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FASHION FOR GOOD

Developing C2C Certified™ Jeans

Lessons learned in developing the world's first Cradle to Cradle Certified™ GOLD denim jeans product

PREFACE

Prepared by Fashion for Good and C&A with the support of McDonough Innovation, Eco Intelligent Growth (EIG) and McDonough Braungart Design Chemistry (MBDC)

For the most recent information on the Product Standard, visit www.c2ccertified.org.
For feedback, questions and suggestions, please contact press@fashionforgood.com.

THE STORY OF THE C2C CERTIFIED DENIM JEANS PROJECT

In 2017, C&A, a leading fashion retailer, and Fashion for Good jointly helped two India-based garment manufacturers – Cotton Blossom and Pratibha Syntex – to develop and produce two Cradle to Cradle (C2C) Certified™ T-shirts¹. The T-shirts were certified GOLD – an achievement level not seen before for a fashion garment. The context and value of the C2C Certified Product Standard, as well as all details on this process, are available publicly in the C2C Certified™ How-To-Guide, which can be accessed [online](#).

Based on the positive experience with the C2C Certified™ T-shirts, we wanted to take the next step in the implementation of C2C Certified™ products. The T-shirts were a way to showcase that C2C Certified™ apparel products are feasible and economically viable to produce. The next level of development was a truly complex garment, such as a denim jeans. Our success in gaining certification shows that C2C Certified™ serves as a standard to qualify products for a Circular Fashion Industry more broadly.

We want to share their lessons to advance the textile and fashion industry towards Cradle to Cradle Certified™ products. In the process of developing Cradle to Cradle Certified™ denim jeans, we were able to overcome a number of challenges. This booklet highlights key learnings. Using practical showcases, it provides guidance and concrete solutions on how to approach more complex Cradle to Cradle Certified™ projects and how to reach full product certification at GOLD level.

In addition to this guidance, this booklet presents the full Bill of Material i.e. what has gone into the making of the first Cradle to Cradle Certified™ GOLD jeans. We are sharing the recipe publicly with the industry to encourage other brands, retailers and manufacturers to pave the way for all jeans to be made this way.

Fashion for Good has also published an Almanac of Assessed Materials: an overview of materials and chemicals that are eligible for certified products at SILVER, GOLD and/or PLATINUM level. The full Almanac, including materials and processes for denim, lingerie, elasticated fabrics, garment embellishments, and printed garments is publicly available [online](#).

We hope this booklet will be a valuable resource for brands and garment manufacturers aspiring to produce C2C Certified™ denim products. Of course, the goal of this work is to attain certification for new products and materials. Please reach out to McDonough Innovation, our partner Cradle to Cradle Certified™ Accredited Assessors (Eco Intelligent Growth (EIG), EPEA Switzerland (EPEA CH) and McDonough Braungart Design Chemistry (MBDC)), or any of the Accredited Assessors listed [here](#) to get help in this process.

Thoughts on this guide are encouraged and welcomed, so please reach out at press@fashionforgood.com

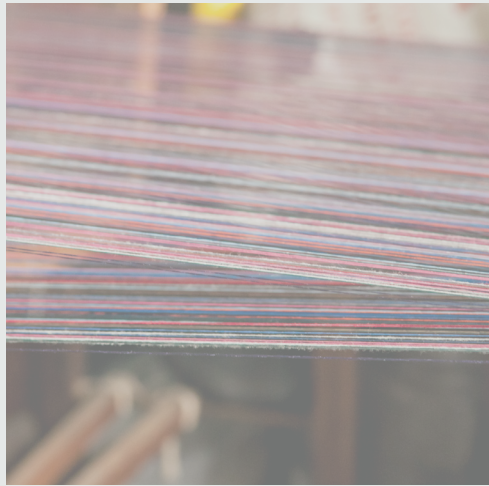
The Fashion for Good team, August 2018

¹ Cradle to Cradle Certified™ is a certification mark licensed by the Cradle to Cradle Products Innovation Institute

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INTRODUCTION

1. INTRODUCTION TO THE CRADLE TO CRADLE CERTIFIED™ PRODUCTS PROGRAM²

The Cradle to Cradle (C2C) Certified™ Products Program² is a multi-attribute product certification that assesses products and materials for safety to human and ecological health, design for future (re-)use, and sustainable manufacturing.

ASPIRATION OF CRADLE TO CRADLE

The end goal is to create products that support a delightfully diverse, safe, healthy and just world, with clean energy, soil, water and air – equitably, economically, ecologically, and elegantly enjoyed.

The current take-make-use-dispose cycle of fashion has several negative effects: it contributes to water pollution and climate change, consigns large volumes of waste to landfills, and poses risks to worker health and safety. End customers are becoming more conscious of the social and environmental impacts that their clothing purchases make, and they are demanding more from the companies that manufacture their clothing.

