

**FIBER CORE CONVERSION FOR ALCOA, INC.'S, WARRICK OPERATIONS
ECOAT® LINE SUPPLIED TO THE WARRICK SUPER SLITTER**

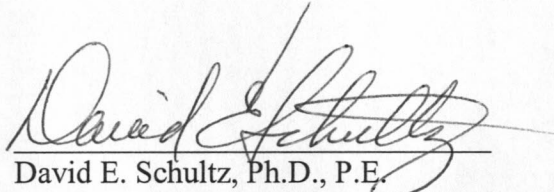
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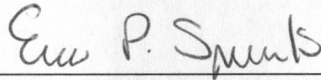
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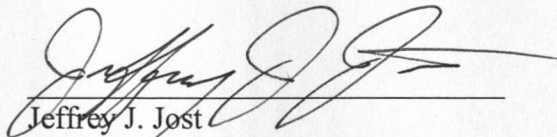
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A special thanks goes out to my wife Holly for her continued support and her persistence in helping me stay on track toward completing this project. Her patience and love helped me stay focused while she attended to the needs of our four daughters: Lauren, Olivia, Samantha, and Maggie. I hope my children recognize that efforts do pay off when committing significant time toward educating oneself.

ABSTRACT

Vidmar, Joseph J., M.S.I.M., University of Southern Indiana, May, 2004. Fiber Core Conversion for Warrick Operations Ecoat® Line supplied to the Warrick Super Slitter. Major Professor: David E. Schultz, Ph.D., P.E..

When processing coated aluminum sheet, the fiber core plays a significant part in the cost effectiveness of the end product. The fiber core can either lead to significant losses due to rework or scrap if not designed correctly for the process application.

This paper uses the decision made in 1996 to convert to HSM-1 fiber cores for the tight-line slitters at Warrick Operations to convert the material produced off the Warrick Super Slitter back to the regular strength fiber core. A description of slitting and winding theory is included in the paper. This helps support the conclusion that through the utilization of a looping pit, that the Super Slitter is able to deliver a more consistent rewind tension across the face of the mandrel. This in turn leads to the ability to reduce the strength requirements of the fiber cores used on the Super Slitter in turn reducing the processing cost of the E Coat material.

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FIBER CORE CONVERSION FOR ALCOA, INC.'S, WARRICK OPERATIONS ECOAT® LINE

SUPPLIED TO THE WARRICK SUPER SLITTER

INTRODUCTION

The purpose of this paper is to describe the background and the decision making process that lead to the fiber core conversion of the High Strength Metallan (HSM-1) cores to regular strength fiber cores for coated material produced from the Alcoa, Inc., Warrick Operations E Coat® Line. This product is provided to Alcoa, Inc., Warrick Operations for further processing on its Super Slitter operation. The paper will be divided into three sections: background, main narrative, and conclusions. In the background section, a brief description of Alcoa, Inc., Alcoa Warrick Operations, the Alcoa Business System (ABS), web handling and slitting theory, web tensioning, the purpose and construction of fiber core, and ABS and the Warrick Super Slitter will be presented.

The main narrative will outline the decision matrix for the conversion, the core conversion economics, the customer conversion and trials, and the conversion for the Warrick Procurement and the supplier Sonoco – Morganfield. The conclusion provides a description of the results of the conversion and the financial impact of the conversion.

BACKGROUND

Alcoa, Inc., is the world's leading producer of primary (molten) aluminum, fabricated aluminum, and alumina powder. Alcoa is active in all major aspects of the aluminum industry that include technology, mining, refining, smelting, fabricating and recycling. Alcoa's aluminum products and components are used worldwide in aircraft, automobiles, beverage cans, buildings, chemicals, sports and recreation, and a wide variety of industrial

and consumer applications, including such Alcoa consumer brands as Alcoa® wheels, Reynolds Wrap® aluminum foil, and Baco® household wraps. Among Alcoa's other businesses are vinyl siding, packaging machinery, precision castings, closures, fiber optic cables, and electrical distribution systems for cars and trucks.

Alcoa is a global company with roughly 120,000 employees at over 350 locations in 41 countries. For the year 2002, Alcoa's annual revenues exceeded \$20.3 billion¹.

Alcoa Warrick Operation

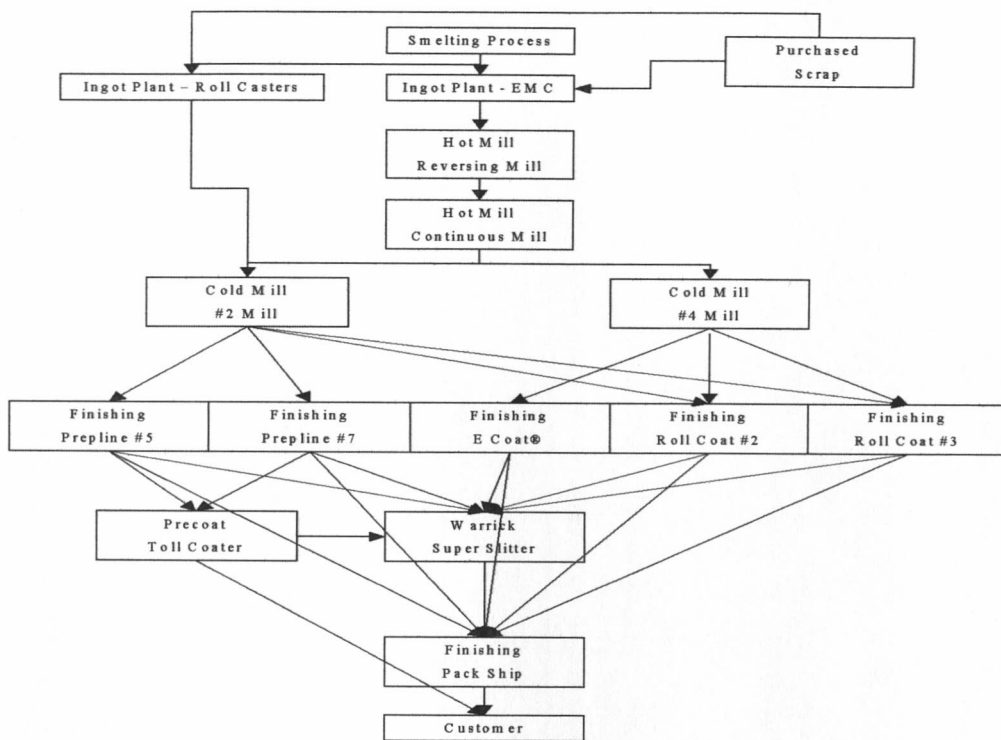
One of Alcoa's 350 locations is Alcoa, Inc., Warrick Operations which is located in Newburgh, Indiana on the Ohio River. With over 120 acres under one roof and 300 acres within the fences, Warrick Operations is one of the largest aluminum smelting and fabricating facilities in the world. Alcoa's Primary Metals and Rigid Packaging Divisions (RPD) are located here. Aluminum sheet for beverage and food can ends and tabs are made along with other flat-rolled aluminum products such as venetian blind stock, and aluminum siding stock.

Figure 1 – Alcoa, Inc. – Warrick Operations Production Flow Path illustrates a production flow path, which starts with alumina powder that is then converted into molten aluminum through an aluminum smelting process. This molten aluminum is then transferred to the Ingot Plant via cruces. The molten aluminum is poured into furnaces along with scrap aluminum, alloyed for metal properties, and then cast into ingot form through an electromagnetic casting (EMC) process or a roll casting process. The EMC ingots are roughly 20 inches thick, 360 inches long, and up to 65 inches wide. With the roll casting process, molten aluminum is injected into the roll bite of two water-cooled rolls. The end result is the formation of an aluminum sheet that is then recoiled onto a rewind.

¹ Alcoa, Inc., 2003 Annual Report

Figure 1

Alcoa, Inc. – Warrick Operations Production Flow Path



Source: Joseph J. Vidmar, Alcoa, Inc., Warrick Operations Production Flow Path Illustration, 2004.

EMC ingots are then coiled into a rolled product through the hot line rolling mill. The hot mill utilizes a single stand reversing mill to reduce the ingot into a flat slab roughly two inches thick and sixty-five inches wide. This elongated slab is then processed through a multi-stand continuous mill that reduces the thickness of the aluminum sheet down to 0.118 inches thickness and coils the aluminum sheet into a wound roll. The aluminum rolls, or

coils, are then reduced in thickness to the customers finished thickness also known as gauge, which range from 0.0055 inches to 0.025 inches, through multi-stand cold mills. At the end of the Cold Rolling Process, an aluminum ingot that started out at 360 inches long can now be an aluminum coil at 0.0055 inches thickness at over 100,000 feet in length.

At this point, the aluminum coils are transferred to the finishing operation that will then clean, trim to either a finished customer width or an intermediate width if the material is to be slit, and apply a coating depending on the end product. The finishing operation consists of five prep coating lines, the Super Slitter, the #2-56 inch slitter (rework machine), and the packaging/transportation operation.

The Alcoa Business System

The Alcoa Business System, or ABS, is an interlinked set of principles and tools used to manage Alcoa businesses. ABS was adopted by Alcoa in late 1997 and is an adaptation of the Toyota Production System. The three overarching principles of ABS are²:

- Make to Use
- Eliminate Waste
- People Linchpin the System

The make to use principle begins with Alcoa customers and is based on the ideal of single piece production, on demand, defect free, at the lowest possible cost, and made safely³. This principle is based on customer usage, or consumption signal, as opposed to making to inventory.

The most important objective of the Alcoa Business System has been to increase

² Taiichi Ohno, Toyota Production System, Beyond Large-Scale Production (Portland, Productivity Press, 1988)

⁴.

³ Taiichi Ohno, Toyota Production System, Beyond Large-Scale Production (Portland, Productivity Press, 1988) 18.

production efficiency by consistently and thoroughly eliminating waste. This principle highlights Alcoa's drive toward the ideal of exposing and solving problems, when and where they occur, to continuously improve the cost, quality and speed of all manufacturing and business processes. Waste exists in many forms within the manufacturing process. Waste of overproduction, waste of time on hand (waiting), waste in transportation, waste of processing itself, waste of stock on hand (inventory), waste of movement, and waste of making defective products are the seven forms of waste⁴.

The third principle of the Alcoa Business System is the drive to create the people environment, engaging all Alcoa's employees in identifying and solving the problems linked to the transition from "make to inventory" to "make to use" toward continuous improvements in costs, quality, and speed.

While the Alcoa Business System is about improvements, it has also led to significant cost savings. At the end of 2002, Alcoa had achieved \$600 million in annualized cost savings toward its three-year \$1 billion 2001 to 2003 goal⁵.

Web Handling and Slitting Theory

In order to understand the detail surrounding the core conversion project, a brief description of web handling and slitting theory needs to be provided.

A web is a long, thin, and flexible material. Webs come in various forms. Some of the most common types of webs are paper, film, foil, nonwovens, textiles, and metals (aluminum, steel, and brass). Webs are most commonly produced and converted into coiled form in order to save on space, minimize handling cost, and optimize the efficiency of the

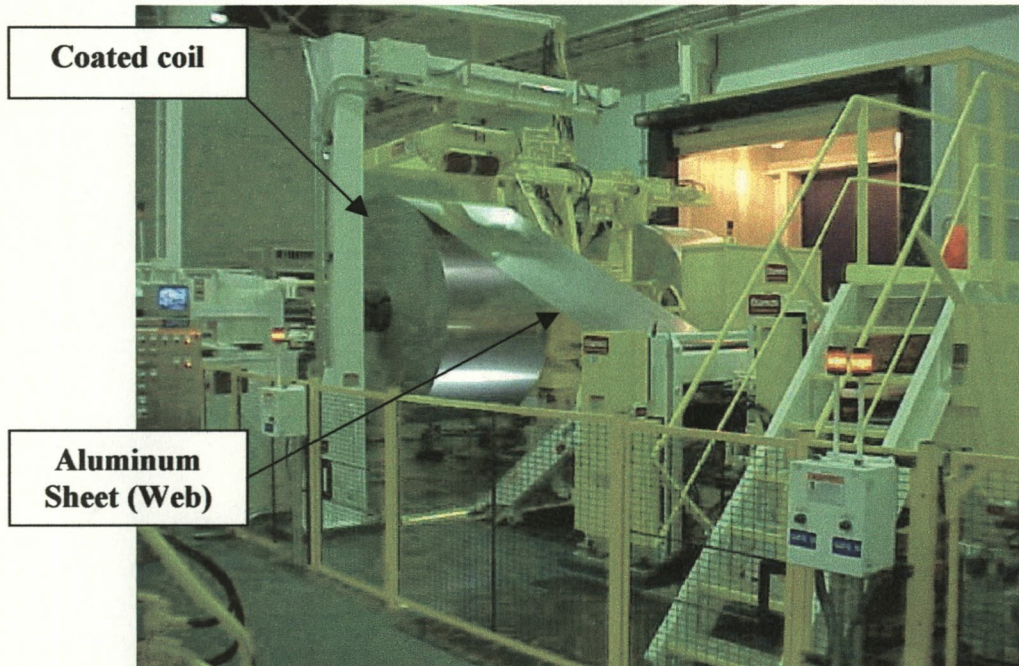
⁴ Taiichi Ohno, Toyota Production System, Beyond Large-Scale Production (Portland, Productivity Press, 1988) 20.

⁵ Alcoa, Inc., 2003 Annual Report.

converting process⁶. Web converting takes one or more web materials and permanently alters them in some form by applying a coating, slitting, or trimming. Figure 2 is a depiction of a coated aluminum coil (web) uncoiling on the Alcoa, Inc., Warrick Super Slitter.

Figure 2

Aluminum Coil (Web) – Super Slitter Uncoiler



Source: Joseph J. Vidmar, Alcoa, Inc., Warrick Operations Super Slitter Unwind, 2003.

For Alcoa Warrick operations, one example of a web converting process would be the Hot Mill's Continuous Mill. An incoming slab of two inch thick material is coiled onto a rewind mandrel at a finished gauge of 0.118 inches. An additional way of converting webs into a finished product for customers is a slitting process. Slitting is the shearing of an incoming web material to a desired customer width and recoiling these individual webs, or cuts, onto a rewind. The two most common types of slitters are tight-line (tension) and

⁶ David R. Rosium, Ph.D., The Mechanics of Web Handling (Atlanta: Tappi Press, 1998), 1.

looping, or deep, pit slitters.

