

THE REINFORCER

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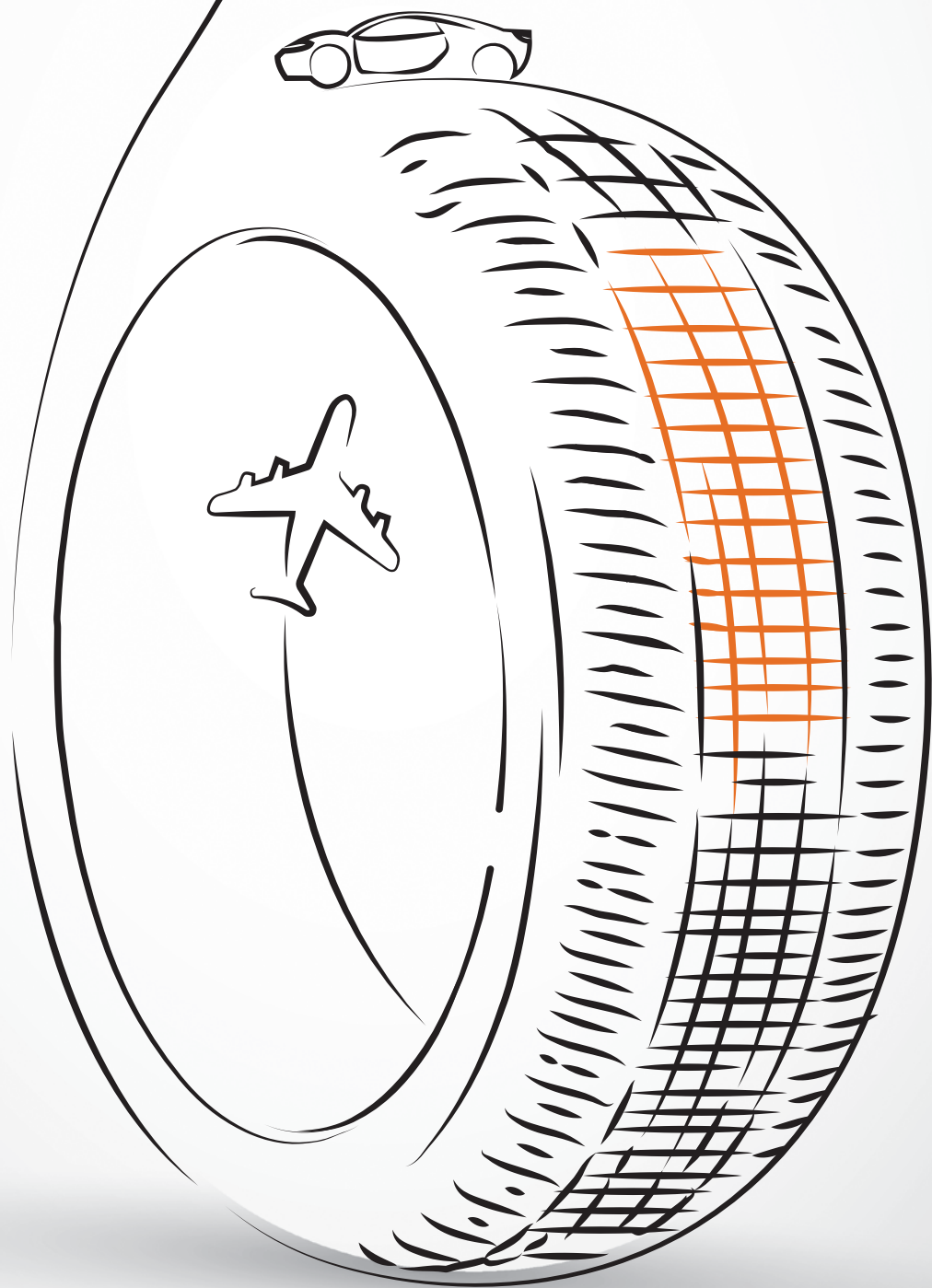
Determined to Create Value

KORDSA



We Reinforce Life

Reinforcing 2 out of every 3
aircraft tires and 1 out of every 3
automobile tires produced
in the world.