The C2C Certified™ Products Program is the only product-based certification that is based on rigorous, science-based criteria for all aspects of sustainability. It provides a means for manufacturers to benchmark their current performance and decide how to improve it, and it helps retailers to communicate this continuous improvement strategy to end customers. The complete C2C Certified™ Product Standard and supporting information can be found [online](#).

“By launching the first fully Cradle to Cradle Certified™ denim jeans, C&A is not only empowering customers to choose popular apparel that is good for the world but encouraging other companies to follow their lead. This dedication to setting the fashion standard to one that puts human and environmental health first, takes an inspiring step to increase economic, social and ecological benefits based on quality, not just quantity, to point the way to a thriving circular economy.”

- William McDonough, Co-founder, MBDC

2. THE BASIC STEPS TO GETTING A PRODUCT C2C CERTIFIED

Getting a garment C2C Certified™ involves a process of inventory, assessment and optimisation.

There are five basic steps that the C&A team followed, with the help of their assessors and suppliers:

STEP 1: Determine if your product is appropriate for certification

- Does it comply with the [Banned List of chemicals](#)?
- Does your product meet eligibility requirements in the C2C Certified™ Product Standard? Ineligible products include:
 - Products from rare or endangered species (e.g. ivory)
 - Products leading to or involving animal abuse
 - Products from companies involved in rainforest damage, child labour, blood metals, or blood diamonds

STEP 2: Select an Accredited Assessment Body for the testing, analysis, and evaluation of your product

- Select from the list of Accredited [Assessment Bodies](#)
- Develop a certification plan, including cost, timeline, and necessary resources

STEP 3: Work with your assessor to compile and evaluate data and documentation

- Collaborate with the assessor and supply chain to collect data
- Work with the assessor to develop optimisation strategies
- Submit an Assessment Summary Report, compiled by the assessor, to the Cradle to Cradle Products Innovation Institute for final review and approval

STEP 4: Receive certification for your product

- Sign a Trademark Licence Agreement, and pay the certification fee to the Cradle to Cradle Products Innovation Institute
- Work with the Cradle to Cradle Products Innovation Institute to post products on the product registry

STEP 5: Report your progress

- Every two years, work with the assessor and supply chain to gather new data for re-certification
- Submit the Re-certification Assessment Summary Report to the Cradle to Cradle Products Innovation Institute for review

3. C2C CERTIFIED DENIM: ORCHESTRATING A NETWORK OF PARTNERS

The key challenge in creating Cradle to Cradle Certified™ denim jeans is the complexity of the network of partners involved. Table 1 below lists the knowledge partners contributing to this project. Table 2 below highlights the supplier group who made the GOLD Certified denim jeans possible.

Table 1: Overview of knowledge partners on the C2C Certified™ denim jeans project

| Partner | Role |
|--------------------------------------|--|
| McDonough Innovation | Advice on design and production requirements |
| McDonough Braungart Design Chemistry | Served as assessor for the C2C Certified™ Products Program |
| Eco Intelligent Growth | Served as assessor for the C2C Certified™ Products Program |

Table 2: Overview of material suppliers involved in the C2C Certified™ denim jeans project

| Supplier | Part / Process | Product provided |
|--|---|--|
|  | Fabric | 99% cotton, 1% elastane 98% cotton, 2% elastane |
|  | Sewing Thread | Cotton (Gold level) and polyester (Bronze level) sewing thread |
|  | Fabric dyes | DyStar® Indigo Vat 40% Solution |
|  | Interlining | Cotton interlining for waistband |
| LOWATAG•/CHARMING | Patch | Laser cut jacron patch |
|  | Cut-make-trim | Product manufacturing Laundry |
|  | Premium Stretch Fiber | Environmentally compatible Stretch Fiber (Roica® V550) |
|  <i>Little Parts. Big Difference.®</i> | Metal trims | Metal buttons Metal rivets |
|  | Pocket lining | Organic cotton pocket lining |
| Various | Auxiliaries, printing and laundry chemicals | Washing chemicals Printing chemicals |