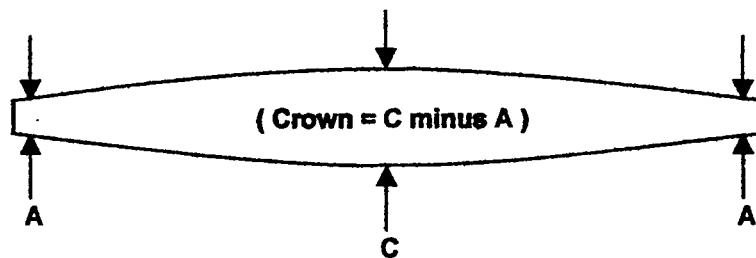
Tight-line (Tension) Slitters

With tight-line slitting, the unwind and the rewind are directly coupled through the sheet. The slitting, or trimming, of the web is accomplished through a dished knife type slitting application. Tight-line slitting is most commonly used for edge trimming and the slitting of up to four cuts with low mill profile. The tension in the web is generated by the amount of drag generated by the unwind holding back against the rewind or by the over speeding (lead speed) of the rewind. Closely coupled, a small distance between the unwind and rewind, tight-line slitters can run at speeds up to 5000 feet per minute.

Looping (Deep) Pit Slitters

Pit slitters require deep loop pits to compensate for mill profile when slitting to narrow cut widths. Figure 3 is an illustration of mill profile. The percent center, or crown, is created during the rolling or roll casting process to improve tracking of the material through the rolling mill processes. In the metal industry, this is measured in terms such as percent center and average percent side set. When this metal is slit into narrower pieces and recoiled onto a common rewind, the outer cuts will often be wound at a lower tension than the center due to this thickness variation across the web. During the slitting process, looping pits account for the variations in metal profile.

Figure 3
Mill Profile

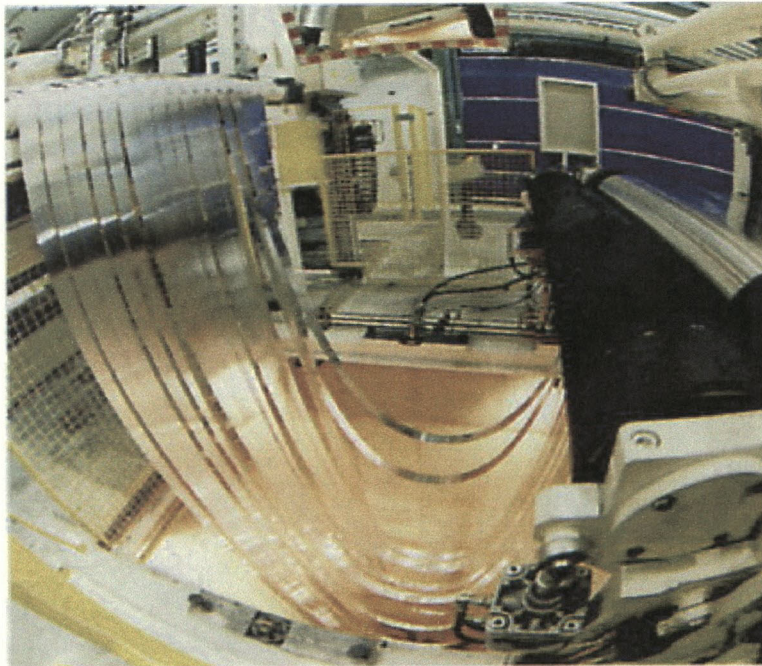


Source: Joseph J. Vidmar, Mill Profile Illustration, 2004.

Pit slitters are generally used to slit material at two cuts or greater. Some pit slitters slit material up to 100 individual cuts. They can run at speeds up to 2500 feet per minute with good loop position control. With a loop pit slitter, a slitter head pulls directly against an unwind, or uncoiler, creating back tension which improves metal tracking and width accuracy during the slitting process. At the downstream, or discharge side of the slitter head, the individual cuts are then pushed into a looping (deep) pit as illustrated in Figure 4. In Figure 4, the individual cuts are at different elevations. This disparity of the cut height is indicative of the incoming metal profile. With a pit slitter, as the individual cuts are rewrapped on to a common rewind, the cuts are at a more uniform tension across the face of the rewind madrel.

Figure 4

Looping (Deep) Pit Slitter



Source: Josef Frohling GMBH, Walzwerksmaschinebau, Aluminum, Figure 4, 1998.

Fiber Cores

As the thickness, or gauge, of the web is reduced through the converting processes, the web must be coiled onto a core to help support the coil during this converting process. Cores come in many forms. Some of the most common are aluminum, steel, plastic, and paper or fiber. Fiber cores are the most economical due to their ability to be easily converted into different inside diameters, thicknesses, and widths. They are also environmentally friendly since they can be shredded and recycled in order to fabricate new fiber cores.

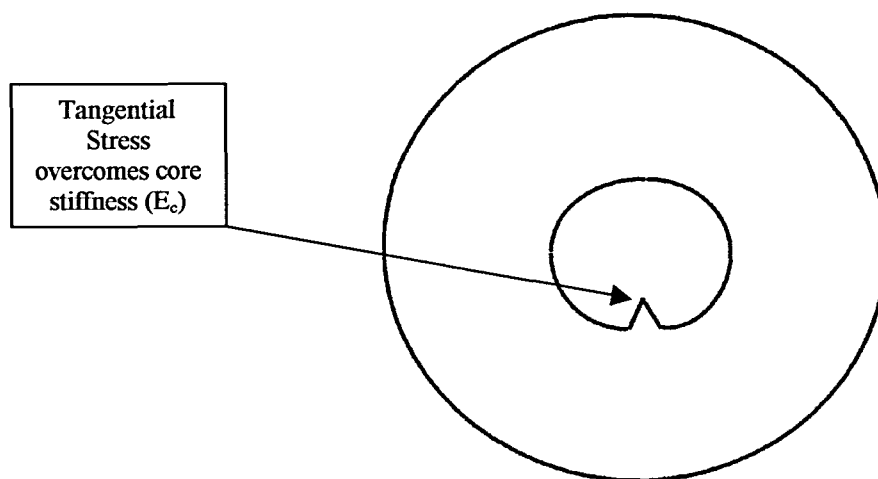
The purpose of a fiber core is to protect the inner diameter wraps of a coil from

handling or transportation damage⁷. Fiber cores will not support the entire weight of a large coil or prevent coil collapse such as a steel or aluminum core. The core stiffness, or E_c , along with winding tension determines the stress condition at the coil inside diameter (ID). The core stiffness is determined by modifying the type and thickness of the adhesive layers during the construction process. The critical variables of a fiber core are outside diameter (OD) dimensional control, length dimensional control, the OD stiffness (E_c), and the moisture content of the core⁸.

As the first one to two inches of the web is wound, the fiber core has little effect on the within coil stress condition. At a given tension set point, a core with high stiffness (E_c) reduces the compressive tangential stress at the ID, which makes a coil less likely to V-buckle collapse⁹. Figure 5 is a depiction of a “V” Buckle type coil collapse.

Figure 5

Depiction of a “V” Buckle Type Coil Collapse



Source: Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

⁷ David R. Rosium, Ph.D., The Mechanics of Winding (Atlanta: Tappi Press, 1994), 4.

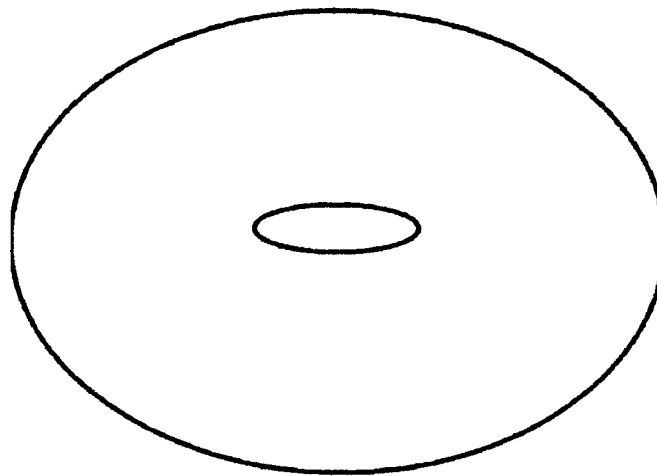
⁸ Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

⁹ Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

By raising the stiffness (E_c) of the fiber core, an initial higher tension set point can be established, which in turn stabilizes the coil ID by increasing the radial stress. This reduces the likelihood of sag collapse¹⁰. Figure 6 is a depiction of a “Sag” type coil collapse. Sag collapses occur due to forces of gravity overcoming the resistant forces of friction and the radial stress within a coil¹¹.

Figure 6

Depiction of a “Sag” Type Coil Collapse



Source: Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

Winding models have been built to quantify the effect of fiber core properties on stress values within the coil. Since the fiber core compresses significantly as the aluminum sheet is being wrapped, the first several wraps have a compressive tangential stress. As the coil builds, the previous wraps begin to act more like an “aluminum core,” and the succeeding wraps then have tangential stress near zero throughout most of the coil. Work by

¹⁰ Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

¹¹ Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

Gerhardt and Qiu of Sonoco Products Company addressed the issue of fiber core radial stiffness. This work has led to the development of more accurate information of the fiber core in the winding models. These models estimate the internal stresses in a wound coil.

During a trial in 1996 at Alcoa Warrick Operations, pressures between wound aluminum coils and the fiber cores were measured. The measured pressures closely agreed with radial pressures predicted using the WINDER¹² model and core stiffness values reported by Sonoco. These tests helped confirm the stiffness calculations for materials used in the construction of the fiber cores.

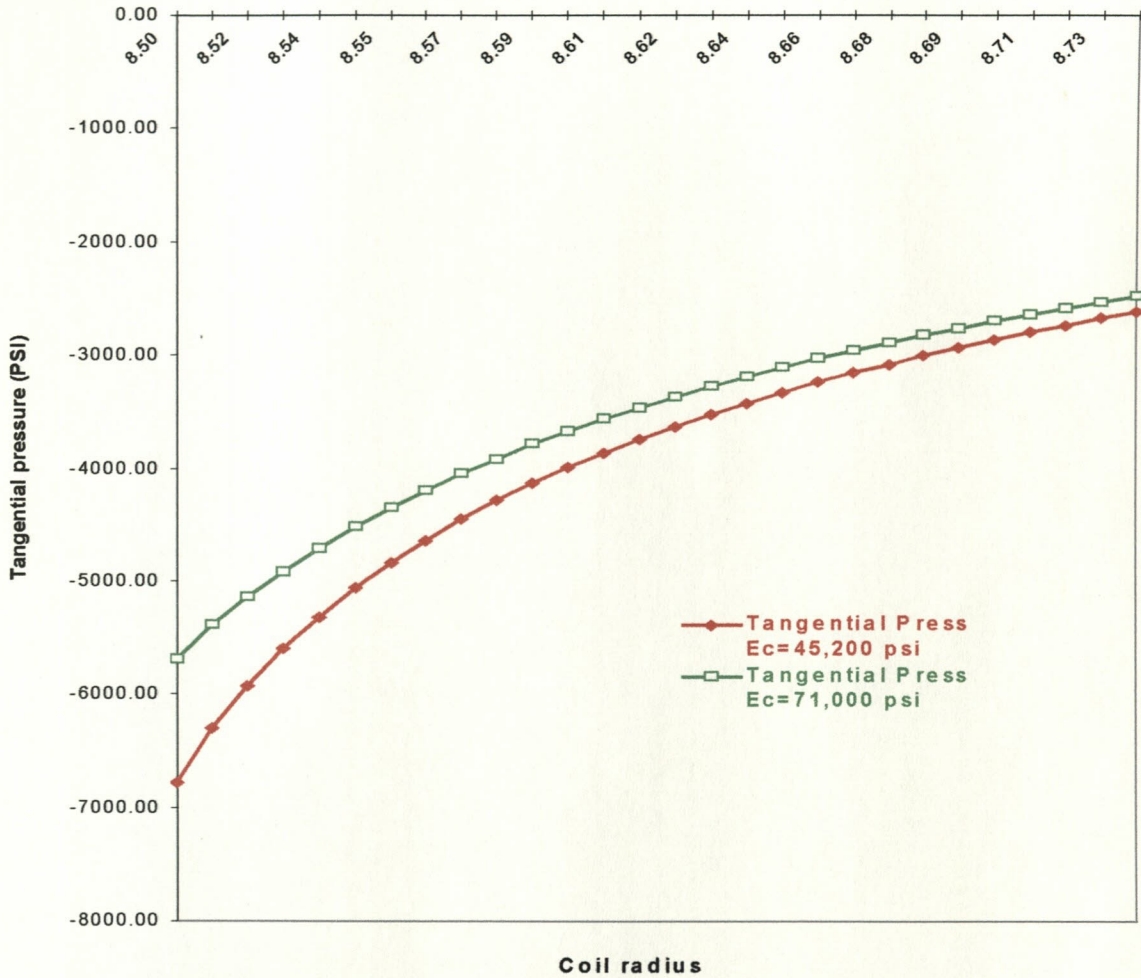
Figure 7 shows the difference in the tangential pressure values near the coil ID for 16 inch inside diameter (ID), 0.500 inch thick regular strength fiber cores versus a 16 inch ID, 0.500 inch HSM-1 fiber core with different radial stiffness values at the same winding tension. The coils wound on the high stiffness cores have 19% less compressive tangential stress near the ID. Therefore, assuming all other variables remain constant, aluminum coils wound on the higher stiffness cores are less likely to V-buckle collapse at the same rewind tension set point.

¹² WINDER V4.2, A proprietary winding analysis software package developed by the Web Handling Research Center, Oklahoma State University

Figure 7

Tangential Pressure at the 16" Coil ID .500" Thick Regular Strength Fiber Cores

Versus a 16" ID .500" HSM-1 Fiber Core with Different Stiffness Values



Source: Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

Winding Tension

According to David R. Rosium, Ph.D., an expert in web handling theory, “winding tension is the single most important parameter in the winding process.” The optimum

winding tension depends on product characteristics such as width, gauge, coating thickness, and coating type. Winding tension is defined as the average machine direction (MD) web force per unit of web width (winding tension = force/area)¹³. The web force can be read directly from a load cell, if available, or for DC drive rewinders, by recording the rewind armature current, armature voltage, line speed, and estimating efficiency. The most common load cell application is thought of as a scale upon which an undriven idler roller is mounted¹⁴. The load cell is often a strain gauge application¹⁵.