KORDSA

THE REINFORCER

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Our products not only improve the lives of individuals, families and our loved ones, but also “Reinforce Life”.





Foreword

ALİ ÇALIŞKAN

CEO

Dear Esteemed Partner,

2017, like 2016, is turning out to be an exciting year economically, socially and politically, with both highs and lows across the globe. Regardless of these challenges, I am proud to say that the first half of 2017 is yet another remarkable year for Kordsa from many different perspectives thanks to our innovative, technology-oriented mindset and our agility in adapting to change. In order to gain a broader vision that can lead to new discoveries of the kind that ignite organizations or industry, we need to get out of our cocoon, combine multiple existing ideas and disciplines and unite our power. Today, we seek new technologies and ideas not only internally through our R&D Centers but also externally through collaboration with universities, suppliers and customers in order to create value-added products.

One good example of our open innovation practices is “Behind the Borders” project, which brings tire manufacturers and our tire experts together. This project continues at full speed through customer visits which give us opportunities to develop new technologies together as well as creating practical solutions that ease our daily work routines. Moreover, as a result of our technology-driven mindset, we made a record number of patent applications in 2016: we applied for 32 inventions and 103 patents in 2016. In total, we have 411 patent applications and 128 inventions.

We are proud to announce that our Composite Technologies Center of Excellence has become operational as a platform of open innovation practices. Our R&D center located at the Composite Technologies Center of Excellence has been recently qualified as an R&D Center by the Ministry of Science, Industry and Technology. We are honored to say that we now have two officially-approved R&D centers. As an output of this center, we have developed a resin technology for automotive composites that brings speed and increased productivity to the industry by reducing the curing time of

9 minutes to 3 minutes. Providing the composite material with a smoother and higher quality surface finish, the new resin technology developed at our R&D center in Composite Technologies Center of Excellence is also a process technology suitable for increasing automotive production speed.

We also continue to support collaborative university projects. In an effort to encourage students to participate in technology, innovation and R&D, we provided composite materials to the YTU Racing Team composed of Yıldız Technical University students. The composite materials supplied by Kordsa are used particularly for the hull, wings and seats of the vehicle. The YTU Racing team participated in the Formula Student East competition, one of the world's biggest student engineering competition.

We, Reinforcers of the World, constantly innovate to reinforce life and continuously invest in our human resources, which is one of the pillars of our corporate culture. I can proudly say that moving up to 3rd place this year, Kordsa is listed among best employers in Bahia, Brazil by the Great Place to Work Institute two years in a row. Ranking in 3rd place is the result of the high standard of human resources management that we implement in our operations on various geographies. Moreover, we reached our injury-free safety targets at our four plants, which is a clear sign of our dedication to workers' health and safety.

Having embedded the sustainability approach into our targets and strategies, we are presently compiling our third sustainability report and it will be published soon. Last year, we were entitled to enter the BIST Sustainability Index and were listed in the BIST 50 Index. In parallel to our sustainability efforts, we are sustaining our steady growth within the BIST 50 Index.

We are rewarded for our efforts with numerous prestigious awards. We were listed among the “Most Ethical Companies in Turkey” for the fourth consecutive years, which officially recognizes our dedication to ethical principles, one of our seven corporate values. Additionally, we were awarded in “Brand and Export Support” category at the “Contributors to Turkey's Brand Value and Turquality Awards” ceremony by Brand Turkey 2017, the intersection of Turkey's leading brands, whilst Kordsa teams were granted six awards at the Sabancı Holding Golden Collar Awards, including the Creating Value category award.

Our innovative technologies are very much integrated in our everyday life, making it safer, more efficient, comfortable and convenient. Kordsa, the reinforcer of one out of every three automobile tires and two out of every three aircraft tires, strives to make life more sustainable by reducing rolling resistance to decrease fuel consumption through its tire reinforcement technologies as well as lightening vehicles through its composite technologies. We develop new products and technologies with an environmentally-friendly mindset. Our products not only improve the lives of individuals, families and our loved ones, but also “Reinforce Life”.