4. C2C CERTIFIED DENIM: PLANNING FROM ASSESSMENT TO LAUNCH

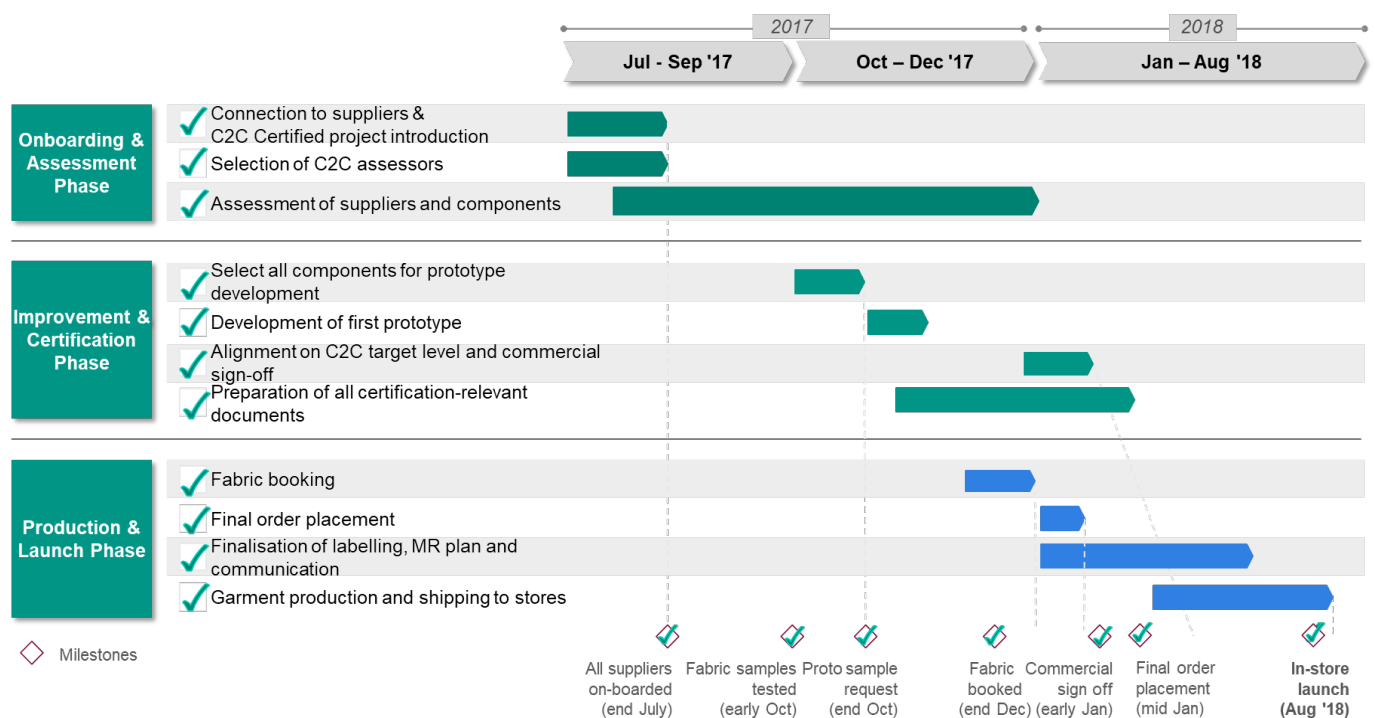
Steering a complex C2C development and certification project requires considerable organisation. In the case of the denim jeans project, around one year was needed to bring the product to shelves.

As is outlined in the overview of basic certification steps above, support from a knowledgeable Accredited Assessor who can guide the entire process is crucial. In a complex project like this one, it pays off to identify and engage the right experts and stakeholders for the different aspects of the C2C certification process from the start. Familiarising all involved with the C2C Products Standard and setting expectations is a key first step in a successful collaboration.

Furthermore, the planning should allow for plenty of time to assess components and look for alternatives together with suppliers, for whom this process might also be novel. In the case of the denim project, this aspect took almost five months.

The sample timeline below illustrates the planning. More information on best practices in planning C2C Certification can be found in the C2C Certified™ How-To-Guide, which can be accessed [online](#).

Figure 1: Sample timeline for C2C Certified™ denim jeans





C&A encountered a number of challenges in developing Cradle to Cradle Certified™ denim jeans. This overview serves to help other brands and manufacturers who might want to embark on developing their own complex C2C Certified™ garments anticipate these challenges.

For every challenge highlighted, the team also lists tangible solutions and advice.

Six key challenges in developing a complex C2C Certified™ denim product

- 1 Selecting the right suppliers
- 2 Organisational complexity
- 3 Complexity of assessment
- 4 Limited availability of assessed components
- 5 Limited availability of assessed chemicals
- 6 Meeting commercial Key Performance Indicators

CHALLENGE 1: SELECTING THE RIGHT PARTNERS

The Challenge:

A long-term, complex co-development project like developing C2C Certified™ jeans requires finding the right, committed partner base.

The C2C Certified™ Product Standard requires re-thinking every aspect of product design and manufacturing. Applicants must analyse how a product performs under the C2C Certified™ criteria: Material Health, Material Reutilisation, Renewable Energy, Water Stewardship and Social Fairness.