Any coated aluminum coil wound on a fiber core can be made to “V” Buckle collapse by increasing the rewind tension high enough, conversely, any coated aluminum coil can be made to sag collapse if tension is decreased enough. The key is finding the optimum set point for a given coil or product type¹⁶. The proper tension target is dependent on many equipment and product variables. Therefore, optimal winding tension cannot be set without an understanding of the basic fundamentals of the product and the equipment being utilized. Figure 8¹⁷ is a depiction of how a lower coefficient of friction coating narrows the acceptable winding tension range. The E Coat® material is classified as a medium coefficient of friction (COF) coating based on the surface roughness after coating.

¹³ David R. Rosium, Ph. D., The Mechanics of Winding (Atlanta: Tappi Press, 1994) 6.

¹⁴ David R. Rosium, Ph. D., The Mechanics of Winding (Atlanta: Tappi Press, 1994) 6.

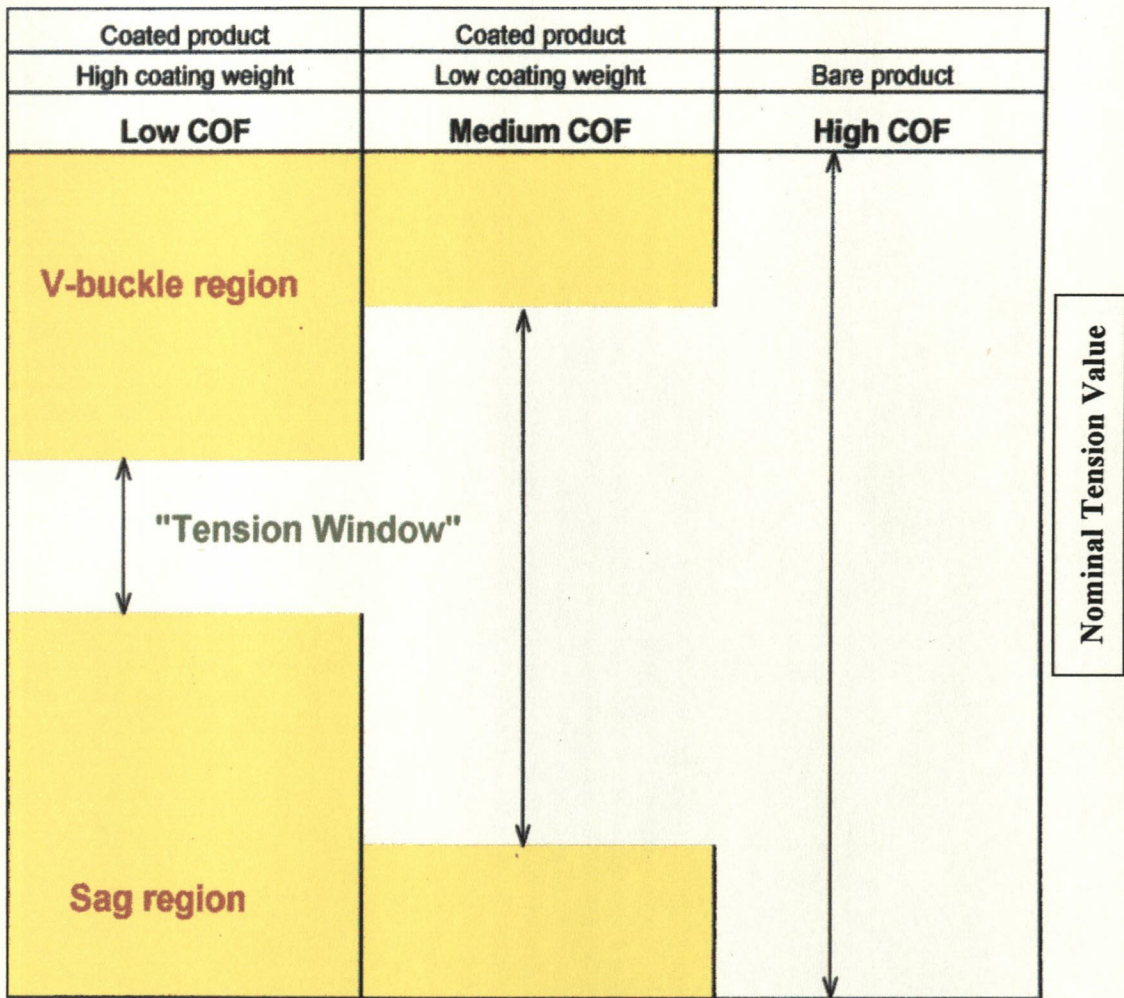
¹⁵ David R. Rosium, Ph. D., The Mechanics of Winding (Atlanta: Tappi Press, 1994) 6.

¹⁶ David R. Rosium, Ph. D., The Mechanics of Winding (Atlanta: Tappi Press, 1994) 6.

¹⁷ Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

Figure 8

Depiction of how lower Coefficient of Friction Coatings Narrow the Tension Window

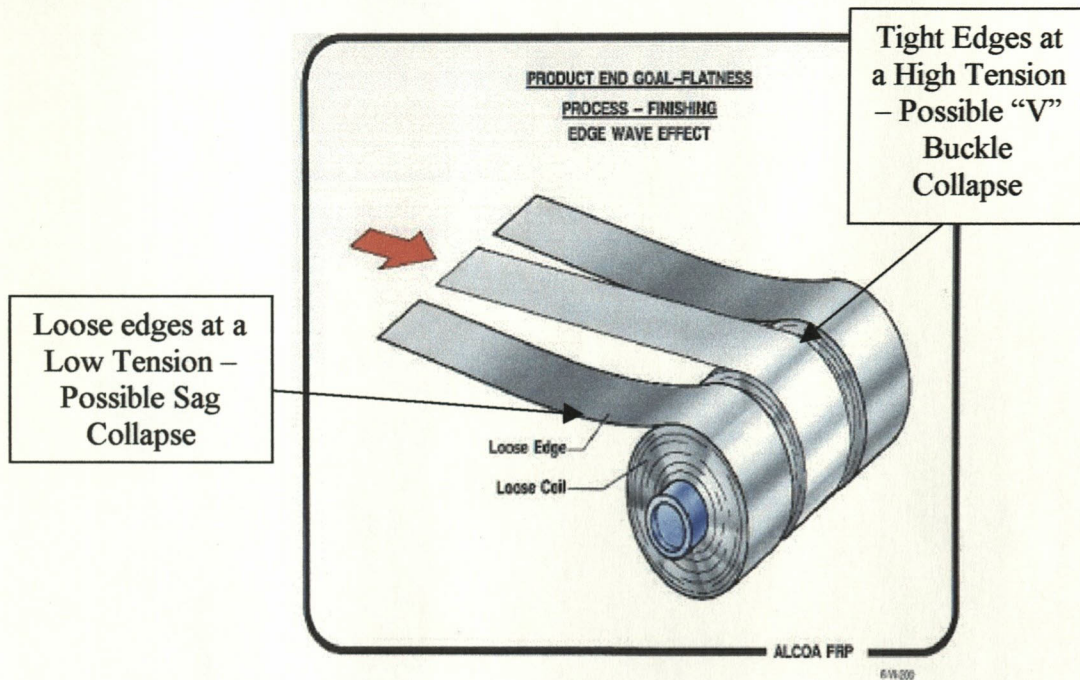


Source: Becker, Bernie J., A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

During the slitting process, without a looping pit, high levels of rework and scrap can be incurred as a result of the individual cuts being wound at different tensions on a common rewind if mill profile percent center is high. Figure 9 illustrates how the outer cuts can be loose and the inner cut can be tight if slitting on a tight-line slitter.

Figure 9

Three Cut Slit Material Wound on a Common Rewind Mandrel

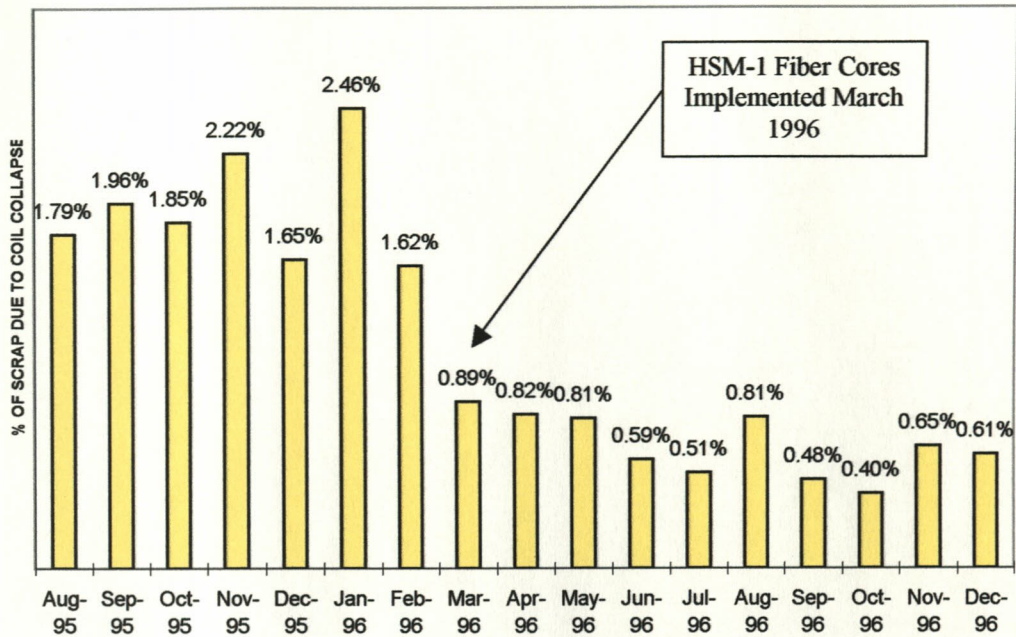


Source: Alcoa, Inc., Web Handling Seminar Manual, 2000.

This occurred in the mid 1990s at Warrick Operations when attempting to slit three and four cut material on the 56 inch and 64 inch tight-line slitters. In order to successfully slit this material, temporary countermeasures were instituted to increase the tension window while slitting coated end stock in order to avoid "V" buckle collapses on the inner cuts and sag collapses on the outer cuts. This change included slitting and rewinding the cuts onto high strength (HSM-1) fiber cores versus regular strength fiber cores as previously stated with a 19% improvement in core stiffness. By winding these cuts onto HSM-1 fiber cores, a larger tension window was developed between the inner and out cuts thereby reducing the level of rework and scrap; however, this change was marginally effective as Figure 10 illustrates.

Figure 10

Percent Scrap Associated with Collapse off the 56" and 64" Tight-line Slitters



Source: Bernie J. Becker, A Systems Approach to Reducing Winding Defects at Alcoa – Warrick Operations.

With Warrick's two pit slitter being capacity constrained, options to improve the cost effectiveness of the business were considered.

ABS and the Warrick Super Slitter

One way for Warrick to improve the slitting process cost effectiveness was the development of a new slitting machine. In April 2000, Warrick Operations Rigid Packaging Division routed a Request for Authorization with the purpose of installing a state-of-the-art slitter at Warrick Operations. The basis for the new slitter was significant cost reductions associated with waste elimination that was inherent in the current slitting production processes. The new slitter would realize advances in safety, quality, and customer

satisfaction while improving the rate of workplace change in the Fabricating Products Department. These advances would be accomplished by eliminating older slitting machines that were incapable of meeting customer requirements for continued product quality improvements. These improvements included down gauging (reducing the material thickness), new coatings with lower coefficient of friction, and tighter width tolerances. Additional improvements to be realized by this new slitting machine included the elimination of outsourcing overcapacity slitting material at a contracted slitter facility in Minster, Ohio, reducing scrap and rework that was generated by slitting coated products on the 56 inch and 64 inch tight-line slitters which were designed for slitting bare products and aluminum can body stock (D and I), as well as improving productivity through increased line speed and the utilization of up-to-date slitting and winding technology.

Two tension slitters, #1 and #2 – 56 inch slitters, that were installed in the mid 1970s and a newer 64 inch tension slitter installed in 1988 were to be idled. These lines were designed with the capability of slitting one to two cut aluminum sheet as well as oiling aluminum can body stock material with an electrostatic oiler. Additionally, two pit slitters (#3 Pit and #2 Ruesch) were to be idled. The bulk of the D and I material was transferred to Tennessee Operations, Warrick's sister plant, after the startup of their SMS Continuous Cold Mill. By moving this product to Tennessee, this resulted in the tension slitters being used for a variety of different products. One of the products being slit was coated End Stock produced off of the E Coat® Line. The customer requirement for this product was to slit it into three or four cuts ranging from a finished width of 13.410 inches to 17.486 inches.

In December 2001, the Warrick Super Slitter produced its first customer coil. This coil was a coated product identical to the one produced off of the three tension slitters. From

January 1, 2002, to August 27, 2002, roughly 24 million pounds of the coated product had been slit at Precision Strip, off the Warrick tension slitters, and the Warrick Super Slitter. As of August 1, 2002, one hundred percent of the coated end stock product was being slit off the Warrick Super Slitter. Since this product was now produced off the Warrick Super Slitter, which has a loop pit, a cost savings opportunity exists to revisit the 1996 decision to continue to wind this material on high-strength (HSM-1) fiber cores versus regular strength fiber cores.