With this new issue of the Reinforcer, we are inviting you to take a first-hand look at Kordsa's business development in the first half of 2017 as well as emerging trends in our lines of business. Wherever our industries are evolving and the future is being shaped, you will encounter Kordsa.

We are confident about the progress we have made in 2017, and we will keep on reinforcing more and more areas in life.

I wish you a good reading.

WE REINFORCE LIFE

CSR Projects

Kordsa Brings Composite Technologies and Young People Together

Reinforcement technologies professional Kordsa are supporting projects at Yıldız Technical University and Trakya University in an effort to introduce young people to composite technologies.

In order to engage youth in composite technologies and to encourage them to be involved in technology, innovation, R&D and engineering, Sabancı Holding affiliate Kordsa introduced university projects powered by the company to the students of Kocaeli University. Kordsa supported these university projects by sponsoring the carbon material for the cars being built. These vehicles, reinforced with composite technologies, were displayed at Kocaeli University Teknopark for an entire month.

The Trakya University Design Project Team's Pehlivan-02 and Pehlivan ElekTrak, powered by Kordsa Platinum sponsorship, were two prize-winning cars in several different competitions. The Pehlivan Elektrak's body is fully made of carbon fiber; thus, it is enabled to remain light-weight yet strong. The environmentally-friendly car recharges itself in 45 minutes and can run for 100km on only 0.75 TL (around \$0.21) worth of electricity. The Pehlivan Team, setting out from Edirne, toured around the Balkans last year.



The YTU Racing Team, which was established as a part of the Machine Technologies Club in order to participate in the Formula Student Competition, designed and built a single-seat, open-wheel racing car with Kordsa sponsorship. The team successfully participated and got a good ranking in Formula Student England (Silverstone) and Formula Student Germany (Hockenheim). Reinforcement technologies leader Kordsa, with its open innovation mind-set, works together with young people in an effort to encourage academic and industry collaboration. Kordsa also strives to engage young people in entrepreneurship by supporting them in the R&D and production phases.

Indonesia Internship Program



On January 16, 2017, we held an event to mark the end of our Vocational High School Internship Program. From October 16, 2016 to January 17, 2017, 36 students participated in the 3-month internship.

During this event, the interns put on two performances—a drama performance and a band performance—to show their appreciation of Indo Kordsa, the interns got certificates and mementos from Indo Kordsa, and the company's supervisor, company head, and high school industrial cooperation officer had their pictures taken together with the interns.

Kordsa Meets Future Reinforcers in Indonesia

Mechanical engineering students of the Gajah Mada University paid a visit to Kordsa's Indonesia plant. The students had a busy agenda with presentations from Kordsa reinforcers and a tour of the plant, and they ran simulations of Kordsa's manufacturing and management processes. Kordsa aims to raise brand awareness in the minds of the future reinforcers through such get-togethers with engineering students.



Kordsa Reinforces the Future with Youth People



Sponsored by reinforcement leader Kordsa in an effort to encourage young people to participate in technology, innovation, R&D and engineering, Yıldız Technical University student team YTU Racing has produced its fourth vehicle and took part in Formula Student East, one of the biggest student engineering competition. Kordsa has provided composite material support to the YTU Racing project team in recent years. The team has already taken part in the Formula Student race, held every year at one of the most famous F1 circuits, Silverstone in the UK, and is the first and only Turkish team to take part in this race.

The YTU Racing team, one of the many projects powered by the technology exporter Kordsa in line with its mission to reinforce the future, was established as part of the Machine Technology Club of Yıldız Technical University in 2011 with the participation of 30 students from different faculties. The YTU Racing team, having produced its fourth vehicle this year, is ready to participated in the Formula Student race that takes place annually on the Silverstone circuit in Hungary. The launch of the vehicle took place at Yıldız Technical University. The sponsors, academics and students' families were present at the event. In the foyer area, participants had the chance to see the first three cars that had taken part in previous years' Formula Student races. The YTU Racing team is the first and only Turkish team to take part in the Formula Student East race.

