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The Industry Long Needed A New Abrasive
Media Tester (p. 18-20)**



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**MFN Shot Peening
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26-28 March, 2019
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W Abrasives

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Say WAAT?

The Industry Long Needed A New Abrasive Media Tester

For years, abrasive manufacturers and some users have used a portable testing machine to assess the durability of their abrasives. This equipment allowed, in a way, the comparison of the uniformity of a batch to another from the same manufacturer. However, many have used this equipment to compare the durability of an abrasive between different manufacturers or types of products (high carbon abrasives, cut wire, peening shot, etc.). Many factors can influence the results, one specific being: the hardness of the media. The harder the media, the more elastic it is, and the more it rebounds in the blast chamber, consequently receiving more impacts during the test period. Many have not considered the warnings in the different standards (ex: SAE J445) and thus compared two products that did not have the same properties.

WINOA, the world leader in steel abrasives, decided to develop a test machine quite similar to a real shot-blast machine. WAAT - W Abrasives Abrasive Tester is a unique abrasive testing machine developed to give more reliable and accurate results when testing abrasives for durability in a shot-blasting process.

WINOA has been working on the development of the new abrasive testing machine since 2004, refining the mechanics and processes to this final version. Recently, a second WAAT machine was installed at its technical center in Houston, Texas and the first tests were recently completed.

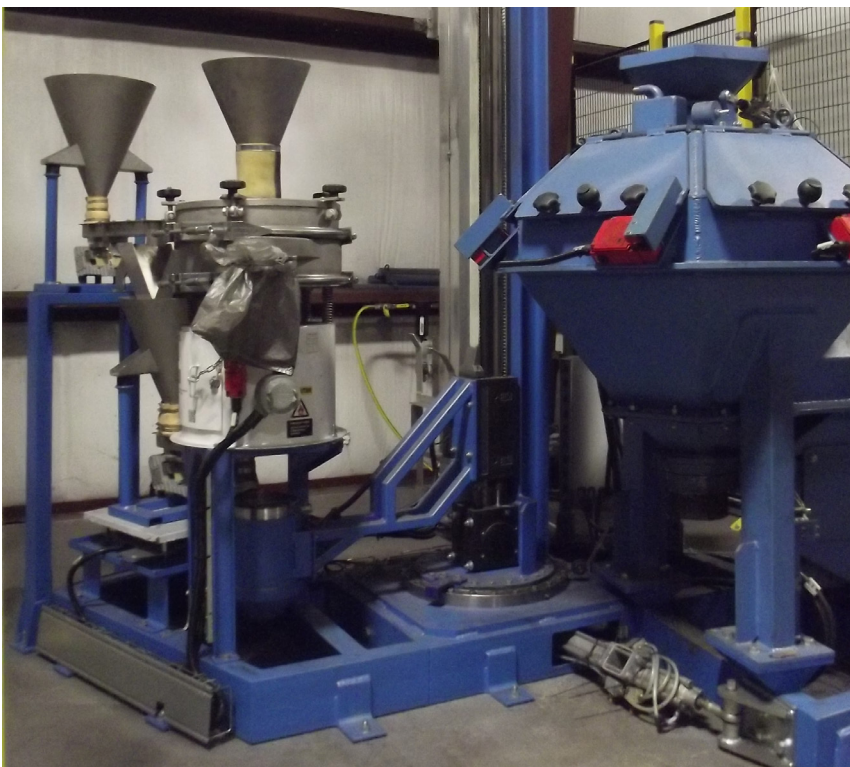
This unique equipment makes it possible, among other things, to support the development and improvement of abrasives and to compare the durability of the media more accurately depending

on impacts, but also by friction from the blast wheel blades. Due to its process, the WAAT machine allows measurement of the media operating mix. Based on product characteristics, a stabilized operating mix can be performed and analyzed thereby allowing more information and data to be obtained when creating new High Performance media. Given its configuration, it is also possible to test the resistance of different target plate materials and alloys to a repeated impact of different media (shape, hardness and type). Thus, whether for the manufacturer of shot blasting equipment or for all those developing alloys or for foundries, this piece of equipment makes it possible to compare different samples at the same time for reliable comparisons.

How it works!

Before commencement, we must acknowledge that SAE J445 clearly stipulates that; 'shot testing machines can be used to test incoming shot for consistency and comparative life with previous shipments of the same type of shot from the same manufacturer under laboratory conditions'. We must also acknowledge that the specification also explains that 'the results obtained from testing machines are not intended to be used in establishing consumption or cost in production machines because of other considerations not duplicated in the laboratory.' These other considerations are primarily the lack of an airwash separator, blast pattern and consideration to the size and type of contamination being removed, media velocity and rebound effect, and the hardness of the cabinet interior or the components being blasted in production.