MAIN NARRATIVE

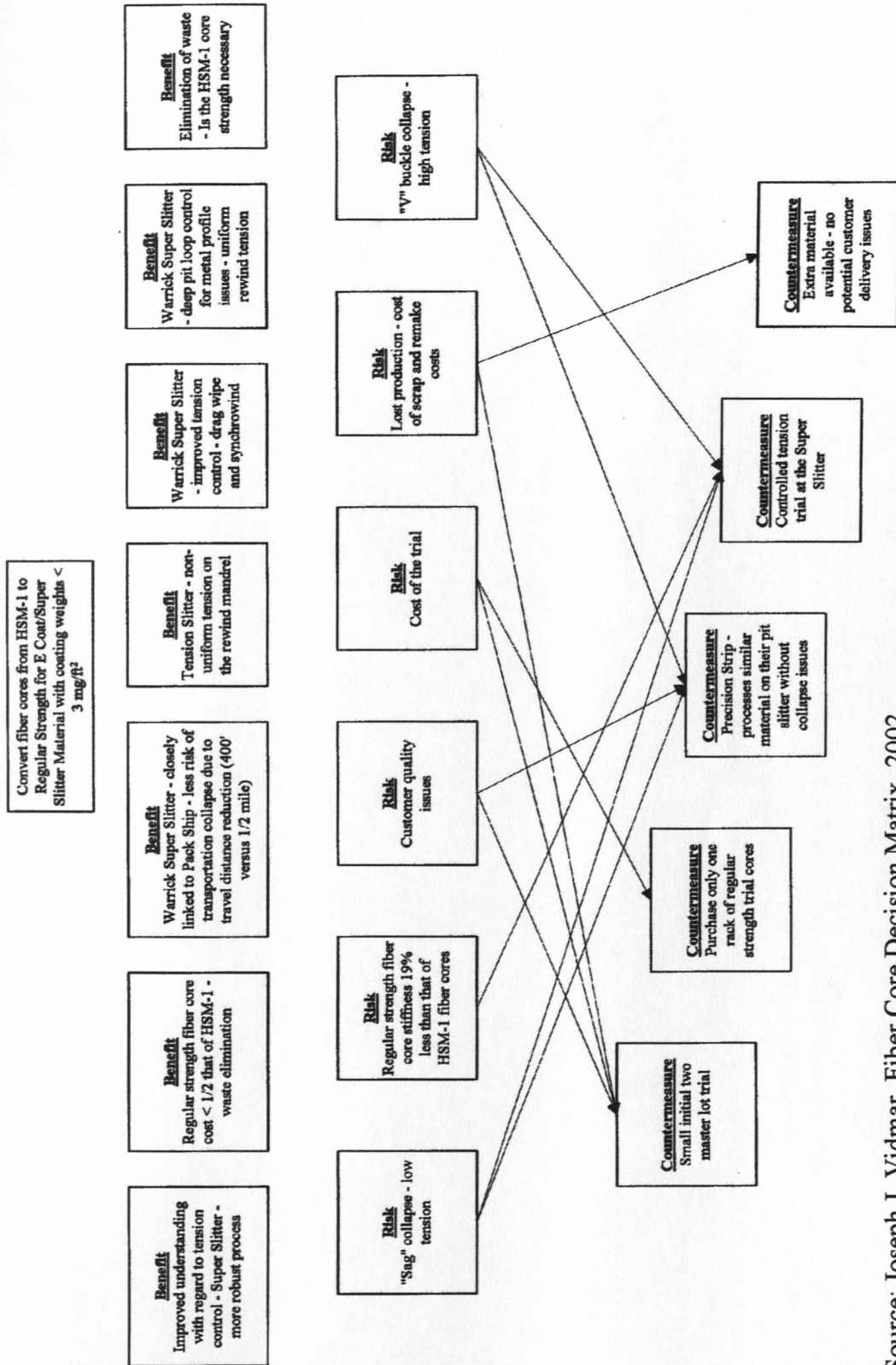
The main narrative section describes the decision matrix used to evaluate the risks associated with the potential core conversion, the initial economic calculation performed for the potential cost savings, the customer trials needed and the conversion associated with each customer, and the conversion of the HSM-1 fiber cores at Warrick Operations and the supplier Sonoco – Morganfield.

Decision Matrix

In order to determine whether to revisit the 1996 decision to wind the three and four cut E Coat® material onto regular strength fiber core versus HSM-1 fiber cores a decision matrix was used to identify the benefits, risks, and countermeasures for each of the risks identified. Figure 11 illustrates the decision matrix.

Figure 11

Fiber Core Conversion Decision Matrix



Source: Joseph J. Vidmar, Fiber Core Decision Matrix, 2002.

As Figure 11 details, for all of the risks identified, countermeasures were identified to address or minimize the negative consequences of a trial. The size of the initial trial was to be managed to two master lots, 60,000 pounds, of E Coat® material. If the coils either “V” buckled or sag collapsed, the material would have to be scrapped. The scrap rate for E Coat®/Warrick slitter material was roughly \$0.67 per pound. This equated to a potential loss of \$40,200, which is equivalent to the estimated annual savings for the entire project. In addition, efforts were made to protect the customer should the coils collapse. Two additional coils were to be coated as a backup for the trial.

Core Conversion – Initial Economics

The initial cost saving associated with this fiber core conversion were calculated based on the actual production data for all Coors material produced at Warrick and slit on the following production centers (64 inch slitter, #1 – 56 inch slitter, Precision Strip #7 Slitter, and the Warrick Super Slitter) from January 1, 2002, to August 31, 2002. The cursory economics listed in Table 1 represent a calculated cost for the 13.410 inch x 16.070 inch x 0.500 inch regular strength fiber core. These calculations were done prior to the formal quote being received which was requested through an email sent by the Alcoa - Fiber Core Process Manager to the Sonoco Products Customer Service Representative on August 27, 2002, for a quote on the 13.406 inch x 16.070 inch x 0.500 inch regular strength fiber core.

Table 1

Initial Economic Calculations Conducted September 15, 2002

Purchase Order Item Number	Core Length	Core Inside Diameter	Core Wall Thickness	Core Type	Purchase Order Cost	Material Cost/Inch	Labor Cost
67	13.41	16.070	0.500	HSM-1	\$ 8.86	\$ 7.546	\$ 1.314
63	70	16.070	0.500	HSM-1	\$ 39.39	\$ 0.563	
28	70	16.070	0.500	Regular	\$ 17.44	\$ 0.249	
N/A	13.41	16.070	0.500	Regular	\$ 4.655	\$ 3.341	\$ 1.314

Pounds of Coors Material Slit from 1/1/02 to 8/31/02	24,000,000
Average Coil Weight	31,001
Number of master coils produced	774
Number of customer coils produced	1,548
Number of fiber cores used	6,193
Average number of fiber cores used/month	774
Cost differential between .500" regular and .500" HSM-1	\$ 4.20
Monthly Fiber Core Saving for Coors Material	\$ 3,255.37
Return on Capital - Corporate Rate	18%
Annualized Fiber Core Saving (Estimate) - NPV of Payment	\$35,507.97
NPV of five year contract	\$128,197.35

This is a calculated value

Source: Joseph J. Vidmar, Economic Calculations, 2002.

Based on the initial economics, a long term (five year) contract with Coors, the estimated cost savings, and the fact that the initial trial was to be minimized to two customer coils, approval was given by the Fabricating Production Manager to proceed with the trial and the conversion to the regular strength fiber cores for the E Coat® to Warrick Super Slitter Coors material. The formal quote requested August 27, 2002, was received on October 15, 2003, with the core price at \$5.09 per core, \$0.44 higher than the calculated core cost conducted in the initial economics. The core cost for the 13.406 inch x 16.070 inch x 0.500 inch HSM-1 fiber core listed on Purchase Order WA157890, Effective Date May 1, 2001 (Appendix A), lists the core cost at \$8.86. The initial quote yielded roughly a 43% reduction

in fiber core cost for the Coors material produced off the E Coat® line and slit at Warrick.

With the receipt of the formal quote, the next step was the opening of the purchase order and the introduction of the potential new fiber core in the inventory system with Sonoco Products. The initial trial cost was \$485.76, one rack, 96 cores, of 13.410 inch x 16.070 inch x 0.500 inch regular strength fiber cores.

The risks of converting from regular strength fiber cores as outlined previously were “V” buckle collapse from the rewind target tension being too high or sag collapse from the rewind tension being too low. An analysis of the material produced off the Super Slitter up to August 31, 2002, showed no material Coors scrapped for collapse while using the HSM-1 fiber cores. The SAP (production tracking computer program) scrap code for slitter collapse is 480E. Since no collapse was evident, the assumption was that the HSM-1 fiber core provided adequate support and protection from collapse. An initial probability of failure for the first phase of the trial was assumed to be the 19% reduction in core stiffness from the HSM-1 to regular strength fiber core. The cost of failure was the core cost, \$485.76, in addition to the potential cost of the product scrapped (\$0.67 per pound) should the fiber core lack the stiffness to support the material. In order to consume one rack of fiber cores, the total amount of material shipped to the customer would be 360,000 pounds. A projected scrap rate for collapse was one cut of material, or 1% of the total amount of material produced. The expected value (EV) of the trial for 96 customer coils is outlined below based on these assumptions.

$$\text{Core Trial Cost Savings} = 96 \text{ cores} * (\$8.86_{\text{HSM-1 core}} - \$5.09_{\text{Regular Strength core}}) = \$361.92$$

$$\text{EV} = p_{\text{success}} * (\text{profit success}) - p_{\text{failure}} * (\text{cost failure})$$

$$\text{EV}_{\text{trial}} = .81 * (\$361.92) - .19 * ((3,600 * \$0.67) + (\$485.76))$$

$$EV_{\text{trial}} = \$293.16 - \$550.57 = (\$257.41)$$

Based on EV, using the 19% reduction in core stiffness as the probability for failure, the cost of failure exceeds the profit from success, which says the trial should not have been conducted. However, after discussion with the Corporate FRP Mechanical Winding Engineering Resource, it was determined that the likelihood of winding at a tension high enough to collapse the regular strength fiber core was less than 5% based on past experiences with winding in the tension window for the E Coat® material. With this assumption in place, the modified EV calculation is listed below.

$$\text{Core Trial Cost Savings} = 96 \text{ cores} * (\$8.86_{\text{HSM-1 core}} - \$5.09_{\text{Regular Strength core}}) = \$361.92$$

$$EV = p_{\text{success}} * (\text{profit success}) - p_{\text{failure}} * (\text{cost failure})$$

$$EV_{\text{trial}} = .95 * (\$361.92) - .05 * ((3,600 * \$.67) + (\$485.76))$$

$$EV_{\text{trial}} = \$343.82 - \$144.89 = \$198.93$$

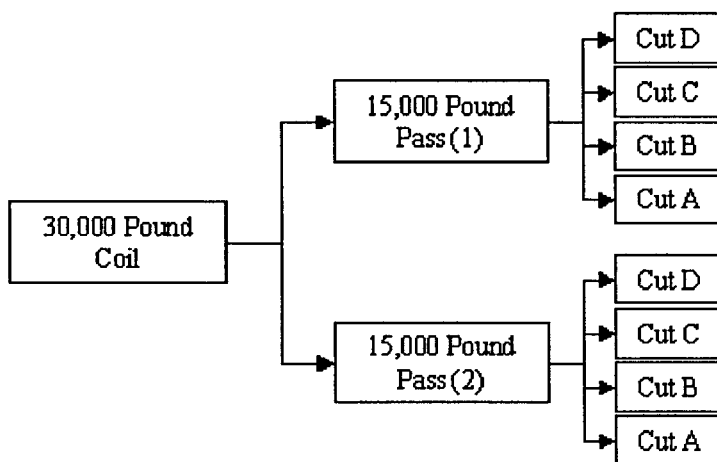
Customer Conversion – Coors and Rexam

In June of 2002, change request FAB.CC.091 (Appendix B) was routed, by the E Coat® Metallurgist, with the intent of converting all the E Coat® material with internal and external coating weights less than three milligrams per square foot from 0.500 inch HSM-1 (SAP core code 04) to 0.500 inch regular (SAP core code 02) strength fiber cores. Appendix C provides a detailed list of the customer cross-references for which the fiber core codes were changed. The codes were changed in the production control program (SAP) on October 15, 2002; however, after discussion with the RPD Technical Team Leader for Coors and Rexam, trials needed to be conducted for the Coors and Rexam material before converting to regular strength fiber cores. . One rack of the 13.410 inch x 16.070 inch x 0.500 inch regular strength cores was ordered November 15, 2002, and received November 21, 2002. Based on

the upcoming holidays and the limited resources to track the trial both at Warrick and at the Coors facility in Golden, Colorado, the decision was made to delay the first phase of the trial until after the New Year, January 1, 2003. The trials needed to be conducted in two phases. The initial phase was for the Super Slitter to produce two master lots, roughly 60,000 pounds, of material bound for Coors on regular strength fiber cores. These two master lots would produce sixteen customer-sized coils. Figure 12 illustrates details of an incoming master lot to the Super Slitter.

Figure 12

Breakdown of One E Coat® Coil Slit on the Warrick Super Slitter



Source: Joseph J. Vidmar, Coil Breakdown Illustration, 2004.

The purpose of the fiber core trial was to evaluate whether the Super Slitter would “V” buckle collapse the material with the 19% reduction in core stiffness from the HSM-1 to the regular strength cores fiber cores. Table 2 lists the lot numbers for the coils produced during the first phase of the trial on January 9, 2003, the drag wipe (tensioning device) set point, and the exit tension as read by the exit load cell.

Table 2

First Phase Trial for Coors – Cross Reference 6408

<i>Coil Lot Number</i>	<i>Drag Wipe Set Point (PSI)</i>	<i>Exit Load Cell Reading (PSI)</i>
9N75454-1	29.8 to 30.2	3420-4647
6N75454-2	29.8 to 30.2	4268-5453
5N74585-1	29.8 to 30.2	3180-4440
2N74585-2	29.8 to 30.2	4062-5030

Source: Joseph J. Vidmar, Citech Process Computer Data, 2002.

The results of the first phase trial for the Super Slitter were positive. No indications of “V” buckle collapse or sag collapse were evident, at the coil ID, during the slitting process or downstream during the packaging process. The coils were shipped to the customer via truck on January 13, 2003. An email was sent to the RPD Technical Team Leader, on January 9, 2003, detailing the results of the trial. A reply from the RPD Technical Team Leader was received on January 17, 2003, that the coils would be monitored for consumption at Coors. A follow up email was sent to the RPD Technical Team Leader on February 11, 2003, requesting an update on the material sent to the customer. A reply to this email was received on February 22, 2003, confirming the successful consumption of the four packages at the customer. The reply also requested a second phase trial be started with two to three runs, roughly fifteen master lots (450,000 pounds), of the Coors material be produced with regular strength fiber cores before beginning full production.

The second phase trial was initiated on March 12, 2003, with the start of production of customer cross-reference 6408 on the afternoon shift following up with the customer cross-reference 6701 on dayshift March 13, 2003. A total of 88 customer passes were produced off the Super Slitter. Of those 88 passes, 74 would be shipped to Coors. Bad starts

at the coil ID and wall weave defects were associated with 14 cuts. No issues associated with the strength reduction of the cores were identified as either “V” buckle or sag collapse. Based on the quantity of material produced, the cost savings with this one run would have been roughly \$500, a 65% reduction in core costs. As soon as feedback was received on the consumption of the material, the fiber cores would be converted to the regular strength cores.

On March 14, 2003, an email was sent to the RPD Technical Team Leader with the results of the second phase trial. Additionally, it was identified that the material produced from E Coat® line and shipped to Rexam (17.486 inch wide – 3 cut and 6.157 inch – 9 cut) could be converted to regular strength fiber cores. On the same day, an email reply was received from the RPD Technical Team Leader approving the immediate conversion of the Rexam material produced from the E Coat® line and slit on the Warrick Super Slitter. The conversion of the Rexam material was not identified during the initial scope of the project. By converting this customer from HSM-1 fiber cores to regular strength fiber cores additional cost savings would be realized.