This can only be done through collaboration, openness and transparency throughout the supply chain and at a very detailed level; the molecular level, which is very unusual in standard practices.

HOW TO SOLVE IT

Short-term solutions:

- Focus on suppliers with trusted long-term business relationship
- Find partners with shared values and a shared interest in overcoming challenges and finding solutions
- Ensure partners have shared values and interest in sustainability
- Ensure partners have a good track record in social and environmental management
- Ensure the selected partners are transparent, have an innovative mindset, a strong focus on R&D, and are willing to put resources behind the project

Long-term solutions:

- Make this way of working and thinking the norm by engaging more and more brands, retailers and manufacturers on the journey. Together we must create the needed transparency to know what goes into the making of our products at a molecular level
- Change the focus from screening (i.e. making sure the worse substances are avoided) to assessing (i.e. knowing what goes into the making of products) and optimizing (i.e. focusing on only using safe ingredients)
- Think about end-of-use scenarios when designing our products
- Continue to encourage and reward renewable energy use, particularly on-site generation, treating water as a precious resource and honour all people and natural systems affected by the creation, use, disposal or reuse of products

Assessor view:

"Design and implementation of products, processes and relationships for circular fashion is easier said than done. Global brands need strong commitment from all stakeholders to make it work: internal teams as well as external partners. This project was led by C&A in collaboration with EIG and MBDC, and it demonstrates what an effective global circular project collaboration can deliver. Timing, focus and determination are everything. Coming up with a full-garment Gold level certification in just one year is a real achievement; something to be proud of as a team and as a brand. We all know this is just the beginning, but it's a very strong start as it shows the potential societal impact that denim apparel could have if it was made this way."

- Ignasi Cubiñà, Co-founder and Director,
Eco Intelligent Growth

"Material health assessment and optimization of multi-component garments — due to the multiple factories and suppliers that must be willing to open their doors and disclose their formulations to MBDC and other assessors — present several significant challenges. Trust and collaboration throughout the supply chain are critical and can take time to accomplish. However, once everyone is aligned, continuous improvement of the molecules and materials is both efficient and effective."

- Howie Fendley, Director of Projects and
Senior Chemist, MBDC

Supplier view:

"There's no certification like C2C, it covers all the core elements of sustainability. This made us excited to be a key supply chain partner in this project."

The biggest challenge was making jeans with 100% cotton sewing thread. C&A & Pacific jointly solved the issue by scientifically developing new measures to avoid breakage

We would be proud to collaborate again on C2C Certified™ initiatives in the future as Pacific Jeans is committed to adopting technological innovation and eco-friendly product development."



- Syed M. Tanvir,
Director, Pacific Jeans
Group

CHALLENGE 2: ORGANIZATIONAL COMPLEXITY

The Challenge:

More "complex" products consist of more components and often require more chemicals. Therefore, more suppliers and more internal departments are usually involved when developing new C2C Certified™ products. This can lead to significant complexity in project management.

All involved partners (brand, manufacturer, and suppliers) must be on-boarded and understand the C2C Certified™ Product Standard from the start. Decisions from different component suppliers are often interdependent.

HOW TO SOLVE IT

Short-term solutions:

To ensure the project does not stop when challenges are met, you need buy-in from senior leadership and support from all involved business functions. In order to navigate a complex stakeholder landscape, you need a nimble but highly focused project team. The team must select committed supply chain partners and involve final manufacturers early. Proactive expectation management and pragmatic and a solution-oriented approach are needed from all involved.

Long-term solutions:

Develop C2C Certified™ toolbox with suppliers and manufacturers so product design and development can follow standard processes.

SHOWCASE: Supplier teams connected early on to develop new fabric

Typical Approach:

Most brands work with an established group of suppliers. However, many suppliers, when confronted with the C2C Certified™ framework for the first time, are not sure if their current solutions and processes will meet the standard's criteria. It is also common for a new component to need development from scratch, with supplier teams that have not worked together before.

Our Project Approach

It is important to allow for enough time at the beginning of a C2C Certified™ project for everyone to familiarise themselves with the C2C Certified™ Product Standard and what this means for their context. Furthermore, when developing the project timeline, enough buffers for potential R&D phases must be built in.

In the denim project, the fabric supplier needed to develop a new fabric and run trials with C2C Certified™ stretch fiber and dyes that were unknown to them.

They had to adapt multiple process steps before achieving the desired outcome. Collaboration between the fabric mill and the dye manufacturer; as well as between the fabric mill and the elastane producer were key to bring the product development to success.