The internal set up of the WAAT machine is that there is an actual blast wheel similar to what is found in all automatic blast machines. The wheel is run on a VFD (Variable Frequency Drive) so the end calculation can take into consideration the customer's actual throwing speed. This is the advantage of the WAAT over other durability testing machines in that the throwing speed is fixed at around 200 feet per second (61 meters per second) compared with the



WAAT Machine

Blasting



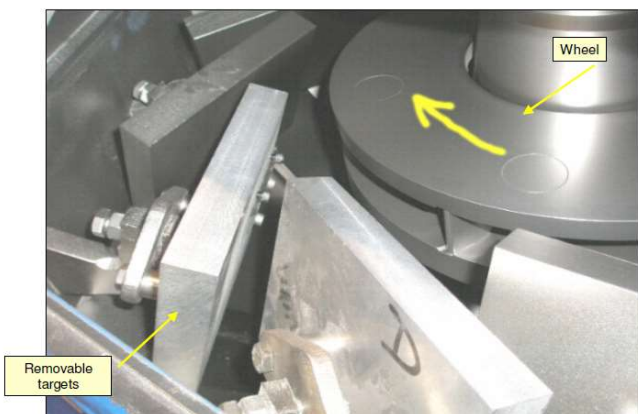
Craig Wallbank during WAAT Set up

the precise weighing section of the machine, and this will accurately discharge the given weight to the bucket that travels between intervals from the top of the wheel, and this in turn collects the sample from the bottom of the wheel once the abrasive has been blasted internally with an actual blast wheel. This bucket will traverse from top to bottom for 500 cycles whereupon it will then travel to the take-out screening section. This is a vibratory screen installed with the precise 'Take Out' mesh for the original starting size of the abrasive and adapted to take into consideration the application of the abrasive being tested. The vibratory screen is also installed with an accurate weighing scale so it can calculate the weight and percentage lost during cycles. Once the abrasive has completed 3000 cycles, the abrasive testing is complete and a final weighing of the sample is taken. The WAAT is fully PLC-driven with a computer program that gives the results with each 500 cycle increments until it has reached its programmed number of cycles. This enables us to calculate the percentage lost during the course of the testing and the number of cycles it achieved.

In addition, the WAAT machine is designed to efficiently measure the energy transmitted by the media. It is equipped with Almen strips and allows the creation of the saturation curve, thus determining the intensity

WAAT that can accelerate the abrasive to a more realistic +300 feet per second (92 meters per second) or even up to 390 feet per second (119 meters per second). Also found in the blast chamber are removable target plates that can be switched out depending on the customer's actual blasting process. These include Aluminum / Steel / Iron / and hard plates, so that there can be a full representation of 'Rebound' that occurs inside a blast machine. In the currently used abrasive durability machines, the

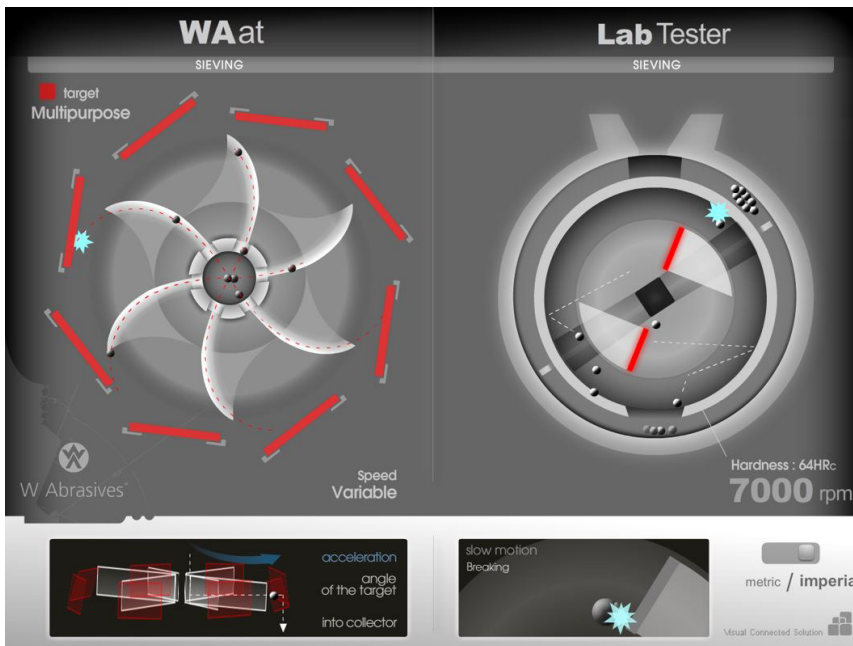
abrasive particles are propelled against a hard target using two-bladed battering heads. As the particles are bombarded against the hard target, harder abrasive particles will have greater rebound properties and therefore more impacts will take place than that of softer abrasives, until they fall into the recovery section to repeat the process. Therefore, the harder the abrasive, the more vigorous the rebound. The steps: A quantity of abrasive, approximately 500 grams, is added to