Kordsa, thanks to its pioneering approach, has always encouraged university-industry collaboration. As one of the sponsors of the YTU Racing team this year, just as in previous years, Kordsa provided composite materials to the YTU Racing team. The composite materials supplied by Kordsa can be used in particular for the hull, wings and seats of the vehicle. Thanks to Kordsa's contributions, the vehicles have become stronger, more robust and faster due to their lighter weight.

At the launch event, the Chairman of the Turkish Exporters Assembly, Mehmet Büyükekşi, made a speech emphasizing the importance of young people's success for the future of the country. In his speech, he also thanked sponsors for supporting young people and hence reinforcing Turkey's future.

Kordsa Raises Awareness

Kordsa Indonesia plant organized a blood donation campaign at Indokordsa. With its "Give Blood, Save Lives" slogan, Kordsa reinforcers invited other companies in the area to join them. The campaign served to create awareness among Kordsa reinforcers as well as throughout the whole organization and the companies involved.



WE REINFORCE LIFE

News

Kordsa Makes Record Number of Patent Applications in 2016

Kordsa, which was recently analyzed as a success story by INSEAD Professor Ben Bensaou for his book “Innovation Machine” due to its R&D and innovation practices, closed 2016 with a record number of patent applications.

Supplying reinforcement technologies around the world from the U.S. to Thailand, Kordsa created 32 inventions and filed 103 patent applications in 2016 alone. With its business processes based on R&D and innovation, Kordsa maintains its leadership in innovation in the global reinforcement market with 411 patent applications and 128 inventions in total.

Kordsa’s Second R&D Center Gains Ministry Approval



Kordsa, a subsidiary of Sabancı Holding and a global player in the tire, composite and construction reinforcement technologies market, had had a second R&D center approved by the Ministry of Science, Industry and Technology. The Composite Technology Excellence Center, where R&D and production processes for composite technologies are brought together under a single roof, has officially qualified as an R&D Center.

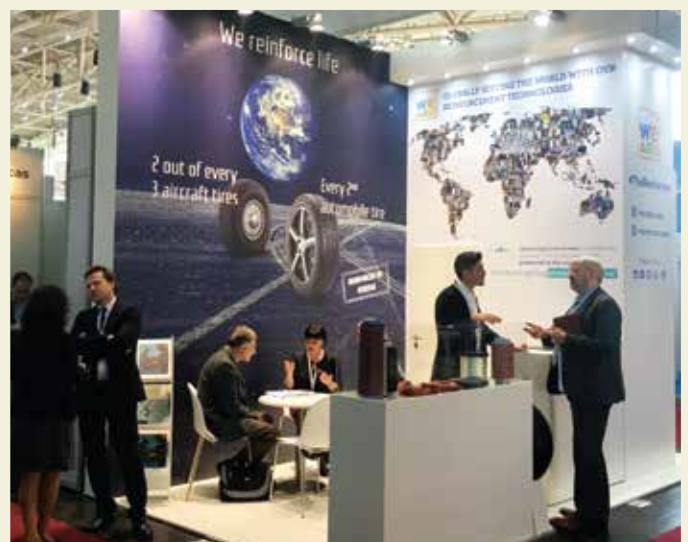
Kordsa’s Composite Technologies Center for Excellence, which has been created in collaboration with Sabancı University in an effort to bring together R&D and innovation practices in composite technologies under a single roof, is now officially registered as an R&D Center, meaning that Kordsa now has two officially-approved R&D centers. Kordsa’s other approved R&D center, located in İzmit, is seen as an R&D and innovation hub for the global and Turkish market in tire reinforcement and construction reinforcement technologies.