Supplier view:

"At Arvind, sustainability forms the core pillar of the way we do business. The C2C Certified™ project with C&A was a great opportunity to develop denims that have the right fabrics to offer ethical fashion to end consumers.

The developments involving biocompatible elastane and special dyes required multiple trials and close coordination of all partners to make this a success. Especially dyeing was a huge challenge. We overcame this challenge with inputs and trials from experts in the field. Despite tight timelines and various challenges in meeting the parameters, we eventually achieved the desired results to produce a fabric that is truly sustainable. In-depth R&D and participation of all experts involved in this project was the key reason for our success.

The project is a huge step towards redefining the way contemporary denims are made. This should encourage more brands and manufacturers to create fashion which is sustainable and worth the investments made to make this planet a better place."

- Saurabh Samnol, Chief Marketing Officer, Arvind Limited

CHALLENGE 3: COMPLEXITY OF ASSESSMENT

The Challenge:

The more "complex" the product, the more components. In most complex products, it is common to have components from both the biological and the technical cycles.

Mixing components from different cycles reduces the material reutilisation potential. As a result, it is difficult to achieve a high level (GOLD or PLATINUM) under the C2C Certified Product Standard.

HOW TO SOLVE IT

Short-term solutions:

Brands must try to substitute components from the technical cycle to components from a biological cycle, without compromising product features or quality. Suppliers must go the extra mile to find options that fit the C2C Certified™ requirements. Assessors must be able to evaluate the implications of combining several components.

Long-term solutions:

Further R&D is needed to develop solutions for different components for different cycles. A break-through in chemical recycling and blend separation could solve some of the challenges in using blended fibres and mixed materials.

SHOWCASE: Finding a suitable cotton interlining for C2C Certified™ denim jeans

Typical Approach:

Waistband interlinings support the shape and provides durability of the waistband.

In general polyester knit or nonwoven interlinings are preferred for jeans waistbands since they also allow both flexibility and stability and are inexpensive.

However, polyester poses two challenges from a C2C Certified™ perspective: Polyester often contains antimony and thus does not allow for high C2C Certified™ achievement levels. In addition, mixing cotton fabric with a polyester waistband reduces the material reutilisation potential which could also impact the certification level.

Our Project Approach

In the C&A C2C Certified™ denim project, the interlining supplier did not have a standard cotton interlining for denim products. The supplier's cotton interlining products typically used for other applications were therefore tested for their applicability for denim products. Denim post processing involves high temperatures and the supplier wanted to make sure its products worked well.

Having its own R&D and interlining production facility in Europe as well as in Asia clearly was an advantage to try out several modifications. After testing at the manufacturer site, the cotton option proved suitable for a denim product and met all required quality parameters.

The standard polyester interlining was swapped to a cotton interlining. Additional tests were then conducted to verify there were no pesticides present in the product.

Supplier view:

"The C2C Certified™ Product Standard requires a very detailed list of the chemicals and raw materials we use. The main challenge was to match product performance and, at the same time, the chemical restrictions. We were able to react quickly and provide the right solution thanks to the fact that we are used to look for alternative, sustainable solutions. I was particularly pleased to see how the cooperation between C&A and Freudenberg worked well to up-scale C2C Certified™ productions."

- Jutta Vo Quang, Freudenberg, Global Strategy Apparel



CHALLENGE 4: LIMITED AVAILABILITY OF ASSESSED COMPONENTS

The Challenge:

The list of previously C2C assessed materials is limited and growing slowly as more C2C Certified™ projects are conducted. In more complex products, some components will likely not have previously assessed alternatives publicly available.

Every single component in a product needs to be assessed for Material Health for the final product to be certified at a high level. Without already assessed options, assessment costs should be anticipated. Potentially, additional time and resources for developing a "new" solution are required.

HOW TO SOLVE IT

Short-term solutions:

The project team must account for additional time and resources for the assessment, development and testing of new alternatives with the suppliers when setting their project timeline

Long-term solutions:

Further development of publicly available positive lists of assessed components and materials is crucial

A culture of sharing must be established so that everyone has access to materials that have already been assessed, whether certified or not. It is crucial to avoid non-disclosure agreements between assessors and producers that prevent information from becoming public.

In addition to this guide, Fashion for Good's [Assessed Materials Almanac](#) and [How-to-Guide](#) can be helpful here. We worked with suppliers and assessors to request previously assessed materials in order to drive such an open culture, and we hope to further grow this Almanac over time.

SHOWCASE: Using previously assessed material simplifies the C2C Certified™ process

Typical Approach:

Most denim fabrics are not made of 100% cotton. To increase comfort and improve fit, a small amount of elastane is incorporated to create stretch.

To ensure the commercial relevance of the products, this was a point which could not be compromised. However, until recently, no C2C Certified™ elastane was on the market.

