



Science.
Applied to Life.™

Your aluminum grinding
challenges, solved.

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Foreword

by Alisa Schilmoeller, 3M Abrasives Marketer

The aluminum industry is expected to grow 7.3% during the next five years,¹ as a continued emphasis on light weighting drives demand for nonferrous (aluminum) components in the automotive and aerospace markets.

Since 2005, the demand for aluminum has grown at a faster rate than any other metal or alloy, primarily due to its increased popularity in shipbuilding, structural framing, trailer manufacturing and repair, service decks and ladders, and platform construction.

As market growth drives demand, manufacturers are increasingly looking for process improvements to meet those demands and reduce their operating costs. But, how do you maximize workforce productivity on the foundry floor, when faced with the unique challenges of working with aluminum?

This eBook identifies three challenges of working with aluminum—**productivity loss, belt longevity, and worker fatigue and safety**—while exploring a new technology designed to combat those challenges.

— *Alisa Schilmoeller*

¹ Aluminum Manufacturing – US Market Research Report. *IBIS World*. July 2017.

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“Many aluminum casting companies have historically approached aluminum cutting, grinding and finishing by relying on vertical band saws, lubricants and excessive belt pressure. But these have had disadvantages in terms of cost, quality, productivity and safety. The right abrasive can bring advantages to a process, offering greater quality, safety and productivity—while minimizing downtime and labor costs.”

–Mike, 3M Abrasive Systems Division, U.S. Marketing Manager

Scientifically-speaking: aluminum

Physically, chemically and mechanically, aluminum is a metal like steel, brass, copper, zinc, lead or titanium. It can be melted, cast, formed and machined much like these metals—and it conducts electric current. In fact, often the same equipment and fabrication methods are used as for steel. Aluminum and its alloys are vital to the aerospace industry and important in transportation and building industries, such as building facades and window frames.

Fundamental properties

Aluminum is a low-density metal that is easy to machine. Its properties include: low weight, high strength, superior malleability, excellent resistance to corrosion, and good thermal and electrical conductivity.

Uses and applications



Transportation

Automobiles, aircraft, trucks, railway cars, marine vessels, etc.



Construction

Windows, doors, siding, building wire, sheathing, roofing, etc.



Household items

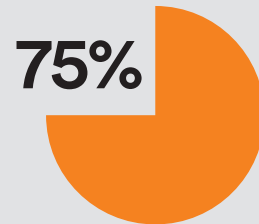
Cooking utensils, furniture, chairs, etc.



Packaging

Cans, foil, etc.

Did you know?



of the total aluminum ever produced is still in use today.

Aluminum has
1/3

the density of steel,
hence its much lighter weight.



It nearly equals copper,
in terms of excellent heat
and electrical conductivity.



forms when aluminum reacts
with oxygen, enhancing its
corrosion resistance.

Overcoming obstacles: identifying and solving three challenges of working with aluminum while...

- ☑ Gate grinding
- ☑ Flashing removal
- ☑ Parting line removal
- ☑ Deburring



Challenge #1: Productivity loss

► **Challenge: Abrasive belt loading is a prominent factor in lost productivity.**

Loading is caused when heat-softened aluminum ‘sticks’ to the abrasive belt, considerably reducing the belt’s cut rate and abrasive life. With the low melting point of aluminum, and the soft characteristic of the substrate, it becomes malleable as it heats up. When an operator continues to grind in this state, the aluminum becomes sticky, causing the mineral to shell or pull from the belt. This slows production, requires more change-outs and minimizes output.

Although some operators may try to combat loading by applying a wax lubricant on the belt, that requires an extra step—and one that comes with the additional cost of the lubricant.

By reducing loading, we can improve productivity, and save time and money.



Example of belt, when loaded

► **Solution: Utilize an abrasive belt that has a built-in lubricant.**

The built-in lubricant will reduce loading and help you get the most life out of your abrasive belt.



Challenge #2: Decreased longevity

- ▶ **Challenge: Mineral shelling decreases belt longevity, prematurely ending a belt's abrasive life.**

Mineral shelling is the loss of abrasive grain from a product while grinding, aside from the general wearing down process. Working on casts with tight angles, an operator may find themselves using more pressure when grinding on the belt's edge. Under those conditions, the abrasive grain can shell from the edge of that belt, when grinding, if it isn't supported by a contact wheel.