As one of the leading development centers in the world, the Composite Technologies Center for Excellence provides an environment in which basic research, practical applied research, technology development, product development, entrepreneurship, and production processes can all be carried out under the same roof. All the relevant players in these processes—researchers, designers, engineers, managers and staff involved in the production process, PhD students, postdoctoral fellows, faculty members and entrepreneurs from incubators—will co-exist in this ecosystem. With the Composite Technologies Center for Excellence, Kordsa is serving its stakeholders in all the phases of the R&D cycle, starting from basic research, continuing with prototype production and ending in mass production, according to customer requirements.

Kordsa at Tire Technology Expo

Kordsa participated in the Tire Technology Exposition in Hannover, where the latest tire industry technologies and trends are shared. While displaying its tire reinforcement technologies, Kordsa also shared information on its product Monolox for heavy construction equipment with participants at the conference as part of the exposition.

Kordsa, a Sabancı Holding affiliate, attended the 17th Tire Technology Expo, one of the leading expositions at which the latest developments in the tire industry are shared, in Hannover, Germany. While displaying its latest tire reinforcement technologies at its stand, Kordsa also made a presentation at the Tire Technology Conference on the features and usage areas of Monolox. Monolox, which has a protective rubber layer with a cord structure formed by monofilament fibres twisted together, protects the structural integrity of tires in harsh road conditions. In addition, the cut-resistant Monolox offers 2.5 times higher cut resistance performance compared to standard textile materials. The presentation attracted great attention from participants, conveying the message that Monolox can be used in many other areas due to its existing qualities. The presentation also included an introduction to Kordsa’s experience in the reinforcement market and its work in innovation.



Kordsa Gets Environmental Management Certificate

Kordsa earned the ISO14001:2015 Environmental Management System certificate in Indonesia, following Turkey. Having fulfilled such conditions as effective waste management for a sustainable future, energy conservation, and emergency and disaster preparedness, Indokordsa earned its ISO14001:2015 certificate. Recognized around the world, the ISO14001 certificate also adds to the prestige of the organizations as an indicator of the economic dimension of sustainability, such as effective cost control, increased efficiency and market share.



Kordsa at JEC World 2017



Kordsa, a global player in the tire, composite and construction reinforcement market, participated in JEC World, the largest composites show in the world. The exhibition has been held in Paris since 1956 and took place between March 14-16 this year. 1,250 companies from more than 100 countries exhibited at JEC Composites World this year. The show attracted more than 35,000 visitors from all around the world. Kordsa, attending the most significant gathering of the industry for the fourth time, also hosted a group of journalists from Turkey.

Kordsa shared with participants its innovative composite technologies that provide efficiency in the automotive industry. Bringing speed and productivity increases with its new resin technology, Kordsa provides a revolutionary shortening in the curing process and reduces curing time from 9 minutes to 3 minutes. Kordsa's new resin technology, which provides composite materials with a smoother and higher quality surface finish, is also a process technology suitable for automotive production speed. Kordsa is expecting to expand its share in the European composite technologies market and aims to reach \$70 million of revenue in composite technologies.

Kordsa's New Resin Technology for Fast Curing Prepreg Systems Brings Speed and Efficiency to Automobile Industry

Kordsa's technologies are bringing speed and efficiency to the automotive industry, reflecting the power of its composites. Through the speed and productivity increases provided by its new resin technology, Kordsa can announce a revolutionary shortening in the curing process thanks to its abilities in innovation. With the new resin technology developed by Kordsa, the curing time of 9 minutes has been reduced to 3 minutes, while the surface quality of the composite material has also increased. Alongside this new resin technology, Kordsa has also developed and launched a processing technology suitable for automotive production speed.

Kordsa's new technology has been developed by the groundbreaking R&D Center at the Composite Technologies Composite Center of Excellence, which brings together industry representatives and academics under the same roof for basic research, applied research, technology development, product development, entrepreneurship and manufacturing processes. This new technology will bring a fresh new dimension to the industry and Kordsa's range of thermoset prepregs, which include a wide range of resin formulations specially formulated by Kordsa for different applications and production processes. Its short curing cycle and hot de-moldable nature are especially optimized for mass production in the automotive industry.