Our Project Approach

A supplier of stretch fiber, ROICA™ by Asahi Kasei released news that one of their yarns (Roica™ V550) was C2C GOLD assessed for Material Health during the project.

While C&A and ROICA™ Asahi Kasei were not previously working together, the offer of a C2C Certified™ GOLD stretch fiber led the brand to reach out to ROICA™.

After trials with the fabric supplier, the new stretch fiber proved suitable for denim fabric. Using this fiber eliminated the need for additional assessments.



Supplier view:

"Asahi Kasei was able to develop the premium stretch fiber ROICA™ V550 because of our strong commitment to eco-friendly business and our mindset of continuous improvement. We are very excited to see that the circular economy is arriving in the textile industry, finally bringing a positive fashion vision to the consumer. This shift in what's possible is very fulfilling for all the partners that were involved in the development of ROICA™ 550 and all makers of garments containing stretch."

- Dr. Stephan Huetten, Manager - Development & Environment, Asahi Kasei

CHALLENGE 5: LIMITED AVAILABILITY OF ASSESSED CHEMICALS

The Challenge:

Washing, dyeing, printing and finishing processes often include a large number of chemicals. Generally, the more complex the product is, the more chemical processes are involved.

Each chemical in a product needs to be C2C assessed for Material Health for the final product to be certified. Without already assessed options, assessment costs should be anticipated. Potentially, additional time and resources for developing a "new" solution are required.

HOW TO SOLVE IT

Short-term solutions:

Project team must account for additional time and resources for the assessment of chemicals as well as the optimisation of new recipes. Where no suitable alternative chemicals can be found, the project team could consider trade-offs between product features and the C2C achievement level.

Long-term solutions:

Further development of publicly available positive lists of assessed components and materials is crucial

A culture of sharing must be established so that everyone has access to materials that have already been assessed, whether certified or not. It is crucial to avoid non-disclosure agreements between assessors and producers that prevent information from becoming public.

In addition to this guide, Fashion for Good's [Assessed Materials Almanac](#) and [How-to-Guide](#) can be helpful here. We worked with suppliers and assessors to request previously assessed materials in order to drive such an open culture, and we hope to further grow this Almanac over time.

SHOWCASE: Finding suitable washing chemicals for the C2C Certified™ denim jeans

Typical Approach:

For several popular denim styles, the finishing process includes the use of lubricants, stiffening agents, softeners and many other finishing chemicals.

In the C2C denim project, both the manufacturer and the brand had a long list of chemicals they wanted to use for the final product.

Most, if not all, of these chemicals were not assessed for Material Health and hence not approved for use in a C2C Certified™ product.

Our Project Approach

After collecting the required washing chemical list from the supplier and the brand, project teams narrowed down the list with the supplier, chemical manufacturers and the assessors to focus on the most important chemicals. As a result, the number of chemicals used was reduced significantly.

The next step was to reach out to a number of chemical manufacturers, and ask them to share the chemical formulation of their products with the C2C assessor for Material Health assessment.

Recipes were then re-developed based on the list of approved chemicals.

For screen and pad printing, C&A was able to use the chemicals assessed previously for their C2C Certified™ GOLD T-shirts. Hence, only sharing a list of chemicals and redeveloping recipes was needed, and assessment could be avoided.



CHALLENGE 6: MANAGING COMMERCIAL KPIS AND C2C CERTIFIED AMBITION LEVEL

The Challenge:

The more complex the product, the more components, the more likely it is that C2C Certified™ will impact productivity and cost parameters.

To achieve the highest certification level, each component and chemical used in a product need to be assessed for Material Health and optimised to remove all ingredients presenting a risk.

HOW TO SOLVE IT

Short-term solutions:

Project team must account for additional cost, time and resources during the initial planning of production deliveries. Furthermore, project team and suppliers should go the extra mile to find alternatives with the same performance and cost as existing components. In some instances, the project team must consider trade-offs between product features and the C2C Certified™ achievement level.

Long-term solutions:

Further development of positive lists of assessed components and materials is crucial. Further R&D is required to find more alternative components.

SHOWCASE: Finding suitable sewing thread for the C2C Certified™ denim jeans

Typical Approach:

Sewing thread is an important component in a garment from a quality and productivity standpoint. Polyester sewing thread is normally used in the production of jeans due to its strength and performance. However, for the highest levels of C2C Certified™, polyester can not be used due to presence of antimony trioxide. Antimony trioxide is a suspected carcinogen and above 100 ppm means that the product can only reach BRONZE level.

Our Project Approach

Initially an organic cotton sewing thread was identified as the best option. Quality parameters were tested and met the needed standard.

