

## Wear Abatement Strategies are a Cost Saving Component of Capital Equipment Purchase.



*The model 24 AD wringer is for separating cutting fluids from chips. Correctly specifying the wear abrasion's potential of such a unit at purchase can save costs over time.*

The metalworking industry, like many other manufacturing market segments, has been forced to scrutinize capital equipment purchases in an effort to squeeze the most from a tight capital project budget with short expected returns. Often, pre-project planning and equipment evaluation do not take into account the long-term operational effects of rugged operating conditions, faster machining times, material alloys with challenging compositions, and varying material quality

from global sourcing options. Manufacturing optimization and production time can be compromised if operational factors and wear strategies are not part of the up-front equipment evaluation discussions. Good industrial equipment design will build-in a safety factor for operational wear; however, specific application and production details should be shared with the equipment design engineer to gain the best value and longest equipment life.

Wear abatement strategies are especially important when selecting metal scrap handling equipment. Physics and experience dictate where and how a particular part will erode over time. Various wear-resistant materials provide specific advantages but may have drawbacks in other functional areas. Knowing exactly what material the equipment will be running

is the key to a durable installation. Up front communication of factory conditions, and concerns and constraints are vital to long-term service life and unplanned downtime. Critical application data to provide the design engineer for metal scrap handling equipment are:

### Important Application Data for Developing Wear Abatement Strategies

The specific alloy(s) to be handled
Metal chip geometries, densities and abrasiveness expected
How equipment will be fed (continuous or batch)
Specific cutting fluid(s) and volume
Actual normal process rate (lbs/hr)
Maximum surge or instantaneous rate (lbs/hr)
Frequency & description of bar ends, parts or tramp metal in the chips

The data provided will give the equipment engineer enough detail to deliver the correct level and placement of wear resistance for the application while deploying realistic, cost effective recommendations. The Wear Strategy table (shown on Pg. 2) shows some of the materials and methods applied to PRAB design engineering.

As an example, Metal Chip Wringers employ many of the various wear abatement strategies. These units extract cutting fluids from machine shop scrap by exposing the chips to 600 g's of force at the separation screen. Given today's alloys and production rates, wringer components are subject to severe sliding and impact abrasion depending on their position in the machine and the

## Wear Strategies Table

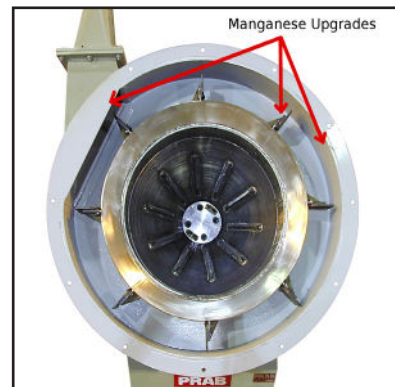
	MEDIUM HARD AR	AR 400 / AR 500	MANGANESE STEEL (11-14%)	HARD SURFACING WELDING ROD	HEAT TREATMENT	NI-HARD
<b>HARDNESS</b>	235 BHN*	400 BHN / 500 BHN	UP TO 600+ BHN	RC 60+**	RC 32 - RC 62 (Depends on base metal and process)	600 BHN
<b>ANTICIPATED WEAR</b>	Sliding/Rolling	Sliding	Impact/sliding	Impact/sliding	Impact/sliding	Sliding
<b>EXAMPLES OF USE IN PRAB EQUIPMENT</b>	Conveyor Tracks, Wear Liners, Oscillator & Harpoon Conveyors	Custom Designs for Severe Sliding Wear Applications	Wringer Discharge Scrolls, Wringer Paddles, Fan Blades	Wringer Liners, VAC Crusher Tools, ScrapVeyor™ Flights	Shredder Knives, Pipe Bends, Cast Iron VAC Parts	Pipe Elbow Segments & Cast Isolation Joints
<b>RELATIVE COST (1=LOWEST COST)</b>	1	2	3	6	4	5
<b>NOTES</b>	General Use AR Steel	Difficult To Fabricate	Variable Hardness, Work Hardens In Use. Difficult To Fabricate	Expensive & Difficult To Apply A Smooth Deposit. Cannot Weld "Out of Position"	Through Hardening, Carburization, Flame Hardened, Austempering	Limited to Castable High Volume Parts. Relatively Brittle

\* BHN is the Brinell hardness number. \*\* RC is the hardness on the Rockwell 'C' scale.

characteristics specific to the scrap being processed. To compound the issue, Wringer parts need to be formed, cut, or machined to produce the unit.

### Below are some specific strategies to protect a Chip Wringer in an extreme wear application:

- Basic unit is designed for replaceable and upgradeable wear surfaces: liner, air paddles, screen, top cover & discharge housing
- Extensive use of AR (abrasion resistant) steels to combat wear such as sliding friction across the formed liner
- Special hard surfacing welding electrodes are used to create a very hard surface applied to specific areas, such as protection of structural welds, impact zones & specific surfaces of the liner and accelerator vanes on harsh applications
- Upgraded Wringer screen material adds life to the critical separation area of the unit (Grade 1 screen)
- Manganese steel top cover, discharge housing, air paddles, and impact ring work harden to combat the effects of both sliding & impact wear
- For air discharge style Wringers Ni-hard castings are used to construct the square to round discharge transition & vibration isolation joint as well as bends for pneumatic discharge piping



*This cut-away illustrates some of the potential wear points on an air discharge wringer.*

environment usually means loss of production due to unscheduled downtime or replacement of equipment after a long battle to keep it running. When planning the purchase of metal scrap or cutting fluid

separation equipment, take into account an application specific wear abatement plan to be sure the investment is sound. Help is available at the earliest stages of a project to be sure the correct equipment is specified to do the job over time.

#### About the Author —

*Carl Baker, is the Vice President of Engineering for PRAB. Carl is a mechanical engineer with more than 30 years industrial metalworking equipment design experience. Carl's work on wear resistance as a foundation of PRAB equipment design has been key to building the company's reputation as a quality, reliable manufacturer and has been a force for creating industry standards.*

Scrap metal handling equipment requires strategic uses of specialized materials to produce a rugged design. An economic balance between initial cost and durability yields recovery equipment with a low total cost of ownership. Ignoring durability in today's high volume, special alloy