Compression molding is the recommended process for this new resin system. It not only cures under 3 minutes at 150°C at the press under isothermal curing conditions but is also hot de-moldable and has a long out-life of 2 weeks at ambient temperature. These extreme conditions do not affect the visual performance of this innovative prepreg system, which is capable of giving class-A surface quality. The new visual prepreg shows good drapability and is suitable for both fast press molding and low-to-medium tack optimized for press curing.

Thanks to its mid-to-high Tg formulation, it is suitable for cataphoresis, hot painting, and hot adhesive bonding. The new all-in-one fast cure hot de-moldable press curable visual prepreg is available as UD and through various weaving styles in carbon and glass. Designed also for structural applications requiring excellent chemical resistance, it gives flexibility with its good chemical resistance. Kordsa's new prepreg is likely to have an exciting future, as it is well-suited to the autoclave short curing cycle that serves as the everyday standard for the world's automotive industry.

Reinforcers Meet at All Stars Award Ceremony



Kordsa reinforcers got together at the 11th All Stars Award Ceremony which recognizes the most successful projects implemented at Kordsa throughout the year. 104 Projects and 830 participants competed in 12 categories ranging from innovation to technology projects and financial performance. With the participation of employees from Indonesia, Thailand, Brazil and the U.S. through live video connection, the All Stars Awards demonstrated that Kordsa reinforcers accomplish more and more projects with a greater success each year.

Kordsa at Techtextil, the World's Leading International Trade Fair for Technical Textiles

Kordsa, a Sabancı Holding affiliate, attended Techtextil 2017, the leading trade fair and platform for the technical textiles industry. The fair connects today's technical textile technology to the future, and Kordsa presented its most innovative products in the composite and construction reinforcement technologies sector to visitors.

Over 30,000 visitors made their way to Techtextil in Frankfurt between May 9-12 to discover the most innovative products including nearly 1,500 yarns, ready-to-wear fabric, machine manufacturers from more than 50 countries in the field of technical textiles and the latest processing technologies.

Kordsa, the reinforcement leader, presented its composite technology and construction reinforcement brand KraTos to the participants at Techtextil 2017.

Used as reinforcement technology in various infrastructure and superstructure construction projects, such as industrial floors, concrete roads, under-rail concrete and airports, KraTos is an innovative product that reinforces concrete, saving labor, time and cost. Moreover, Kordsa develops innovative and unique intermediate products and applications in the field of composite reinforcement for a variety of industries, notably the aviation and automotive industries as well as marine and rail systems. Producing thermoset prepregs for various industrial applications, Kordsa boasts a wide product range and flexible production capabilities thanks to the strength it gains from weaving its own fabric.



Excellence Visit to Brazil



Kordsa organized an excellence visit to its plant in Brazil. Operating in a wide geography from Americas to the Asia Pacific, Kordsa aims to extend good practices to all its plants through Excellence Visits. During the visit, good practices in manufacturing and technology were shared with the participants, and Kordsa's latest awards were celebrated. Korda Brazil team won the 1st place in the Efficiency Category at the Golden Collar Award Ceremony, and was identified as the 3rd best workplace in the Bahia region according to the Great Place to Work list.

U.S. Leg of Leadership Training

Kordsa North America professionals came together for a fresh round of "Leadership Training." Leaders joined various workshops during the three-day program that was built to develop operational excellence, and lean and effective management. They worked on team building skills, and methods for personal leadership development and effective ways of working.



Kordsa Presents Concrete Reinforcement Technology KraTos at 40th Turkeybuild Exhibition

Sabancı Holding affiliate Kordsa, known as "the Reinforcer" in the tire, construction and composite industries, has participated in the 40th Turkeybuild Exhibition held at TÜYAP Beylikdüzü exhibition center between May 23-27 and shared its innovative concrete reinforcement synthetic fiber product KraTos with construction industry professionals.