On April 1, 2003, an email was received from the RPD Technical Team Leader giving final approval to convert Coors material to the regular strength fiber cores. On April 7, 2003, all HSM-1 fiber cores were consumed for Coors and Rexam and all production would be produced using the regular strength fiber cores.

Core Conversion – Warrick Procurement/Sonoco Morganfield

Based on the internal success of the second trial, the new fiber cores needed to be set up in the procurement system (EMPAC) at Warrick and at Sonoco Morganfield. The process includes Sonoco sending a new quote for the material based on an estimated annual volume at Warrick. The quote would include the tracking number for the material at Sonoco

Morganfield. An email was sent to the Warrick Procurement Analyst on March 14, 2003, with the new EMPAC (Warrick Ordering and Tracking System) with the new "D" item number (D145566) for the 13.410 inch x 16.070 inch x 0.500 inch regular strength fiber core. The Sonoco Tracking Unit (TU) number was TU03004824. The price quote received from Sonoco on March 18, 2003, for the 13.140 inch x 16.070 inch x 0.500 inch regular strength fiber core reflected a \$0.81 per core reduction from the previous quote received October 15, 2002. The new price was \$4.28 per core. Additionally, the price for the 13.410 inch x 16.070 inch x 0.500 inch HSM-1 fiber cores were requoted with a price of \$9.73743 per core (EMPAC item number D104995, Sonoco TU number TU03004405). This yielded a \$5.46 saving per each 13.140 inch x 16.070 inch x 0.500 inch regular strength fiber core versus the initial estimate of \$3.77 per core. On March 18, 2003, the 13.410 inch x 16.070 inch x 0.500 inch regular strength fiber cores were added to the existing Sonoco purchase order.

As previously outlined on March 14, 2003, the RPD Technical Team Leader gave immediate approval to convert the Rexam material to regular strength fiber cores. A quote for the new core size, 17.440 inch x 16.070 inch x 0.500 inch regular strength fiber core was requested March 18, 2003. The cost of the 17.440 inch x 16.070 inch x 0.500 inch HSM-1 (EMPAC item number D126047, Sonoco TU number TU 03004794) were \$12.69288 per core. The quote was received from the Sonoco Products Customer Service Representative on March 18, 2003. The 17.440 inch x 16.070 inch x 0.500 inch regular strength fiber core quote was \$5.37 per core. This quote reflected a savings of \$7.32 per core a 58% reduction. On March 21, 2003, the 17.440 inch x 16.070 in x 0.500 inch regular strength fiber core was set up in EMPAC (EMPAC item number D145587, Sonoco TU number TU03004470). On April 3, 2003, an email was sent to the Warrick Procurement Analyst to add D145587 to purchase

order WA157890. On April 4, 2003, a confirmation email was received from the Warrick Procurement Analyst confirming the addition. On April 7, 2003, all HSM-1 fiber cores were consumed for Coors and Rexam and all production was being produced using the regular strength fiber cores. On May 15, 2003, purchase order WA157890, Appendix D, was revised with all of the changes reflected in the conversion.

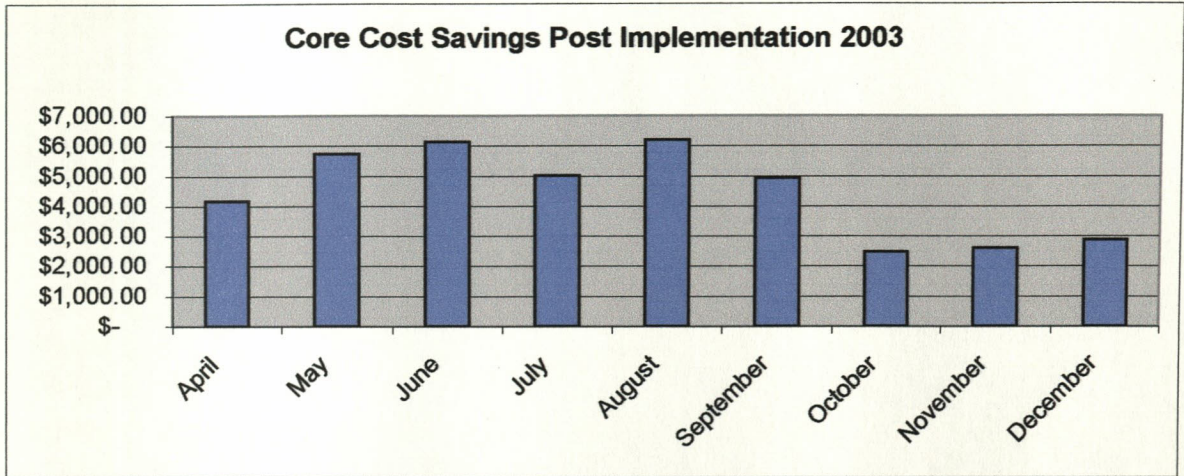
CONCLUSION

The project was fully implemented by April 7, 2003, with all E Coat®/Warrick slit material with coating weights less than three milligrams per square foot converted over to the regular strength fiber core. From April 7, 2003, through December 31, 2003, no “V” buckle or sag related collapse occurred as a direct result of the conversion from the HSM-1 fiber core to the regular strength fiber core. A search was conducted in the product tracking system, SAP, for all scrap off the Warrick Super Slitter during this time period. The scrap code used to identify and tracking coil collapse for the Super Slitter is 480E. During this time frame, over 26 million pounds of the E Coat® material was slit off the Warrick Super Slitter.

Figure 13 illustrates the monthly costs savings for the fiber cores used off the Super Slitter from April 7, 2003, through December 31, 2003. Over 7,000 various sized regular strength fiber cores were used for the E Coat® material during this time period. For the first three months of 2003, the average the monthly fiber core cost for the slitter process was roughly \$60,000. The average monthly savings for the project was \$4,459, which represents a 7% reduction in fiber core costs for the slitter.

Figure 13

Fiber Core Cost Savings Post Implementation 2003



Source: Joseph J. Vidmar, Detailed Economics per Table 5, 2004.

Table 3 details the customer cross references converted from the HSM-1 fiber core to the regular strength fiber core, the fiber core size, the number of cores per set, and the actual number of customer passes produced off the Warrick Super Slitter from April 7, 2003, to December 31, 2003. The table is broken down into the number of passes produced per month by customer cross reference.

Table 3

E Coat®/Super Slitter Production April 7, 2003 to December 31, 2003

<i>Xref</i>	<i>Core Size</i>	<i>No. of Cores Per Set</i>	<i>April</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>
6406	13.406	4	22	14	10	20	6	2	6	22	
6408	13.406	4	108	164	192	117	150	153	47	21	62
6410	13.406	4	2	2							
6421	13.406	4				1					
6422	13.406	4				2					
6425	13.406	4								2	
6598	17.44	3	4	6		6	9	3	4	4	12
6599	17.44	3	26	27	47	37	73	40	30	50	28
6612	6.125	9				4		2	2	6	3
6617	6.125	9	6	14	9	7	4	6	8	5	8
6618	17.44	3		6		6	4				
6620	17.44	3				2					
6625	17.44	3				2					
6626	17.44	3				4					
6701	13.406	4	18	27	14	11	14	12	12		14

Source: Joseph J. Vidmar, Warrick Shop Floor SAP System Production Download, 2004.

Table 4 details the regular strength fiber core cost versus the HSM-1 fiber core cost on the Warrick/Sonoco Products Purchase Order dated May 15, 2003.

Table 4

Regular Strength Versus HSM-1 Fiber Core Cost – May 15, 2003

Prices Based on Purchase Order Dated 5/15/2003			
Core Size	Regular	Price/Inch	HSM-1
13.406	\$ 4.28281		\$ 9.73743
17.440	\$ 5.56896		\$ 12.69288
6.125	\$ 1.58246		\$ 3.57415*
70	\$ 18.08528	\$ 0.258361	
70		\$ 0.583535	\$ 40.84743

* - Labor cost is excluded from calculation for this value since these cores are cut at Warrick Operation

Source: Joseph J. Vidmar, Warrick/Sonoco Purchase Order WA157890, May 15, 2003.

Table 5 details the savings associated by month for each customer cross reference.

The dollar value listed is the cost differential between the regular strength fiber cores and the HSM-1 fiber cores as listed in Table 4 times the actual production listed in Table 3. From April 7, 2003, to December 31, 2003, the saving for the nine-month period was \$40,130. Based on an 18% return on capital the annualized savings would be \$48,635.37. For the five-year long-term contract period the savings would be \$175,592.59 using an average monthly cost savings of \$4,458.89.

Table 5

Monthly Cost Savings per Customer Cross Reference

<i>Xref</i>	<i>April</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>August</i>	<i>September</i>	<i>October</i>	<i>November</i>	<i>December</i>	<i>Year 2003 Savings</i>
6406	\$480	\$305	\$218	\$436	\$131	\$44	\$131	\$480	\$0	\$2,225
6408	\$2,356	\$3,578	\$4,189	\$2,553	\$3,273	\$3,338	\$1,025	\$458	\$1,353	\$22,124
6410	\$44	\$44	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$87
6421	\$0	\$0	\$0	\$22	\$0	\$0	\$0	\$0	\$0	\$22
6422	\$0	\$0	\$0	\$44	\$0	\$0	\$0	\$0	\$0	\$44
6425	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$44	\$0	\$44
6598	\$114	\$171	\$0	\$171	\$256	\$85	\$114	\$114	\$342	\$1,368
6599	\$741	\$769	\$1,339	\$1,054	\$2,080	\$1,140	\$855	\$1,425	\$798	\$10,201
6612	\$0	\$0	\$0	\$32	\$0	\$16	\$16	\$48	\$24	\$135
6617	\$48	\$112	\$72	\$56	\$32	\$48	\$64	\$40	\$64	\$534
6618	\$0	\$171	\$0	\$171	\$114	\$0	\$0	\$0	\$0	\$456
6620	\$0	\$0	\$0	\$57	\$0	\$0	\$0	\$0	\$0	\$57
6625	\$0	\$0	\$0	\$57	\$0	\$0	\$0	\$0	\$0	\$57
6626	\$0	\$0	\$0	\$114	\$0	\$0	\$0	\$0	\$0	\$114
6701	\$393	\$589	\$305	\$240	\$305	\$262	\$262	\$0	\$305	\$2,662
	\$4,175	\$5,739	\$6,124	\$5,006	\$6,192	\$4,933	\$2,467	\$2,608	\$2,886	\$40,130

Source: Joseph J. Vidmar, Fiber Core Savings Based on Core Usage (Table 3) and Core Cost (Table 4), 2004.

Based on the economic benefits of the project and the fact that no negative impacts internal to the slitting process, nor impacts external at the customers were identified this

project was noted as a success. Additional opportunities of like coated material off of the two Warrick Roll Coat lines should be evaluated for potential conversion. These opportunities could yield similar results for the business and focus on eliminating waste inherent in the coating and slitting processes.

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WINDER V4.2, A proprietary winding analysis software package developed by the Web

Handling Research Center, Oklahoma State University

Appendix A

Source: Sonoco Products Purchase/Alcoa Warrick Operations Purchase Order WA157890,
2001.

Customer:
ALCOA
VENDOR NO. 821004-00
STATE ROUTE 66
NEWBURGH, IN 47630
United States



Bill To:
PO BOX 1187
PITTSBURGH, PA
15230-1187

Customer #:
009284

Order Fulfillment Center
North Second Street
Hartsville, SC 29550
888-875-8754
FAX (843) 339-6803

Ship To:
VENDOR NO.
821004-00
STATE ROUTE 66
NEWBURGH, IN
47630 United States

Contact:
Deffendall, Mike
8128534661
8128534216 (Fax)

