
Technical Bulletin

ERVIN INDUSTRIES, INC.

3893 Research Park Drive
P.O. Box 1168
Ann Arbor, Michigan 48106
(734) 769-4600
(800) 748-0055
(734) 663-0136

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EFFECT OF SIZE ON RELATIVE IMPACT VALUES FOR STEEL SHOT & GRIT

The impact-energy contained in a single particle of steel abrasive is generally related to variables of particle **mass** and **velocity**, per the mathematical equation for kinetic energy: $\frac{MV^2}{2}$

Where velocity (wheel speed) is constant, the impact value then varies as the cube of the diameter of the abrasive particle (mass). Thus, a shot having twice the diameter of a smaller shot will have **eight (8) times** the impact value!

Small changes in abrasive size can have a dramatic effect on impact value, as the table below reveals:

RELATIVE IMPACT VALUES AS SIZE IS INCREASED:

Screen Opening	Base .0117"	Base .0139"	Base .0165"	Base .0197"	Base .0234"	Base .0278"
.0555"						8.0X
.0469"					8.0X	4.7X
.0394"				8.0X	4.7X	2.8X
.0331"			8.0X	4.7X	2.8X	1.7X
.0278"		8.0X	4.7X	2.8X	1.7X	1
.0234"	8.0X	4.7X	2.8X	1.7X	1	
.0197"	4.7X	2.8X	1.7X	1		
.0165"	2.8X	1.7X	1			
.0139"	1.7X	1				
.0117"	1					

Example: Considering material (Base .0117") passing through an .0139" screen and retained on .0117" screen, this material is assigned an Impact Value of one (1). Then, material through .0165" and on .0139" has an Impact Value of **1.7 times** the .0139"-0.0117" material. Material through .0278" and on .0234" has **8 times** the Impact Value of the .0139"-0.0117" material.

These are tremendous changes in Impact Value. To put the relative value of 1.7 in perspective, consider these illustrations:

- (a) if you drive your car at 55 mph — 1.7X means you'd be driving at **93 mph!**
- (b) If your bowling average is 165 — 1.7X means you'd have an average of **280!**
- (c) If your best golf drive is 220 yards — 1.7X means you'd be driving **374 yards!**

Thus, in applications such as shot peening, or roll-etching, seemingly slight changes in the average work-mix size—or in the screening specifications of new shot or grit, can effect major changes in impact values. **IMPACT** is the name of the game in Peening and Roll-Etching. Relative Impact values should be watched most carefully! Profile is also an imperative in application where painting, coating, or bonding of the blast-cleaned surface is involved. Consequently, control of the work-mix size balance is critical in these applications, too.

Thus, extreme care should be exercised in establishing the screening specifications for a particular application. Bear in mind, the **new** shot or grit purchased is just the “raw material” for the “work-mix” that will be developed in the operation.

Control of the size-balance in the work-mix is the single most important challenge in an operation, because it is the work-mix that does the actual work. It will be done properly only as long as the work-mix has the proper size-balance, which, in turn, determines the impact value delivered to the work. Study of the tremendous changes in Impact Value in the table above tells the story: you must continually monitor and control your work-mix size-balance, by making frequent screen analysis of the work-mix being thrown by the blast wheel or nozzle.

Your Ervin sales representative will show you how to set-up a simple, easy operations-analysis system.

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