Reinforcement leader Kordsa took part in the international building and construction materials fair Turkeybuild in Istanbul, presenting KraTos, which provides long-term and high durability as well as savings on cost, time and labor. KraTos is a more sustainable and environmentally friendly concrete reinforcement material compared to steel, and is differentiated by its long term durability due to its user friendly, non-electric conductive and anti-corrosive structure providing lifetime control over crack generation in concrete thanks to its easy and homogeneous mixing feature. KraTos is widely used in all kinds of infrastructure and superstructure applications including field concretes, coating and screed applications, industrial floors, concrete roads, water and ports structures, under-rail concrete, airports, and precast concrete components.



Kordsa Reinforces its Position in the US Market

Kordsa, a global player in tire, composite and construction reinforcement technologies, has supported its existing investment in the U.S. market with a new purchase. Kordsa's subsidiary in the U.S., Kordsa Incorporated, acquired the Chattanooga facility of the Luxembourg-based INVISTA S.à r.l. in the U.S. state of Tennessee. Kordsa aims to maintain its leadership position in the U.S. market with this new facility.

Kordsa Incorporated, the U.S. subsidiary company of Kordsa, has purchased the plant of Invista Corporation in the Chattanooga region of Tennessee. With this acquisition, which will ensure the sustainability of Kordsa's facilities in the U.S., Kordsa Inc. will have the legal right over the land in which Invista and Kordsa were formerly located, including the existing infrastructure, power generation station, and salt and polymer production lines.

Kordsa Meets with Little "Reinforcers"

Aiming to reinforce communities in the countries it operates, Kordsa visited a school in the Bahia region of Brazil, within the scope of an Excellence Visit to its Brazilian plant. Entertaining the little ones with various games and activities at the school it supports through its social responsibility project, Kordsa will continue to reinforce the future with the help of its social responsibility projects.



Kordsa Participates in Indonesian President's Official Visit



Kordsa, a global brand from Turkey, has attended a meeting held as part of Indonesian President Joko Widodo's official visit to Turkey as a special invitee of Joko Widodo. At the meeting held in Ankara with the participation of executives from leading Turkish companies, Zeki Kanadıkıncı, Chief Operating Officer for the Asia-Pacific region, represented Kordsa.

Kordsa won an Indonesian Export Champion award in 2016, and was listed among the top 100 fastest growing companies in Indonesia by Infobank, one of Indonesia's biggest economic magazines, earlier this year. In 2015, in an effort to meet demand in the region, Kordsa undertook an investment of \$100 million and opened a second tire cord and polyester yarn factory in Indonesia. Later, Kordsa strengthened its position in Indonesia with another investment to add an additional 7 kiloton capacity.

The Free Trade Agreement negotiations expected as part of Indonesian President Joko Widodo's visit will definitely strengthen Kordsa's position, as well as those of other Turkish companies in the Asia-Pacific region by developing bilateral business cooperation and trade opportunities.

WE REINFORCE LIFE

Awards

Kordsa among the Best Employers in Brazil, Two Years in a Row!



The Kordsa plant in Brazil has once again been listed among Brazil's best employers for the second consecutive year. According to a survey conducted by the Great Place to Work Institute (GPTW) that included 33 companies, Sabancı Holding affiliate Kordsa, renowned globally as "The Reinforcer", ranked 3rd in the list of the best employers in Bahia, Brazil with an 86 percent Trust Index.

Kordsa CEO Ali Çalışkan, commenting on two straight years of success, stated: "In last year's survey by the Great Place to Work Institute, Kordsa was listed in 7th place among the best employers. Our ranking 3rd place this year is the result of our high standard of

human resources management that we implement in our operations in all different regions. I am delightful that we have been recognized among the companies with a strong human resources culture by strengthening our position versus last year as a brand that is spreading from Turkey to the world. My sincere congratulations to all my colleagues for their contributions to our success. This result proved once again the strong relationship between our operational and financial success and our employees' happiness. We will continue to invest in our human resources, which is one of the pillars of our corporate culture."

