

Die Life Planning for Die Casting Dies

Die life is a function of the part, the tool construction, the steel, the treatment and the alloy being cast, so the standards answer the question of how many shots with a method rather than a number. The tables below give the two rating scales the method pairs, the measures listed for adding die life with the cost of each, and the heat check grading that decides when an area of the die is spent.

Reference only. This is a reference summary of published sources and it is not a specification of ours, and nothing here is a guaranteed number of shots. The rating scales, the measures and the grading are reproduced from the NADCA product specification standards, which is a copyrighted document published by the North American Die Casting Association, and the grading figure belongs to the company credited in it. Final specification is confirmed on the job.

Why the answer is a plan and not a number

The two rating scales

Part consideration	What the class means	Estimated die life	Shots
Class A	Critical to function and to cosmetics	Class 1	Less than 10,000
Class B	Cosmetic, no function	Class 2	10,000 to 25,000
Class C	Critical to function	Class 3	25,000 to 50,000
Class D	Not critical but functional	Class 4	50,000 to 100,000
Class E	No function	Class 5	More than 100,000

The part consideration classes and the estimated die life classes published in the guideline for increasing die life. They are read together, so a cosmetic area expected to run past a hundred thousand shots and a cosmetic area expected to run for twenty thousand are not planned the same way.

What the plan produces

Seven measures that add die life

Measure	What the source says it costs
Redesign the part to remove or reduce sharp internal corners and features that promote early cracking of the tool steel	No tooling cost, but it is a change to the part design
Use special tool steels in the areas where high wear is expected	Increases tool cost
Insert the areas of the cavity blocks so they can be replaced more economically after wear has occurred	May increase tool cost and brings replacement forward
Shoot blast the surface of the tool steel to help reduce heat checking and cracking	Adds to tool cost, and it leaves a surface texture on the die cast part
Add a vibratory, shot blast or deburring operation to the part	Added part cost
Add a machining operation to remove heat checking or cracking in the areas that are critical on the part	Adds to part cost
Reclaim the surface hardness when it drops from the 40s HRC into the high 30s HRC	Needs a reheat treatment route for the die, and it is stated as an aim rather than a certainty

The measures listed in the guideline for increasing die life, with the cost each one carries as the source states it.

Deciding when an area is spent

Combined heat check rating	What the source says to do
Grading the network cracks, 1 to 10	Compare the die surface against the photographic scale for the small cracks that form a network
Grading the leading cracks, 1 to 10	Compare it against the scale for the larger leading cracks, then add the two gradings
A combined rating of six	The point at which a die making a critical surface, one that is to be polished or chrome plated, might be stopped
A combined rating above 14	The limit given for surfaces that are not seen by the user of the finished product, which can run while the rating climbs toward it

How the published heat check grading is applied, and the two points at which the source says a die might be stopped for a given class of surface. The comparison photographs in the source figure are reproduced there by permission of Uddeholm and are not reproduced here.

Who repairs what

Where to go next

Aobo Steel, tool steel supplier

Aobo Steel supplies tool steel to distributors and mold, tool and die shops, including D2, D3, DC53, A2, O1, H13, H11, H10, H21, S7, M2, M42, L6, P20 and 420 and 440C stainless. Forged or hot rolled, annealed or pre-hardened, cut to your sizes, with test certificates.

Source, NADCA Product Specification Standards for Die Castings, North American Die Casting Association, 2009.

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