

Fig.11. Conventional Exit Slot arrangement.

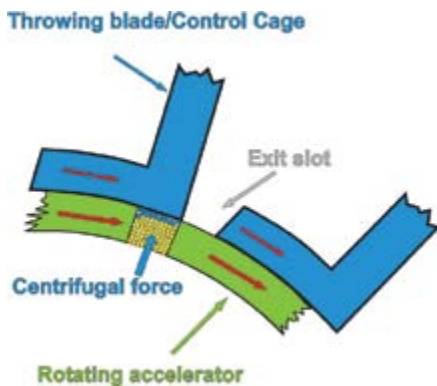


Fig.12. Modified Wheel Exit Slot arrangement.

indicated that there is an almost linear relationship between contact speed and wear rate for a given contact stress and contacting materials. Consideration of changes in any piece of peening equipment is improved by having at least a basic understanding of wear mechanisms.

Quantification of shot wear rate is difficult in the absence of a directly-related specification. Modification of the J445 shot durability specification can, however, yield wear rates directly. Shot selection for optimum wear rate is complicated by the additional factors that have to be considered. Hardness is not the sole factor affecting wear rate. As always, the maxim "caveat emptor" (let the buyer beware) prevails.

The suggested modification of blast wheel design is purely an academic exercise designed to illustrate the types of thought processes and calculations that might be encountered in product re-design. Additional examples of relevant calculations are available from the author on request at Prof.David.Kirk@btinternet.com.

Improvement of wear performance is a constant factor for equipment manufacturers. A balance has to be struck between cost and longevity. Simply buying the cheapest shot, for example, is poor economics. At the other extreme, a manufacturer selling shot that lasted forever would soon go out of business. ●

Huntsville Company Saves Millions for Taxpayers with Process of Repairing Damaged Helicopter Blades

The shot peening services of *Avion Solutions*, located in Huntsville, Alabama, were recently featured in a news story by their local television station. The following is the online print version of the television feature.

YOUR AVERAGE BLACK HAWK helicopter costs about \$16 million. One rotor blade carries a price tag of \$220,000. Obviously, if you can repair a damaged blade rather than replace it, you can save big money. That's where shot peening comes in.

First used on automobiles back in the 1940s to increase the strength of valve springs, it's actually pretty simple. The surface of a metal part is hammered, or impacted, to compress the surface layer. It makes the surface tougher, and less likely to crack.

"It's a little counterintuitive, because you think you're damaging the material by creating dents, but you are creating a stronger surface that's actually resistant to cracks," says Kelly McClurg of Huntsville's Avion Solutions. The company has developed equipment to ultrasonically shot peen damaged rotor cuffs on Black Hawk helicopters. The peening takes place as small beads of material are literally bounced against the parts' surface. What was smooth is made rough, and much tougher.

Glen Soule, a longtime helicopter repairman at Avion Solutions, says the damaged parts would have had a different fate 20 years ago. "We would have replaced the rotor blade and that cost a lot of money," says Soule. Once again, the equipment and process developed by Avion Solutions means quick repairs, and so far some \$60 million in savings.

"I mean it's obviously a good news story for our company, but being able to save that kind of money for the Army, and knowing that money goes back into other things to support the war fighter, it's just fantastic," says Avion's Jeff Blackmon.

Once again, shot peening is a technique that essentially hammers the surface of a metal part. The hammered portion is covered with small dents, but those dents make it a tougher surface. Using it on Black Hawk helicopters has saved tens of millions of taxpayer dollars.

Avion makes repairs on rotor blade cuffs at the Meridianville Airport in Madison County. The Army has two of the shot peening machines at the Corpus Christi Army Depot. The company's goal is to eventually deploy the equipment to forward areas, for on-the-spot repair. ●