When testing the thread in production condition however, thread breakage became an issue as it negatively impacted productivity. This created a product delivery risks and as a result, a risk for timely in-store arrival.

A lot of work went into improving the quality of the cotton sewing thread to reduce breakage. Strength was increased by using long staple (non-organic) fiber and adding a mercerizing treatment. Since the cotton sewing thread was not organic, a test for the presence of pesticides was conducted as per the C2C Certified™ Product Standard. Productivity was improved, but could still not meet the standard productivity level for jeans.

In order to ensure the desired quantity of products could hit the shelves on time, we decided to make a share of products with a polyester sewing thread at BRONZE level. A more exclusive option was made in smaller production numbers with cotton sewing thread, attaining GOLD level. We remain committed to solving the challenge of finding thread which meets quality, productivity and C2C Certified™ criteria at GOLD level.

Supplier view:

"The customer need was to develop the highest level of C2C Certified™ sewing thread so we worked together to identify and develop the best solution. Customer collaboration like this is innovation at its best: working together on site to combine our thread expertise directly with the customer's practical manufacturing requirements to create and test a new product that exactly meets the customer's needs."

- Adrian Elliott, President, Apparel and Footwear, Coats



BILL OF MATERIALS



INTRODUCTION

The negative impact of the fashion industry on our planet and its people stem from the production of raw materials to the disposal of a garment after its first use. Rather than trying to reduce these impacts, Cradle to Cradle® principles advocate for having big impacts, but good impacts: during use phase and end of use, and also during the manufacturing process. The Cradle to Cradle (C2C) Certified™ Products Program is a multi-attribute product certification that assesses products and materials for safety to human and ecological health, design for future (re-)use, and sustainable manufacturing.

This chapter presents the Bill of Material – the full recipe for the C&A jeans. We want to encourage and pave the way for all jeans to be made according to the C2C Certified™ Product Standard. It's a recipe for future success in evolving to develop sustainable fashion for all.

HOW TO READ THE BILL OF MATERIALS

The following information can be found in the tables:

PROCESS AND GENERIC MATERIAL: Details the aspect of the denim jeans that the material relates to, and the type of material.

PART NAME / FUNCTION: When looking for suitable alternatives to an existing process, understanding the specific function provided by a material or chemical is crucial. This column outlines the application of the material.

MATERIAL SPECIFICATION / TRADE NAME / PRODUCT NUMBER: Commercial details of the material.

MATERIAL HEALTH ASSESSMENT: The assessor's evaluation of the material's risks, where risk is a product of the material hazard and its exposure. Hazard is evaluated against the C2C Certified™ Product Program’s human and environmental health hazard “endpoints”. The endpoints are objective measurements of a chemical’s properties or of the potential results of exposure; e.g. carcinogenicity, dermal toxicity, or neurotoxicity. More detail on the Material Assessment Methodology, can be found in the C2C Certified™ [Material Health Assessment Methodology](#).

The assessor then looks at the context in which those ingredients are used and the relative routes of human exposure to each ingredient (such as inhalation, skin contact, or biodegradation). From this analysis, the assessor develops an assessment of risk for each chemical present in each material. The final assessment for each material uses the result of the worst-performing chemical within the material using the ABC-X rating system.

Table 3: ABC-X rating methodology

| | |
|--------|---|
| A | The material is ideal from a C2C Certified™ perspective for the product in question |
| B | The material largely supports C2C Certified™ objectives for the product |
| C | Moderately problematic properties of the material, in terms of quality from a C2C Certified™ perspective, are traced back to the ingredient. The material is still acceptable for use. |
| X | Highly problematic properties of the material, in terms of quality from a C2C Certified™ perspective, are traced back to the ingredient. The optimisation of the material requires the phasing out this ingredient. |
| GREY | This material cannot be fully assessed owing either to incomplete ingredient formulation or to lack of toxicological information for one or more ingredients |
| BANNED | i.e. banned for use in C2C Certified Products Program This material contains one or more chemical ingredients from the Banned List and cannot be used in a certified product |

SUPPLIER NAME: The supplier of the material.

