EASTMAN

Greater **performance**
from your card.

Greater **security**
for your customers.

Until now, smart cards and other security-critical documents have been limited by the material used to make them. Some couldn't withstand the dynamic stress of daily use and aging. Some couldn't accommodate recent advances in composite card structures, more powerful electronics, and security technology. Many required frequent replacement, increasing their total cost of ownership.

Durability at the heart of your card

The increased need for durability has completely changed the secure credentialing market.[1] The increased investment in technology now far overshadows the investment in substrate and film. The traditional favorite, polycarbonate (PC), has material deficiencies related to:

- Chemical attack (including skin oils and lotions)
- Stress corrosion cracking
- Difficulties in processing and composite card structures due to high lamination temperature

Because of these failures, PC-based security cards often require replacement long before their expected 10-year life span.[1] Replacing cards is costly, especially if they fail before their expected life span is reached.

Security in the hands of your customers

New technologies offer enhanced security against forgery and data theft. Packing this technology into a smart card is the industry's next challenge.

- Today's smart cards require the capability to be digitalized and completely IT-compatible.
- With more electronics installed between the lamination layers of the cards, stress corrosion cracking becomes a major security concern.

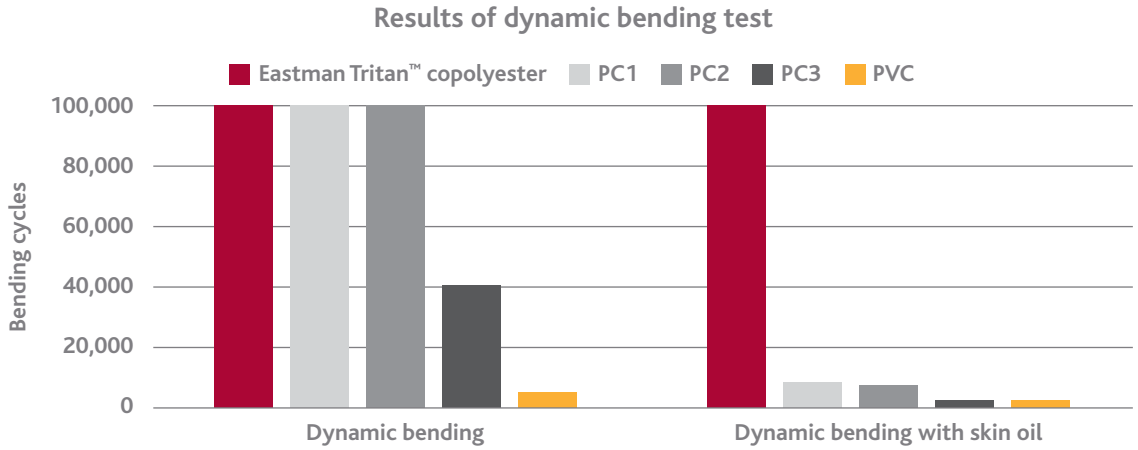
Keeping pace with new security features requires a new generation of polymers.

A material difference in smart-card polymers

To justify an investment in advanced smart-card technology, the card itself must be able to withstand the combined rigors of repeated stress and exposure to a variety of chemicals.

- Polycarbonate (PC) is not sufficiently resistant to chemicals—skin oils, in particular—and is subject to stress corrosion cracking.
- Polyvinyl chloride (PVC) is neither durable nor chemical resistant.
- Eastman Tritan™ copolyester offers a combination of durability and chemical resistance.

The chart below shows the results of dynamic bending tests—with and without exposure to skin oil—that support these conclusions.



Sources: Fogra 08/2015, Fogra 11/2015, Fogra 06/2016

[1]*Martin, Zack. "Evaluating card durability." SecureIDNews.com. SecureIDNews,18 Jan. 2016.*

Tritan is a high performance material with a combination of properties that makes it ideal for smart cards and other security-critical documents:

- Outstanding durability
- Excellent resistance to skin oils
- Excellent printability and ink compatibility
- Excellent resistance to stress corrosion cracking
- Simple processing and adhesive compatibility
- Free of bisphenol A (BPA) and bisphenol S (BPS)

The unique material properties of Eastman Tritan™ copolyester make it possible to further advance the functionality of smart cards. Tritan allows the integration of state-of-the-art electronics and multiple security elements for enhanced personalization. Cards made with Tritan have been tested and passed accelerated aging tests simulating 10 years of real-life usage.[2]

Tritan is a new benchmark for security-critical documents.

There is a material difference between polymers used for the substrates and films used to make smart cards. The following table compares the material properties of Tritan with traditional polymers—properties that define durability and impact the integration of advanced security technology.

"Card producers can use Eastman Tritan™ copolyester to build all mechanical, electronic, optical, biometric, and cryptographic security features, which can be used to protect a smart card against forgery and data theft, without a negative effect on the required durability. Tritan sets a new benchmark for smart cards."

Daniel Lützelschwab
Representative for Folienwerk Wolfen, a world leader in specialized foils

Comparison of materials and films commonly used for security-critical documents

Capabilities/usage	Eastman Cadence™ copolyester (PETG)	Eastman Tritan™ copolyester	PVC (polyvinyl chloride)	PC (polycarbonate)	ABS (acrylonitrile butadiene styrene)	BOPET (biaxially-oriented polyethylene terephthalate)
Lamination	Excellent	Excellent	Excellent	Fair *Requires high-temperature lamination*	Fair	*Requires a coating* [a]
Printing	Excellent	Excellent	Excellent	Good	*Requires corona treatment*	*Requires a coating*[a]
Laser engraving	Good	Excellent	Poor	Excellent	Poor	—
Flex crack resistance	Good	Excellent	Good	Excellent	Poor	—
Chemical resistance	Good	Excellent	—	—	—	Excellent
Processing flexibility	Extrusion/ calendering	Extrusion	Extrusion/ calendering	Extrusion	Extrusion	Extrusion

[a] *BOPET is a semicrystaline thermoplastic; the other materials listed are amorphous polymers.*

[2] *ISO 10373-1 / 24789-2 certificate and Fogra AGE F02 (10) certificate*

Eastman is a global advanced materials and specialty additives company that produces a broad range of products found in items people use every day. With a portfolio of specialty businesses, Eastman works with customers to deliver innovative products and solutions while maintaining a commitment to safety and sustainability. Its market-driven approaches take advantage of world-class technology platforms and leading positions in attractive end-markets such as transportation, building and construction, and consumables. Eastman focuses on creating consistent, superior value for all stakeholders. As a globally diverse company, Eastman serves customers in more than 100 countries and had 2016 revenues of approximately $9.0 billion. The company is headquartered in Kingsport, Tennessee, U.S.A., and employs approximately 14,000 people around the world. For more information, visit www.eastman.com.

For more information about Tritan, visit www.eastman.com/Tritan.

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