Internal view of the WAAT machine

Main Advantages and Innovation versus actual standard Test machine

	WAAT
Throwing Speed	Is adjustable. Can be fixed between 40m/s to 120m/s.
Particle Rejection Size	Adapted depending on the media grade or the application. Typically: 0.125mm to 2mm (120 Mesh to 10 Mesh)
Target plates	Adapted depending on the application. Goes from Soft Aluminum to Cast Iron to Hard Steel
Principle	Abrasive is thrown once per cycle on target plates
Results	In grams/thrown ton (lb/ton) or in nb of cycles



Graphical representation of the WAAT machine and typical test machine

- Proves the quality difference between abrasives
- Test conditions can be set more accurately to that of the customer's actual known blasting parameters
- Consumption can now be calculated in lbs (Kg's) per thrown ton of abrasive and number of cycles

Summary

WINOA, thanks to its high level of investment and development, brought to the market a new abrasive test machine capable of simulating the operating conditions of a turbine shot-blast machine. This was a missing element in the field of abrasives that will allow the optimization of abrasives and shot-blasting processes. This new WAAT machine is now being used by the entire WINOA Group to monitor its performance and by many of its Premium customers that are attentive to product performance.

of the abrasive. The WAAT allows the measurement of several "Almen Arc Height" during a test to determine saturation points and intensity, without disturbing the effectiveness of the test. On other test machines however, only 1 saturation point is measured and the intensity is deduced, which is not the way to measure the intensity of a media. In conclusion, the results of the tests carried out on the WAAT machine demonstrated that:

- The harder the abrasive, the more energy it transfers;
- The softer the abrasive, the better it performs in other test machines, not necessarily the case in the WAAT machine;
- A harder abrasive cleans the parts generally faster;
- A smaller abrasive with the same energy will have better coverage, given the amount per projected mass, and potentially cleans faster;
- A harder abrasive will bounce more, which will better clean the interior of parts where rebound is useful and required;
- A high carbon abrasive gives optimal cleaning and durability at 48RHc.

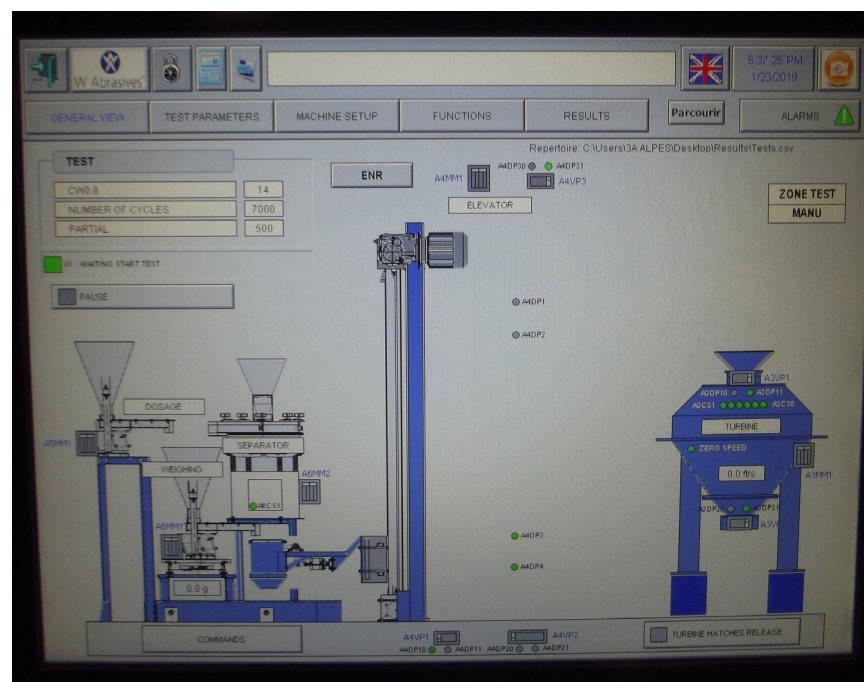
Even though other test machines are useful for monitoring the consistency of a process or a product (as described

in the SAE J445 specification), this innovative WAAT machine can differentiate and measure real performances of various media.

Main benefits

- Provides reliable abrasive consumption information

For Information:
 W ABRASIVES
 18527 Imperial Valley Drive,
 Houston, Texas, 77073, USA
 Tel. +1.936.253 5301/ 800-207-4691
 E-mail: craig.wallbank@wabrasives.com
 contact.united-states@wabrasives.com
 www.wabrasives.com



Schematic of the WAAT machine



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