Effective Date:
5/1/01

Expiration Date:
08/01/2002

Quote #:
042401-29972-1234

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	48" - 62" Perf Ea 2" of Diam Horseshoe Headers .035 Chip			
ITEM 33/D047080	62" Donut Headers, .030 pt chip	RH00000538	1200	\$.8624 Per Each
ITEM 1/D116481	48" - 62" Perf Ea 2" of Diam Horseshoe Headers .040 Chip	RH00000473	1300	\$1.823 Per Each
	64" Horseshoe Headers .030 Chip	RH00000474		\$.907 Per Each
	66" Horseshoe Headers .030 Chip	RH00000475		\$.964 Per Each
	68" Horseshoe Headers .030 Chip	RH00000476		\$1.023 Per Each
	70" Horseshoe Headers .030 Chip	RH00000477		\$1.084 Per Each
	72" Horseshoe Headers .035 Chip	RH00000478		\$1.287 Per Each
	74" Horseshoe Headers .035 Chip	RH00000479		\$1.360 Per Each
	76" Horseshoe Headers .035 Chip	RH00000480		\$1.433 Per Each
	78" Horseshoe Headers .035 Chip	RH00000481		\$1.510 Per Each
	80" Horseshoe Headers .035 Chip	RH00000482		\$2.992 Per Each
ITEM 39/D116482	82" -94" Perf Ea 2" of Diam Horseshoe Headers .040 Chip	RH00000483	1300	\$5.850 Per Each
ITEM3/D116478	60" Polycoated 2 Sides Horseshoe Headers .030	RH00000484	1300	\$1.291 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
ITEM 2/D116479	66" Polycoated 2 Sides Horseshoe Headers .030	RH00000485	1300	\$1.561 Per Each
ITEM 4/D116480	72" Polycoated 2 Sides Horseshoe Headers .030	RH00000486	1000	\$2.08 Per Each
ITEM 22/D047082	66" Donut Headers, .030 pt chip	RH00000490	1200	\$.9951 Per Each
ITEM 23/D047083	68" Donut Headers, .030 pt chip	RH00000491	1200	\$1.0562 Per Each
ITEM 24/D047084	70" Donut Headers, .030 pt chip	RH00000492	1200	\$1.1190 Per Each
ITEM 32/D047087	76" Donut Headers, .030 pt chip	RH00000493	1200	\$1.3185 Per Each
ITEM 8/D047092	48" Donut Foam Headers, .250" thick 16" hole	RH00000494	150	\$1.8122 Per Each
ITEM 9/D047093	52" Donut Foam Headers, .250" thick 16" hole	RH00000495	150	\$2.3298 Per Each
ITEM 10/D047098	56" Donut Foam Headers, .250" thick 16" hole	RH00000496	150	\$2.490 Per Each
ITEM 11/D047099	62" Donut Foam Headers, .250" thick 16" hole	RH00000497	150	\$3.229 Per Each
ITEM 12/D047100	66" Donut Foam Headers, .250" thick 16" hole	RH00000498	150	\$3.420 Per Each
ITEM 13/D047101	68" Donut Foam Headers, .250" thick 16" hole	RH00000499	150	\$3.514 Per Each
ITEM 14/D047102	72" Donut Foam Headers, .250" thick 16" hole	RH00000500	150	\$3.7183 Per Each
ITEM 8/D123275	64" Horseshoe Headers .035 Chip	RH00000502	1700	\$1.016 Per Each
ITEM 7/D123274	66" Horseshoe Headers .035 Chip	RH00000503	1700	\$1.080 Per Each
ITEM 6/D123273	68" Horseshoe Headers .035 Chip	RH00000504	1700	\$1.146 Per Each
ITEM 5/D123272	70" Horseshoe Headers .040 Chip	RH00000505	1500	\$1.577 Per Each
ITEM 4/D123271	72" Horseshoe Headers .040 Chip	RH00000506	1500	\$1.667 Per Each
ITEM 3/D123270	74" Horseshoe Headers .040 Chip	RH00000507	1500	\$1.763 Per Each
ITEM 2/D123269	76" Horseshoe Headers .040 Chip	RH00000508	1500	\$1.858 Per Each
ITEM 1/D123267	78" Horseshoe Headers .040 Chip	RH00000509	1500	\$1.956 Per Each
ITEM 9/D123265	80" Horseshoe Headers .040 Chip	RH00000510	1500	\$3.88 Per Each
ITEM 26/D047081	64" Donut Headers, .030 pt chip	RH00000511	1200	\$.94 Per Each
ITEM 30/D047085	72" Donut Headers, .030 pt chip	RH00000512	1200	\$1.18 Per Each
ITEM 31/D047086	74" Donut Headers, .030 pt chip	RH00000513	1200	\$1.2523 Per Each
ITEM 37/D128775	58" Horseshoe Headers .040 Chip	RH00000535	1500	\$1.100 Per Each
ITEM 36/D128776	54" Horseshoe Headers .040 Chip	RH00000536	1500	\$.9520 Per Each
ITEM 35/D128777	50" Horseshoe Headers .040 Chip	RH00000537	1500	\$.8023 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	10.375" x 19.930" x 0.375" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted IS: 0.025" Duro Butted Stretchwrap/Horizontal/Pallet ized			\$3.21 Per Each
ITEM 22/D050665	72.000" x 16.000" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000413	20	\$9.95 Per Each
ITEM 21/D050663	30.875" x 16.070" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000414	40	\$4.23 Per Each
ITEM 7/D050662	20.000" x 16.000" x 0.250" TC86 Cut IS Prt 1: Flying S - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000415	75	\$2.99 Per Each
ITEM 24/D054150	18.000" x 16.000" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000416	75	\$2.70 Per Each
ITEM 6/D050661	17.000" x 16.000" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000417	75	\$2.54 Per Each
ITEM 5/D050660	14.000" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000418	100	\$2.10 Per Each
ITEM 20/D050659	13.000" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000419	100	\$1.95 Per Each
ITEM 26/D050644	19.000" x 16.070" x 0.500" TC86 Cut	TU03000420	72	\$5.31 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted IS: 0.025" Duro Butted S100 Carts			
ITEM 46/D128629	1.500" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03000421	450	\$.69 Per Each
Obsolete	2.500" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted S100 Carts	TU03000422	285	\$1.16 Per Each
ITEM 3/D050643	18.000" x 16.070" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts	TU03000423	72	\$5.03 Per Each
ITEM 1/D050641	6.000" x 16.070" x 0.500" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted IS: 0.025" Duro Butted S100 Carts	TU03000424	207	\$3.35 Per Each
ITEM 2/D050642	8.500" x 16.070" x 0.500" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts	TU03000425	150	\$4.75 Per Each
ITEM 9/D050639	36.000" x 16.000" x 0.750" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000432	44	\$12.50 Per Each
ITEM 13/D050650	70.000" x 16.000" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03000434	18	\$17.44 Per Each
ITEM 8/D050664	32.750" x 15.930" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted	TU03000436	40	\$4.52 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	S100 Carts			
ITEM 18/D050656	24.000" x 19.930" x 0.375" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted IS: 0.025" Duro Butted S100 Carts	TU03000438	36	\$6.74 Per Each
ITEM 11/D050648	20.000" x 16.070" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted IS: 0.025" Duro Butted S100 Carts	TU03000440	72	\$5.55 Per Each
ITEM 4/D050657	19.500" x 19.930" x 0.375" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted IS: 0.025" Duro Butted S100 Carts	TU03000441	48	\$5.48 Per Each
Obsolete	72.000"x16.070"x.500" HSM-1	TU03002542	24	\$45.50 Per Each
ITEM 19/D050658	20.000" x 19.930" x 0.250" TC86 Cut IS Prt 1: "ALCOA" - Blue BLUE PANTONE 293 IS Prt 2: Date of Mfg. - Black S47 Racks	TU03002555	48	\$4.45 Per Each
ITEM 12/D050649	17.000" x 19.930" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03002672	48	\$3.78 Per Each
ITEM 14/D054157	19.000 X16.070 X.500 HSM-1	TU03002779	72	\$12.58 Per Each
ITEM 10/D054158	20.000" X16.070 X.500 HSM-1	TU03002886	72	\$13.24 Per Each
ITEM 25/D054159	28.125" x 16.070" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted IS: 0.025" Duro Butted S100 Carts	TU03002887	40	\$3.89 Per Each
ITEM 15/D053382	70" X16.070 X.500 HSM-1	TU03002924	24	\$39.39 Per Each
ITEM 35/D087430	28.250" x 16.070" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts	TU03003445	72	\$7.04 Per Each
ITEM 34/D087435	29.000" x 16.070" x 0.500" TC86 Cut	TU03003446	72	\$7.22 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts			
	10.750" x 15.930" x 0.375" Blade Cut OS Prt 1: Stripe * 1" Solid - Blue IS Prt 1: Date of Mfg. - Black Stretchwrap/Horizontal/Pallet ized	TU03003502		\$4.30 Per Each
ITEM 36/D095314	20.000" X16.070 X.450 HSM-1 S-105 CART	TU03003588	72	\$11.99 Per Each
Obsolete	29.000" x 16.070" x 0.400" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted S100 Carts	TU03003868	48	\$6.90 Per Each
REPLACED BY 4405	13.375" X16.070 X.500 HSM-1 S-105 CART	TU03003869	96	\$8.86 Per Each
ITEM 38/D108496	3.250" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.013" KT Duro w/f 1/s Butted IS: 0.025" Duro Butted S100 Carts	TU03003962	225	\$1.04 Per Each
ITEM 39/D108525	3.250" x 16.070" x 0.500" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts	TU03003963	225	\$2.50 Per Each
ITEM 1/D122250	17.000" x 23.850" x 0.250" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004386	48	\$4.63 Per Each
ITEM 37/D104995	13.406" X16.070 X.500 HSM-1 S-105 CART	TU03004405	96	\$8.86 Per Each
ITEM 40/D123030	17.000" x 23.850" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004428	36	\$8.43 Per Each
ITEM 16/D050653	1.800" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004468	450	\$0.73 Per Each
ITEM 17/D050654	2.600" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black	TU03004469	285	\$1.18 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM
	IS Prt 2: "ALCOA" - Blue OS: 0.011" 42# Solid Duro Butted S100 Carts			
	17.440" x 16.070" x 0.500" TC86 Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue OS: 0.020" DX-135 Butted S100 Carts	TU03004470	72	\$4.88 Per Each
ITEM 42/D127277	0.840" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004538		\$.64 Per Each
ITEM 43/D127278	1.000" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004539		\$.65 Per Each
ITEM 44/D127279	1.600" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004540		\$.72 Per Each
ITEM 45/D127280	2.250" x 16.070" x 0.250" PM Core Cut IS Prt 1: SONOCO LOGO & DATE - Black IS Prt 2: "ALCOA" - Blue S100 Carts	TU03004541		\$.79 Per Each
ITEM 41/D126047	17.440 X16.070 X.500 HSM-1	TU03004570	72	\$11.55 Per Each

Customer Part	Description	Baan Part	Pack Unit Qty	Price/UOM

Status:

Notes:

Customer Service Representative

Lead Time:

Payment Terms:

Minimum Order:

Freight Terms:

Appendix B

Source: Alcoa, Inc., Warrick Operations, Fabricating Products Change Request Log, 2002.

CHANGE REQUEST			
CHANGE DESCRIPTION			
Requested by: Julie Sheet		Change Request Number: FAB.CC.091	
Date: 06/04/02	Department: Finishing	Production Center: E-coat	
Continuous Improvement Yes		Type of change: Process	
Duration of Change: Permanent		If Temporary, Timing for Temporary Change:	
Describe the change: Revert to Standard Strength cores on all E Coat material with coating weight < 3 mg/ft from HSM-1 fiber core to regular strength fiber cores.			
Describe the benefits of the change: Cost reduction			
Describe the risks of the change: Chance of core collapses during winding, transportation, or at the customer location			
CHANGE EVALUATION			
Individual(s) assigned to evaluate change: J. Sheets			
How will change be evaluated: Monitor customer complaints for collapsed core incidents			
Intended/Planned time for evaluation: 6 months			
Communicate to employees affected prior to the evaluation:	Yes	Date Completed:	11/11/2002
Any possible impact on other production centers or customers:	Yes	Date Completed:	6/4/2002
If yes, describe possible impact: Possible increase in collapsed core complaints			
Production center(s) and/or customers notified:	Yes	Date Completed:	9/24/2002
Customer Specification reviews required:	No	Date Completed:	
Are safety reviews required:	No	Date Completed:	
Are FDA/Environmental reviews required:	No	Date Completed:	
		Date Completed:	
CHANGE APPROVAL			
<u>Position</u>	<u>Signature</u>	<u>Approve</u>	<u>Date</u>
Area Coordinator	Brent Johnson	Yes	6/6/2002
Production Planning	Ray Fechner	Yes	10/15/2002
Product Met	Fred Packer	Yes	8/8/2002
Department Manager	Jeff Jost	Yes	8/9/2002
Technical Coordinator	Joe Vidmar	Yes	8/2/2002
Others:	N/A <input type="checkbox"/>		
Who is assigned to implement change: J. Sheets			
When will change be implemented: June 28 th , 2002			
CHANGE VERIFICATION			
Verification of Benefits: Core cost reduction			
Have impacted quality system documents been revised:	Yes	Date Completed:	11/2002
Is training/retraining completed:	N/A	Date Completed:	
Has impacted process software been revised:	N/A	Date Completed:	
Has change been communicated to all employees:	Yes	Date Completed:	11/11/2002
Verified by: Julie Sheets		Date Verified:	04/07/2003
Comments: Conversion to .02 - standard strength cores began mid Nov 2002 - Documentation conversion completed early Nov 2002. As of April 7, 2003, no collapsed cores have been reported on converted customers that were not associated with transportation damage.			

Appendix C

Source: Joseph J. Vidmar, Alcoa, Inc., Warrick Shop Floor SAP System Download, 2002.

Xref	Status	Customer	Location	External Coating Weight	Internal Coating Weight	Coating Color	Updated Core Type	Core Type #	Comment
6401	active	MMC	Gainsville	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6404	active	MMC	Riverside	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6405	active	Rexam	Coors / Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6406	active	Coors	Golden	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6408	active	Coors	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6410	active	Coors	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6412	active	Coors	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6415	active	Coors	Golden	2.25	2.25	Clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6417	active	Latasa	Montevideo	2.2	3.5	gold	HS Core	"04"	no change needed
6418	active	Lalapack	Sao Paulo	2.2	2.5	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6549	active	AB/Ball	Golden	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6568	active	AB/Ball	Findlay	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6586	active	Rexam	Coors / Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6588	active	Rexam	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6590	active	Lanesa	Pernambuco	2.22	3.5	gold	HS Core	"04"	no change needed
6595	active	AB/MCC	Oklahoma City	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6598	active	Rexam	Valparaiso	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6600	active	Rexam	Birmingham - Roll Tidel	2	2	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6603	active	Rexam	Birmingham - Roll Tidel	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6607	active	Lanesa	Pernambuco	2.2	3.5	gold	HS Core	"04"	no change needed
6610	active	Centrolampa	Sao Paulo	2.2	2.5	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6618	active	Rexam	Valparaiso	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6621	active	Ball	Findlay	2	2	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
6622	active	Ball	Findlay	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6700	active	Coors	Golden	2	2	gold	16" Fiber, 1/2" core	"02"	change Xref to std core
6701	active	Coors	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
8071	active	Rexam	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
8086	active	Rexam	Golden	2.1	2.1	clear	16" Fiber, 1/2" core	"02"	change Xref to std core
9935	active	Latasa	Montevideo	2.2	3.5	gold	HS Core	"04"	no change needed
1636	inactive	MMC	Gainsville	2	2	gold	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
1683	inactive	MMC	Riverside	2	2	gold	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6407	inactive	Coors	Golden	2	2	gold	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6409	inactive	Rexam	Coors / Golden	2.1	2.1	clear	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6411	inactive	Coors	Golden	2.25	2.25	clear	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6604	inactive	ANC	Golden	2.1	2.1	clear	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6605	inactive	Rexam	Golden	2.1	2.1	clear	16" Fiber, 1/2" core	"02"	add note to change if xref is copied
6609	inactive	Crown	Cabreuva	3.5	2.2	gold	HS Core	"04"	no change needed
6611	inactive	Crown	Baltreuva	2.5	2	gold	16" Fiber, 1/2" core	"02"	add note to change if xref is copied

Appendix D

Source: Sonoco Products Purchase/Alcoa Warrick Operations Purchase Order WA157890,
2002.

To : SONOCO PRODUCTS COMPANY - Ipd Division

North 2nd Street

HARTSVILLE, SC 29550

From : R. Todd Eldridge

Alcoa Inc.

Highway 66

Newburgh, IN 47630

Telephone Number : 888-875-8754 **Telephone Number :** (812) 853-4402

Fax : (843)339-6803 **Fax :** (812) 853-4078

Email todd.eldridge@alcoa.com

Freight Code : Destination/Prepaid

Ship Via :

Payment Terms : NET 60 DAYS 5TH PROX

Retained Percentage :

Notes : FREIGHT: If Alcoa Inc. has agreed to pay freight and UPS cannot be used -

For LTL collect shipments, use <http://tms.meridianiq.com> for carrier routing. If you have not registered previously, use the registration number in the Quick Start Guide for a user ID and password; go to service@meridianiq.com or call 800-295-4014. Be sure to identify yourself as an Alcoa supplier. To arrange carrier routing for FULL TRUCKLOAD

shipments, contact Central Dispatch, 800-762-5623. The following must appear on the Bill of Lading: "Remit freight bills to: Alcoa Inc., Audit & Claims Section, PO Box 170, Pittsburgh, Pa. 15230." PRICING: If the PRICE and/or DUE DATES are incorrect on the purchase order, supplier shall notify the buyer PRIOR to shipment by either fax or email (shown above). Payment shall be rendered based on purchase order price.