- ▶ **Solution: To improve edge retention, reduce shelling and increase longevity, you need a belt that incorporates a more durable backing and a resin system that allows for better mineral adhesion.**



Example of shelling



Challenge #3: Worker fatigue and safety

► Challenge: Worker fatigue can lead to unsafe work environments.

Worker fatigue is one of the many potential hazards present in a foundry work environment. When belt grinding, operators can easily become tired due to physical exertion put on the abrasive. Exerting undue stress on the body runs the risk of improper technique and proficiency, as well as personal injury.

Outfitting employees with adequate training and equipment is key. The proper eyewear, respirator, hearing protection and clothing are just the start. Consistent, on-the-job safety training is also important. And, utilizing equipment that improves grinding efficiency, productivity and quality, while reducing exposure to vibration may help to reduce physical exertion on an operator.²

► Solution: Use an abrasive belt that features advanced cutting technology—make the belt work harder for you by letting the abrasive do the work. Also, have your PPE routine reviewed by a competent partner who can help you put your workers' health first.

Personal protective equipment checklist:



- Safety glasses
- Hearing protection
- Respirator
- Face shield
- Apron
- Gloves

The solution?

The 3M™ Cubitron™ II Cloth Belt 981F.

3M™ Cubitron™ II Cloth Belt 981F

In the previous pages, we've discussed the top three challenges facing your aluminum grinding operations: productivity loss, longevity loss, and worker fatigue and safety. Now we introduce a new solution that overcomes these challenges to help you improve throughput, attain repeatable results and keep costs low.

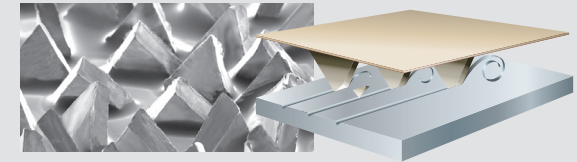


Features and benefits of the new 3M Cubitron II Cloth Belt 981F

- 1 It keeps productivity on track**
Belt loading cuts into productivity, and pausing operations to add a wax lubricant adds both time and cost to your process. To combat this, 3M developed a dry lubricant that is already built into the new abrasive belt that reduces loading when grinding on soft substrates. Cutting out unnecessary steps is the first stride to higher output.
- 2 It's easier on your teams**
Worker fatigue can have a large impact on your performance, risking increased injuries, slip-ups and employee turnover. The Cloth Belt 981F has been shown to cut faster and last longer than competitive Aluminum Oxide, Aluminum Zirconia and Ceramic belts. Thanks to 3M Precision-Shaped Grain, this belt lets the operator cut with less pressure, offering a smooth feel that may help to minimize fatigue.
- 3 It's better for your bottom line**
Abrasives that aren't built to endure get replaced quickly, and the time and cost to change them out add up. However, our new belt features a durable, Y-weight polyester backing that stands up to the stresses of working on gates, parting lines and flashing in tight spaces. Plus, unlike other cloth grinding belts, ours features a proprietary resin system to improve mineral adhesion, further reducing the chances of shell-ing. All of this means less belt change-outs and more cost-savings for your shop.
- 4 Ideal for soft substrates**
Finding just the right abrasive belt for soft substrates can enhance your final result. 3M's Cubitron II Cloth Belt 981F is designed to work on aluminum, as well as other soft substrates, like brass and bronze.

Backed by 3M core technology

3M Precision-Shaped Grain



3M Precision-Shaped Grain uses 3M microreplication technology to form sharp peaks that easily slice through metals—cutting cooler, faster and lasting longer than conventional abrasive grain.

Conventional Abrasive Grain



Conventional ceramic abrasive grain tends to “plow” through the metal, causing heat to build up in the work-piece and the abrasive—resulting in slower cut and shorter abrasive life.

Ready to have your aluminum grinding challenges solved?

Learn more about the 3M™
Cubitron™ II Cloth Belt 981F at
www.3M.com/Cubitron2.



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