WALTER Metals
An ELLWOOD Company

Case Study

MaxDie Hot Work Tool Steel

for Aluminum Extrusion Tooling

Introduction

This case study was performed to determine if a modified hot work tool steel with higher hardness and toughness properties could be cost-effective for aluminum extrusion dies. Walter Metals surveyed several aluminum extrusion tooling shops and received positive responses for an interest in this product. Next, work began on identifying an aluminum extruder that was good and thorough at tracking data for the number of pounds ran across a given extrusion die and had historical data of the product for comparison after the trials were completed.

Project Description

Can MaxDie tools yield more pounds of an aluminum extruded profile than traditional H13 tool steel? MaxDie is a modified H11 type tool steel with higher molybdenum, lower vanadium, and silicon alloy content. MaxDie (a.k.a.Tuf Die) is commonly used in the diecasting and forging industry for its superior properties. The extruder chosen for the trials was Alexandria Industries at their Alexandria, MN facility. Alexandria Industries chose a very tight tolerance, highly cosmetic window framing profile made from 6060 alloy. Alexandria had previously built 143 dies from H13 steel for making this specific profile, and they had accurate historical data for the average pounds produced from the dies.

Evaluation

Our evaluation measured the number of pounds of extrusions produced from the MaxDie trial dies. These were deemed the preferred dies for the production department to get results quickly. The dies were properly maintained and pulled from service for cleaning, polishing, and any additional maintenance in the same manner as the previous 143 H13 dies. The number of pounds of aluminum extruded through the dies was closely monitored and reported to Walter Metals. The die shop that built the trial dies was Total Support Tooling of Florence, AL where Bill Haygood, General Manager, had built many of the previous standard H13 dies. The shop was able to break down any additional costs associated with building the MaxDie trial dies. They were engraved with the profile and die copy number- 11862.144 & 11862.145.

Profile part 11862 from dies #1–143 averaged 78,856 pounds of extruded aluminum window profiles. The standard H13 die cost was $620 (March 2020). MaxDie trial dies cost $695.25 each including materials and fabrication.

Standard H13 and MaxDie were both heat treated to the same hardness range of 48–50 Rc. Heat treating costs were identical for both alloys.

Die 11862.145 was retired from production at 91,589 pounds of extruded profile due to wash out. Rodney McClellan of Alexandria Industries noted that “this die would still be in service for most other customers, but due to the higher surface finish and dimensional tolerance, it was retired.”

Die 11862.144 was retired at 181,766 pounds of extruded profile due to wash.

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Cost Analysis

The results from the testing of the two MaxDie tools do suggest that in a high-volume extruded part some significant benefits can be gained from a higher grade of hot work die steel like MaxDie.

MaxDie 11862.145 made 12,733 additional pounds of extrusion profile over the H13 average while die number 11862.144 yielded 102,920 pounds of additional extruded profile.

The break down below illustrates the numbers of the first 143 standard H13 die averages versus dies 11862.144 and 11862.145.

	H13 143 Dies Total	MaxDie 11862.145	MaxDie 11862.144
Die Build Cost	$620.00	$695.25	$695.25
Pounds of Extrusion	78,856	91,589	181,766
Average Cost Per Pound	$0.0078624	$0.0075910	$0.003825

	H13 Averages Versus 11862.145	H13 Averages Versus 11862.144
Savings Per Pound	$0.0002714	$0.0040374

The aluminum extrusion die design examined in this case study.

Summary and Conclusions

No definitive statement can be made regarding MaxDie as being “better” across all aluminum extruded profiles. There is evidence to suggest it is worth trying MaxDie on very high-volume profiles to prove out the potential improvements vs. standard H13 dies. One of the challenges with this type of trial is measuring data. Many die builders and aluminum extruders do not track data at the level of Alexandria Industries. Without very good data of historical production and trial production for comparison, it is difficult to measure any improvement and therefore the ability to evaluate potential cost savings.

Contact Walter Metals or your Walter Metals/ Ellwood Account Manager for further information on how MaxDie can improve your extrusion production and costs.

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