Order Notes :REV. 8; TERMS REVISED TO NET 60 DAYS; 5TH PROX, PER NATIONAL AGREEMENT (RTE)

REV. 3; 08 JAN 2003 - ADDED ITEM #48 TO BLANKET ORDER FOR RELEASE PURPOSES (RTE)

ATTN: TRICIA TILDEN-GRIGGS

THIS PURCHASE ORDER SUPERSEDES PREVIOUS PO #WA042136 IN ITS ENTIRETY AND IS EFFECTIVE IMMEDIATELY THROUGH 12/31/2003.

NOTE: ITEMS ARE "MOST" LIKELY NOT IN THE SAME ORDER SEQUENCE AS PREVIOUS PURCHASE ORDER!!!! IF ANY ITEMS EXIST WHICH ARE "OBSOLETE", PLEASE INFORM BUYER VIA EMAIL OF SUCH ITEMS FOR REMOVAL. ALL/ANY PREVIOUS TERMS AND CONDITIONS APPLY.

FDA COMPLIANCE: THIS MATERIAL IS TO BE USED IN THE FABRICATION OF PACKAGING MATERIALS WHICH WILL COME IN CONTACT WITH FOOD.

ACCEPTANCE OF THIS ORDER IS CONDITIONED ON SELLER'S ASSURANCE THAT THE MATERIAL COVERED HEREIN IS IN COMPLIANCE WITH THE 1958 FOOD ADDITIVES AMENDMENT OF THE FEDERAL FOOD, DRUG AND COSMETIC ACT. CONEG COMPLIANCE: SUPPLIER ASSURES ALL MATERIALS PURCHASED FOR USE IN PACKAGING COMPLY WITH THE CONEG MODEL

Fri Apr 4 07:45:42 CST 2003 Change Order Page 1 of 16

Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

LEGISLATION REGARDING HEAVY METALS IN PACKAGING MATERIALS.

CALIFORNIA'S PROPOSITION 65: SUPPLIER WILL PROVIDE INFORMATION

REGARDING PRESENCE OF CHEMICALS IN THEIR PRODUCTS WHICH ARE ON

CALIFORNIA'S PROPOSITION 65 LIST (SAFE DRINKING WATER AND TOXIC

ENFORCEMENT ACT OF 1986). (RTE)

Purchase Order Item Detail

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

1. D050657 2016.00 5.24000 0.00 10563.84

EA 0.00

CORE, FIBER, METALLAN SPIRAL TUBE - 19.5 IN LONG X 19.9300 IN I.D. X .375 IN

WALL. LENGTH TOLERANCE TO BE +/- .250

IN. NORMAL CORE CONTRUCTION. INVENTORY LEVELS TO BE 5 DAILY AND 5

FRIDAY/WEEKEND. DESIGNATE "PREPS". APROXIMATE

USAGE: 500 CORES/MO SONOCO CONTROL NO. 57

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

2. D050656 TU03000438 25000.00 6.45000 0.00 161250.00

EA 0.00

(TU03000438) CORE, FIBER, METALLAN SPIRAL TUBE - 24 IN LONG X 19.930 IN I.D. X .375 IN WALL. LENGTH TOLERANCE TO BE +/- .250 IN. NORMAL CORE CONSTRUCTION. INVENTORY LEVELS TO BE 10 DAILY & 10 FIRDAY/WEEKEND. DESIGNATE "PREPS". APPROXIMATE USAGE: 1000 CORES/MO SONOCO CONTROL NO. 55

Item Number	Supplier Reference Number	Quantity	Unit Price	Discount	Line Value
Purchase UOM	Payment UOM	Payment Quantity	Agreement Number		
Line	Manufacturer	Manufacturer Reference Number			

3.	D053382	TU03002924	8000.00	39.39000	0.00	315120.00
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EA 0.00

(TU03002994) CORE, FIBER, - MODIFIED STIFFNESS CORE - 70" LONG X 16" I.D. X .500" WALL. THE CORE IS TO HAVE AN MOD STIFFNESS VALUE OF 57,900 PSI. DESIGNATE "SLIT" - SONOCO CONTROL *** NO. 63 ***. INITIAL INVENTORY LEVELS ARE TO BE "AS REQUESTED BY ALCOA." PRINT "HSM-1" ON THE CORE I.D. PER REQUEST BY ALCOA'S BERNIE BECKER AND CONVERSATION WITH SONOCO'S CHANDRA MATUCCI AND ALCOA'S TODD ELDRIDGE.

Item Number	Supplier Reference Number	Quantity	Unit Price	Discount	Line Value
Purchase UOM	Payment UOM	Payment Quantity	Agreement Number		
Line	Manufacturer	Manufacturer Reference Number			

4.	D050641	TU03000424	4500.00	3.35000	0.00	15075.00
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EA 0.00

Fri Apr 4 07:45:42 CST 2003 Change Order Page 2 of 16

Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

CORE, FIBER, (TU03000424) - METALLAN SPIRAL TUBES 6 IN X 16 IN X .500 IN -

INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

5. D050643 TU03000423 10000.00 5.03000 0.00 50300.00

EA 0.00

CORE, FIBER, TU03000423 - METALLAN SPIRAL TUBES 18 IN X 16 IN X .500 IN -

INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK. KNIFE CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

6. D050658 100016.00 4.45000 0.00 445071.20

EA 0.00

(TU03002555) CORE, FIBER, METALLAN SPIRAL TUBE - 20 IN LONG X 19.930 IN

I.D. X .250 IN WALL. LENGTH TOLERANCE TO

BE +/- .250 IN NORMAL CORE CONSTRUCTION. INVENTORY LEVELS TO BE 4/6
 DIALY AND 6/8 FRIDAY/ WEEKEND. DESIGNATE
 "SLITTERS". APPROXIMATE USAGE: 1000 CORES/MO SONOCO CONTROL NO. 58

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

7. D050659 TU03000419 40000.00 1.95000 0.00 78000.00
 EA 0.00

CORE, FIBER, TU03000419 - METALLAN SPIRAL TUBES 13 IN X 16 IN X .250 -
 INSIDE PRINTED DATE OF MANUFACTURE, SONOCO
 LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

8. D050663 TU03000414 20000.00 4.23000 0.00 84600.00
 EA 0.00

CORE, FIBER, - METALLAN SPIRAL TUBES 30-7/8 IN X 16 IN X .250 - INSIDE
 PRINTED DATE OF MANUFACTURE, SONOCO LOGO &
 ALCOA IN BLACK -- OUTSIDE REPUBLIC - KNIFE CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

9. D050665 4000.00 9.95000 0.00 39800.00

EA 0.00

CORE, FIBER, TU03000413 - METALLAN SPIRAL TUBES 72 IN X 16 IN X .250 -
INSIDE PRINTED DATE OF MANUFACTURE, SONOCO

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - KNIFE CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

10. D054150 TU03000416 45075.00 2.70000 0.00 121702.50

EA 0.00

CORE, FIBER, 920110602841 - METALLAN SPIRAL TUBES 18" X 16" X .250 - INSIDE
PRINTED DATE OF MANUFACTURE, SONOCO

LOGO & ALCOA IN BLACK. OUTSIDE REPUBLIC - PM CUT.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

11. D054159 TU03002887 20000.00 3.89000 0.00 77800.00

EA 0.00

CORE, FIBER, *** SONOCO CONTROL NO.: 62 ***

28.125" LONG, 16" I.D. X .250" WALL. NORMAL CORE CONSTRUCTION.

DESIGNATE

"SLIT" - INVENTORY LEVELS ARE TO BE 5/6 ON BOTH DURING THE WEEK, AND ON WEEKENDS.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

12. D105189 10000.00 6.90000 0.00 69000.00

EA 0.00

CORE, FIBER. METALLAN SPIRAL TUBE. NORMAL CONSTRUCTION,
29"X16.070"X.400" WALL. REPUBLIC OUTSIDE, SONOCO LABEL
IN BLACK, ALCOA LABEL IN BLUE IN THE ID.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

13. D050660 TU03000418 15000.00 2.10000 0.00 31500.00

EA 0.00

CORE, FIBER, TU03000418 - METALLAN SPIRAL TUBES 14 IN X 16 IN X .250 -
INSIDE PRINTED DATE OF MANUFACTURE, SONOCO
LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

14. D050642 2100.00 4.75000 0.00 9975.00

EA 0.00

CORE, FIBER - TU0300425 - METALLAN SPIRAL TUBES 8-1/2 IN X 16 IN X .500 IN -
INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

15. D050662 10050.00 2.99000 0.00 30049.50

EA 0.00

CORE, FIBER, 920110602840 - METALLAN SPIRAL TUBES 20 IN X 16 IN X .250 -
INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

16. D050639 TU03000432 5016.00 12.50000 0.00 62700.00

EA 0.00

CORE, FIBER - (TU03000432) - METALLAN SPIRAL TUBES 36 IN X 16 IN X .750 IN -
INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - KNIFE CUT.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

17. D050650 TU03000434 9000.00 17.44000 0.00 156960.00

EA 0.00

CORE, FIBER, TU03000434 - METALLAN SPIRAL TUBES 70 IN X 16 IN X .500 IN -
INSIDE PRINTED DATE OF MANUFACTURE,

SONOCO LOGO & ALCOA IN BLACK - KNIFE CUT.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

18. D087435 10000.00 7.22000 0.00 72200.00

EA 0.00

FIBER CORES, 29"X16"X.500", REGULAR STRENGTH, NORMAL CONSTRUCTION,
MFGR SONOCO, LABELED "SLIT", MIN/MAX 4/6.

TO BE DELIVERED TO PACK SHIP RECEIVING TU03003446.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

19. D087430 20000.00 7.04000 0.00 140800.00

EA 0.00

FIBER CORES, 28.25"X16".500", MFGR. SONOCO, REGULAR STRENGTH, LABELED
"SLIT", NORMAL CONSTRUCTION, MIN/MAX

4-6, APPROX USEAGE IS 10,000 PER YEAR .TU03003445. DSS

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

20. D095314 72.00 11.99000 0.00 863.28

EA 0.00

CORE, FIBER, 20"X16"X.450", HSM1 (TRIAL CORES), MUST HAVE RED PRINT IN ID OF CORE.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

21. D104995 TU03004405 10000.00 9.39000 0.00 93900.00

EA 0.00

CORE, FIBER. METALLAN SPIRAL TUBE, 13.406" IN LENGTH X 16 INCH I.D. X .500 WALL, HSM. LENGTH TOLERANCE IS + -.062". MODIFIED STIFFNESS WITH AN O.D. STIFFNESS VALUE OF 57,900 P.S.I.. DESIGNATED FOR "SLIT". OUTSIDE REPUBLIC, INSIDE SONOCO LOGO WITH MFG DATE IN BLACK AND ALCOA IN BLUE. INVENTORY LEVELS ARE 6 MIN AND 8 MAX. APPROXIMATE USAGE IS 10,000 PER YEAR. (rev. 01/25/02, M.Deffendall).

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

22. D108496 25000.00 1.04000 0.00 26000.00

EA 0.00

CORE, FIBER - METALLAN SPIRAL TUBES. 3.25" X 16.070" X .250" P.M. CUT.

MIN/MAX SHALL BE 4-6. MUST BE LABELED SLIT,

STACKED HORIZONTAL WITH TRIANGULAR TUBE PLACED IN THE ID.

APPROXIMATE USAGE IS 25,000 PIECES PER YEAR. THIS WILL

BE PURCHASE ORDER ITEM NUMBER 32, CONTROL NUMBER 69

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

23. D108525 25000.00 2.50000 0.00 62500.00

EA 0.00

CORE, FIBER - METALLAN SPIRAL TUBES. 3.25" X 16.070" X .500" P.M. CUT.

MIN/MAX LEVELS ARE 4/6. APPROXIMATE USAGES

IS 25,000 PER YEAR. TO BE LABELED "SLIT". TO BE STACKED HORIZONTALY

WITH A TRIANGULAR TUBE PLACED IN THE I.D. THIS

WILL BE PURCHASE ITEM NUMBER 33, CONTROL NUMBER 70.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

24. D087435 2000.00 7.22000 0.00 14440.00

EA 0.00

FIBER CORES, 29"X16"X.500", REGULAR STRENGTH, NORMAL CONSTRUCTION,
MFGR SONOCO, LABELED "SLIT", MIN/MAX 4/6.

TO BE DELIVERED TO PACK SHIP RECEIVING TU03003446.

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

25. D087430 4700.00 7.04000 0.00 33088.00

EA 0.00

FIBER CORES, 28.25"X16".500", MFGR. SONOCO, REGULAR STRENGTH, LABELED
"SLIT", NORMAL CONSTRUCTION, MIN/MAX

4-6, APPROX USEAGE IS 10,000 PER YEAR .TU03003445. DSS

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

26. D095314 20.00 11.99000 0.00 239.80

EA 0.00

CORE, FIBER, 20"X16"X.450", HSM1 (TRIAL CORES), MUST HAVE RED PRINT IN
ID OF CORE.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

27. D123030 TU03004428/TC86 CUT 4000.00 8.43000 0.00 33720.00

EA 0.00

(TU03004428) CORE, FIBER, TC86 CUT, 17.0" LONG X 23.850" I.D. X .500" WALL. IS

PRT 1: SONOCO LOGO & DATE - BLACK;

IS PRT 2: "ALCOA" - BLUE; S100 CARTS. INITIAL INVENTORY LEVELS ARE TO

BE "AS REQUESTED BY ALCOA."

