA-WORLD

Improved H13 Modified. Improved hardenability makes DHA-World excellent for large cavities. NADCA 207-11 Grade F.

DH21

Economical high strength hot work die steel with 2% moly.

DH31EX

Our highest strength high moly hot work die steel. Excellent for difficult applications like water jacket inserts. NADCA 207-11 Grade C.

DH2F

Pre-Hardened HRC 37-42, H11 Modified with free machining additives. Outstanding machinability.

DHA-Thermo

High Thermo Conductivity Die Steel supplied in the annealed condition. Heat treat to HRC 48. Excellent for cooled core pins.

Toolox44

Pre-Hardened to HRC 45 High Thermal Conductivity Die Steel. Guaranteed minimum V-Notch Charpy of 14 foot pounds.



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