BILL OF MATERIALS

| Process | Generic Material | Part Name/Function | Exact material specification / trade name / product number | Material Health Assessment (MBDC) | Supplier Name |
|---------------|----------------------------|---|--|-----------------------------------|---------------------------|
| Denim fabric | Cotton | Fabric | 55528G, 55540G, 55539G and 55601G | C | Arvind |
| Final garment | Cotton | Interlining | No - 3205 | C | Freudenberg |
| Final garment | Polyester (Bronze version) | Sewing thread | Astra | X | COATS |
| Final garment | Cotton (Gold version) | Sewing thread | Dymax | C | COATS |
| Final garment | Cotton | Pocket lining | 24X2 2/1, Twill | B | Zaber & Zubair Fabrics |
| Final garment | Metal | Button | 3410689, 3410734 | C | YKK |
| Final garment | Metal | Zipper | YGRC-39 GSN8 J C12 KENSIN N-ANTI | C | YKK |
| Final garment | Metal | Rivet | 3226226, 3226227 | C | YKK |
| Final garment | Jacron | Patch | D - BP49 | C | Charming |
| Final garment | Print | Print tags (size & care labels) | | C | BASF/Archroma |
| Laundry | Process chemical | Enzyme pre-treatment | Bactosol HPA liq | C | Archroma |
| Laundry | Process chemical | Wetting agent | HOSTAPAL MRZ | C | Archroma |
| Laundry | Process chemical | Wetting agent | Tanawet Q | C | Tanatex Chemicals B.V. |
| Laundry | Process chemical | Wetting agent | Felosan RGN | C | CHT Bezema |
| Laundry | Process chemical | Washing | Pumice Stone | C | Multiple (Basic Material) |
| Laundry | Process chemical | Washing | Hydrogen peroxide | C | Multiple (Basic Material) |
| Laundry | Process chemical | Washoff Chemicals | Sirrix NE liq | C | Archroma |
| Laundry | Process chemical | Non-ionic surfactant | Kieralon CDP liq c | C | Archroma |
| Laundry | Process chemical | Dispersing agent | Ladiquest 1097 | C | Archroma |
| Laundry | Process chemical | Biodegradable Defoamer | Respumit BA 2000 | C | Tanatex Chemicals B.V. |
| Laundry | Process chemical | Bleach stabilizer | Tanatex Novoco | C | Tanatex |
| Laundry | Process chemical | Stabilizer | Ecofix FF Ultra | C | Zebec |
| Laundry | Process chemical | Biodegradable sequestrant | Plexene QXL | C | Tanatex Chemicals B.V. |
| Laundry | Process chemical | Desizing Enzyme | Lava® Sperse KTZ New | C | Dystar |
| Laundry | Process chemical | Desizing | Lava® Zyme AHG Conc | C | Dystar |
| Laundry | Process chemical | Desizing | Base Deterpal EPQ New | C | OFFICINA+39 |
| Laundry | Process chemical | Biopolishing enzyme | Lava® Cell NBG | C | Dystar |
| Laundry | Process chemical | Biopolishing enzyme | Lava® Cell NHC Cold | C | Dystar |
| Laundry | Process chemical | Non-GMO Biopolishing Enzyme | Tanazym CS | C | Tanatex Chemicals B.V. |
| Laundry | Process chemical | Bio Polishing chemical | Cellulase | C | Multiple (Basic Material) |
| Laundry | Process chemical | Biopolish | Soko Stone NLC | C | Soko Chimica |
| Laundry | Process chemical | Detergent (cleaning) - optical brightener | Bio Bright O2 | C | Atlantic Care Che. |
| Laundry | Process chemical | Optical brightener | Leucophor BF2C liq | C | Archroma |
| Laundry | Process chemical | Neutral Enzyme | Iglazyme Ultralite | C | Zebec |
| Laundry | Process chemical | Neutralizer | Sodium Meta Bi Sulphite | C | Multiple (Basic Material) |
| Laundry | Process chemical | Neutralizer | Acetic acid | C | Multiple (Basic Material) |
| Laundry | Process chemical | Neutralizer | Neutracid NCS | C | CHT Bezema |
| Laundry | Process chemical | Softener | Leomin AFK | C | Archroma |
| Laundry | Process chemical | Softener | Lava® Soft HSB | C | Dystar |
| Laundry | Process chemical | Softener | Lava® Soft EPS 01 | C | Dystar |
| Laundry | Process chemical | Softener | Lava® Soft ME | C | Dystar |
| Laundry | Process chemical | Softener | Denimcol Soft PEN | C | CHT.Corporation |
| Laundry | Process chemical | Softener | Elam EQB Base | C | Garmon |
| Laundry | Process chemical | Softener | Persoftal EP 3060 | C | Tanatex Chemicals B.V. |
| Laundry | Process chemical | Softener | Resil Ultrafab CAM | C | Resil Chemicals |
| Laundry | Process chemical | Finishing Chemicals | RUKOFIN SIQ NEW | C | RUDOLF Bangladesh Ltd |
| Laundry | Process chemical | Finishing Chemicals | Lava® Jeans PRO 50 | C | Dystar |
| Laundry | Process chemical | Finishing Chemicals | Direfix SD liq | C | Archroma |
| Laundry | Process chemical | Finishing Chemicals | Optifix RSL liq | C | Archroma |