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

28. D050653 TU03000421 60000.00 0.73000 0.00 43800.00

EA 0.00

CORE, FIBER, (TU03004468) - METALLAN SPIRAL TUBES 1.800 IN X 16.07 IN X .250

- PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

29. D050664 TU03000436 14000.00 4.52000 0.00 63280.00

EA 0.00

CORE, FIBER, TU03000436, METALLAN TUBES 32.750 IN X 15.930 X .250, OUTSIDE

PRINTED RED STRIP - INSIDE PRINTED

"ALCOA" IN BLUE & DATE OF MANUFACTURE, SONOCO LOGO IN BLACK -
KNIFE CUT

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

30. D127280 10000.00 0.79000 0.00 7900.00

EA 0.00

FIBER TUBES. 2.25" X 16.070" X .250". CTRL NUMBER 76. KANBAN CARD ON
RACK IS REQUIRED. NORMAL CONSTRUCTION,
METALLAN SPIRAL TUBE, PM CUT. INSIDE DATE OF MFG AND SONOCO LABLE
IN BLACK, ALCOA LOGO IN BLUE. MIN/MAX IS 2
RACKS. ESTIMATED USAGE IS 10,000 PER YEAR.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

31. D127279 10000.00 0.72000 0.00 7200.00

EA 0.00

FIBER TUBES. 1.6" X 16.070" X .250". CTRL NUMBER 75. KANBAN CARD ON
RACK IS REQUIRED. NORMAL CONSTRUCTION,

METALLAN SPIRAL TUBE. INSIDE DATE OF MFG AND SONOCO LABLE IN BLACK, ALCOA LOGO IN BLUE. MIN/MAX IS 2 RACKS, ESTIMATED USAGE IS 10,000 PER YEAR. PM CUT.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

32. D127278 10000.00 0.65000 0.00 6500.00

EA 0.00

FIBER TUBES. 1" X 16.070" X .250". CTRL NUMBER 74, MIN/MAX IS 2 RACKS. KANBAN CARD ON RACK IS REQUIRED. NORMAL CONSTRUCTION, METALLAN SPIRAL TUBE. DATE OF MFG AND SONOCO LOGO ON INSIDE IN BLACK, ALCOA LOGO IN BLUE. PM CUT. ESTIMATED USAGE IS 10,000 PER YEAR.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

33. D127277 10000.00 0.64000 0.00 6400.00

EA 0.00

FIBER CORES. 0.84" X 16.070" X .250". CTRL NUMBER 73. MIN/MAX IS 2 RACKS. ESTIMATED USAGE IS 10,000 PER YEAR. ARE TO BE LABELED "PREP" AND CHARGED TO SLITTERS. STACK 56 CUTS SUPPORTED BY "V" CARDBOARD STABALIZERS, SIX STACKS TO A

RACK. NORMAL CONSTRUCTION, METALLAN SPIRAL TUBES, PM CUT. INSIDE
PRINTED DATE OF MFG., SONOCO LOGO IN BLACK, ALCOA
IN BLUE.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

34. D054158 TU03002886 70000.00 13.24000 0.00 926800.00

EA 0.00

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Change Order : WA157890 Revision : 10 Supplier : 82100407

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(TU03002886) CORE, FIBER, MODIFIED STIFFNESS, 20" LONG X 16" I.D. X .500"
WALL. THE CORE IS TO HAVE AN O.D.

STIFFNESS VALUE OF 57,900 P.S.I. DESIGNATE "COAT" ; INITIAL INVENTORY
LEVELS ARE TO BE "AS REQUESTED BY ALCOA."

PRINT "HSM-1" ON THE CORE I.D.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

35. D050649 TU03002672 4000.00 3.78000 0.00 15120.00

EA 0.00

(TU03002672) CORE, FIBER, 17 IN X 19.930 X .250 (CONTROL NO. 0059) INSIDE
PRINT 1: SONOCO LOGO & DATE OF

MANUFACTURE - BLACK. INSIDE PRINT 2: ALCOA - BLUE TC 86 CUT (48/RACK)
LABEL PREPS AND APPROXIMATE USAGE IS 2000
PER YEAR.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

36. D128629 25000.00 0.69000 0.00 17250.00

EA 0.00

CORE, FIBER, (TU03000421). METALLIAN SPRIAL TUBES 1.5" X 16.070" X .250",
PM CUT. CONTROL NUMBER 73.

MIN/MAX WILL BE 2/4 FOR THIS ITEM.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

37. D126047 TU03004794 (WAS 4470) 6000.00 12.24000 0.00 73440.00

EA 0.00

FIBER CORE, HSM-1 (REV. 6.10.02) METALLAN SPIRAL TUBES.

17.440"X16.070"X.500". TOLERANCE IS +/- .125". NORMAL

CONSTRUCTION OUTSIDE REPUBLIC - PM CUT. SONOCO LOGO - ALCOA IN

BLACK. APPROXIMATE USAGE IS 6,000 PER YEAR. DAILY

MIN/MAX IS 4 RACKS (PACK QUANTITY IS 72 PER RACK). PRICE QUOTE IS \$4.88

PER EACH. DESIGNATE "PREPS". KANBAN CARDS

ARE REQUIRED. DESIGNATE AS ITEM 71, CONTROL NUMBER 40 ON INVENTORY SHEET. PO 42136. SONOCO P/N: TU03004794 (WAS4570).

Item added 4.8.2002 per request by Alcoa's Joe Vidmar/Mike Deffendall. (rte)

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

38. D108525 3000.00 2.50000 0.00 7500.00

EA 0.00

CORE, FIBER - METALLAN SPIRAL TUBES. 3.25" X 16.070" X .500" P.M. CUT.

MIN/MAX LEVELS ARE 4/6. APPROXIMATE USAGES

IS 25,000 PER YEAR. TO BE LABELED "SLIT". TO BE STACKED HORIZONTALY WITH A TRIANGULAR TUBE PLACED IN THE I.D. THIS

WILL BE PURCHASE ITEM NUMBER 33, CONTROL NUMBER 70.

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Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

39. D104995 TU03004405 12000.00 9.39000 0.00 112680.00

EA 0.00

CORE, FIBER. METALLAN SPIRAL TUBE, 13.406" IN LENGTH X 16 INCH I.D. X .500 WALL, HSM. LENGTH TOLERANCE IS + - .062". MODIFIED STIFFNESS WITH AN O.D. STIFFNESS VALUE OF 57,900 P.S.I. DESIGNATED FOR "SLIT". OUTSIDE REPUBLIC, INSIDE SONOCO LOGO WITH MFG DATE IN BLACK AND ALCOA IN BLUE. INVENTORY LEVELS ARE 6 MIN AND 8 MAX. APPROXIMATE USAGE IS 10,000 PER YEAR. (rev. 01/25/02, M.Deffendall).

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

40. D108496 13000.00 1.04000 0.00 13520.00

EA 0.00

CORE, FIBER - METALLAN SPIRAL TUBES. 3.25" X 16.070" X .250" P.M. CUT. MIN/MAX SHALL BE 4-6. MUST BE LABELED SLIT, STACKED HORIZONTAL WITH TRIANGULAR TUBE PLACED IN THE ID. APPROXIMATE USAGE IS 25,000 PIECES PER YEAR. THIS WILL BE PURCHASE ORDER ITEM NUMBER 32, CONTROL NUMBER 69

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

41. D054157 TU03002779 80064.00 12.58000 0.00 1007205.12

EA 0.00

(TU03002779) CORE, FIBER, MODIFIED STIFFNESS, 19" LONG X 16" I.D. X .500"
WALL. THE CORE IS TO HAVE AN O.D.

STIFFNESS VALUE OF 57,900 P. S. I. DESIGNATE "COAT" *** CONTROL NO. 60 ***
; INITIAL INVENTORY LEVELS ARE TO BE

"AS REQUESTED BY ALCOA." PRINT "HSM-1" ON THE CORE I.D.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

42. D050644 TU03000420 140040.00 5.31000 0.00 743612.40

EA 0.00

CORE, FIBER - TU03000420 - METALLAN SPIRAL TUBES 19 IN X 16 IN X .500 IN.

LENGTH TOLERANCE TO BE 19.000 IN +/-

.125. INSIDE PRINTED DATE OF MANUFACTURE, SONOCO LOGO AND ALCOA IN
BLACK - OUTSIDE REPUBLIC - KNIFE CUT.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

43. D050648 TU03000440 50000.00 5.55000 0.00 277500.00

EA 0.00

CORE, FIBER, TU03000440 - 20.000 X 16 X 500 INSIDE PRINTED ALCOA IN BLUE -

DATE OF MFG. & SONOCO LOGO IN BLACK -

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KNIFE CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

44. D050661 TU03000417 25000.00 2.54000 0.00 63500.00

EA 0.00

CORE, FIBER, TU03000417 - METALLAN SPIRAL TUBES 17 IN X 16 IN X .250 -

INSIDE PRINTED DATE OF MANUFACTURE, SONOCO

LOGO & ALCOA IN BLACK - OUTSIDE REPUBLIC - PM CUT

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

45. D050654 TU03000422 92000.00 1.18000 0.00 108560.00

EA 0.00

CORE, FIBER, TU03000422 - METALLAN SPIRAL TUBES 2.600 IN X 16 IN X .250 -

PM CUT

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value

Purchase UOM Payment UOM Payment Quantity Agreement Number

Line Manufacturer Manufacturer Reference Number

46. D050666 TU03000413 2000.00 43.33000 0.00 86660.00

EA 0.00

(TU03002542) CORE, FIBER, - H S METALLAN CORE, 72 IN X 16 IN X .500 WALL THICKNESS, WITH EC OF 62,000 PSI. INSIDE PRINTED DATE OF MANUFACTURE, SONOCO LOGO, ALCOA & "HS METALLAN" OUTSIDE. REPUBLIC, KNIFE CUT PRICE REVISED PER QUOTATION.

**Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number**

47. D050654 TU03000422 90000.00 1.16000 0.00 104400.00

EA 0.00

CORE, FIBER, TU03000422 - METALLAN SPIRAL TUBES 2.600 IN X 16 IN X .250 - PM CUT

**Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number**

48. D139805 TU03004744 8028.00 6.58000 0.00 52824.24

EA 0.00

(TU03004744) CORE, FIBER, TC-86 CUT, 21.0" LONG X 19.930" I.D. X .375" WALL. OS PRT 1: STRIPE *1/2" SOLID - RED; S105 CARTS. INITIAL INVENTORY LEVELS ARE TO BE "AS REQUESTED BY ALCOA."

Supplier assures all materials purchased for use in packaging comply with the CONEG Model Legislation regarding heavy metals in packaging materials.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

49. D145566 TU03004824 REGULAR 10000.00 4.13000 0.00 41300.00
EA 0.00

(TU03004824) CORE, FIBER, REGULAR STRENGTH TUBE, 13.406" IN LENGTH X 16.070 INCH I.D. X .500 WALL. LENGTH TOLERANCE IS + - .062". MODIFIED STIFFNESS WITH AN O.D. STIFFNESS VALUE OF 57,900 P.S.I.. DESIGNATED FOR "SLIT".

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OUTSIDE REPUBLIC, INSIDE SONOCO LOGO WITH MFG DATE IN BLACK AND ALCOA IN BLUE. INVENTORY LEVELS ARE 6 MIN AND 8 MAX. APPROXIMATE USAGE IS 10,000 PER YEAR.

Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number

50. D122250 4000.00 4.63000 0.00 18520.00
EA 0.00

FIBER CORES, 23.850"X17"X.250". MFGR, SONOCO, REGULAR STRENGTH, LABLED "SLIT", NORMAL CONSTRUCTION, MIN/MAX 1--3. APPROXIMATE USAGE IS 4000 PER YEAR. TOLERANCE IS +/- .125". THIS ORDER IS FOR THE COLD MILL AND SHOULD BE CHARGED TO THEIR ACCOUNT. THIS ITEM WAS FORMERLY ON PO #WA125904 AND HAS BEEN INCLUDED ONTO THIS ORDER FOR RECEIVING/BILLING PURPOSES (RTE) 3.19.03

**Item Number Supplier Reference Number Quantity Unit Price Discount Line Value
Purchase UOM Payment UOM Payment Quantity Agreement Number
Line Manufacturer Manufacturer Reference Number**

51. D145587 6000.00 5.37000 0.00 32220.00

EA 0.00

(TU03004470) FIBER CORE, METALLAN SPIRAL TUBES. 17.440"X16.070"X.500" REGULAR STRENGTH. TOLERANCE IS +/- .0625". NORMAL CONSTRUCTION OUTSIDE REPUBLIC - PM CUT. SONOCO LOGO - ALCOA IN BLACK.

APPROXIMATE USAGE IS 6,000 PER YEAR. DAILY MIN/MAX IS 4 RACKS (PACK QUANTITY IS 72 PER RACK). DESIGNATE "PREPS". DESIGNATE AS ITEM 71, CONTROL NUMBER 37 ON INVENTORY SHEET. SONOCO P/N: TU03004470.

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

Delivery Schedule

Delivery Location

B. 47 Central Receiving

Alcoa Inc.

Warrick Operations

State Route 66

Newburgh, IN 47630

Item Number Revision Quantity Date Due Tax Code

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003

46. 0 2000.00 12/31/2003

47. 4 90000.00 12/31/2003 1 WA - Xmpt 250317820-005-2 - 0.00%

Agreement Number : NONE Sub Total : 6074909.88

Currency : USD Discount : 0.00 %

Total : 5645741.36

Notes

A. Do not charge Indiana Sales and Use Tax, as we make payment to the state under direct payment number 250317820.

B. Receiving hours for Warrick Operations are 7:00 a.m. To 2:00 p.m., Monday through Friday. Carrier must contact ALCOA's receiving department, (812) 853-4342, at least twenty-four (24) hours in advance to make an appointment for delivery.

C. Mail one copy of the invoice with supplier and purchase order numbers, to: Alcoa Inc., Warrick Operations Accounts Payable, PO Box 981182, El Paso, Tx. 79998-1182, UNLESS otherwise instructed. If your company is authorized to be pay-from-receipt (PFR), no invoice is required.

D. In accepting this order it is understood the Seller agrees to the terms and conditions shown above and attached hereto. The Company hereby objects to any conflicting or additional terms or conditions. Invoices rendered against this order must be in accordance with instructions contained herein. All shipments, shipping papers, invoices, and correspondence must be identified with our purchase order number.

E. TSCA: The seller warrants that any material covered by this purchase order which is, or contains, a chemical substance as defined by the Toxic Substances Control Act (TSCA), 15 USC 2612 et.seq., is in full compliance with all applicable rules, orders, and regulations under TSCA. The seller warrants that such chemical substance is listed on the TSCA inventory, and that the material purchased hereunder does not contain polychlorinated biphenyls (PCB's). The vendor certifies that all chemical substances fully comply with all applicable rules, regulations, and orders under the Toxic Substances Control Act (TSCA), 15 USC 2612 et.seq., and that the vendor is not offering a chemical substance(s) for entry in violation of TSCA or any applicable rule, regulation, or order under TSCA.

For and on Behalf of Alcoa Inc.

By _____

Buyer

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Change Order : WA157890 Revision : 10 Supplier : 82100407

Order Date : 10/22/2002 Revision Date : 04/04/2003 Due Date : 12/31/2003