About Great Place to Work

Great Place to Work® is the global authority on building, sustaining, and recognizing high-trust, high-performing employee-centered workplace cultures. With more than 25 years of experience, GPTW's survey examines the relationship between employees and employers or managers, the commitment of employees to their work, and the relationships between employees and their teammates. One of the most important tools in these analyses is the Trust Index © Employee Survey which further explains the corporate culture through credibility, respect, fairness, pride and camaraderie. The other is the Culture Audit©, which measures HR and management practices.

How is the evaluation made?

Survey results from the Great Place to Work Institute derived 2/3 of their scores from company employees, and the remaining 1/3 was based on comparative analyses of the human resources programs and practices established by each company.

Kordsa is Among Top 100 Fastest-Growing Companies in Indonesia

Kordsa, strives to attain sustainable growth in every country it operates and to provide products and services that will bring value to its customers, and has been rewarded for its efforts with numerous prestigious awards. In being counted among the top 100 fastest-growing companies in Indonesia, world's reinforcement leader Kordsa has added a new award to its global successes. Kordsa, listed among the top 100 companies by one of Indonesia's biggest economics magazines, Infobank, received the award from Indonesian Economy Minister Darmin Nasution.

Kordsa, selected as "Export Star of the Year" in Indonesia in 2016, had reinforced its growth momentum in Indonesia with this award. In 2016 a Kordsa project manager also received the "Best Employee" award in Indonesia for carrying out the project "Safety Experience Center".

Kordsa CEO Cenk Alper, expressing his appreciation for this success, said: "2016 has been a year in which we have reinforced our global leadership with the awards we have received. We had been honored with numerous awards for our R&D and innovation efforts. We were selected as an export champion both in Turkey and in Indonesia. We were listed among the "Great Places to Work" in Brazil. Now we are among the 100 fastest-growing companies in Indonesia. Kordsa will continue to positively impact every region it operates in and to attain sustainable growth. Apart from our operational and financial growth we will endlessly continue to make innovative changes that will create value."



Energy Efficiency Practices Bring Kordsa an Award

Kordsa won the Jury's Special Award in the "Project Contest on Energy Efficiency in Industry" organized by the Renewable Energy Directorate-General at the Ministry of Energy and Natural Resources thanks to the energy efficiency practices it has put into effect.

A global player in the tire, construction and composite reinforcement technologies market, Kordsa has added one more award to its already-existing successes. Thanks to the energy efficiency practices the firm adopted in the scope of its broader sustainability approach, Kordsa was granted the Jury's Special Award in the "Project Contest on Energy Efficiency in Industry" which the Renewable Energy Directorate-General at the Ministry of Energy and Natural Resources organizes every year. The award was accepted by Ali Çalışkan, Kordsa's Deputy Director-General responsible for the Europe, Middle East and Africa regions.

In the contest, organized by the Renewable Energy Directorate-General organizes in order to increase the amount of information exchange between industrial businesses and to encourage new and similar applications, Kordsa was granted the award in the "Projects to Increase Energy Efficiency in Industry" category.

Kordsa's award plaque was bestowed by Ministry of Energy and Natural Resources Undersecretary Fatih Dönmez at the award ceremony that took place as part of the 8th Energy Efficiency Forum and Fair held in Istanbul.



Kordsa Ranked First in Textiles Category of Platin Magazine Awards



Kordsa has been listed among the "Global 100 Companies" by the prestigious economics and business life magazine Platin, working together with Ipsos Research and Consultancy, and ranked in first place in the textile industry category. At the awards ceremony, 21 leading companies in various industries were given awards in 21 different categories from energy to mining, and from pharmaceuticals to logistics. The list was formed by analyzing numerous corporations registered in Turkey and their activities on a global scale based on 13 key criteria, including balance sheet data, value added production, reputation and partnership structure.

Platin Magazine's Global 100 list began this year with the aim of rewarding the Turkish corporations that contribute the most to international trade. The list aims to recognize the efforts of trading companies as well as celebrating the strength and diversity of Turkish exporters. This list, highlighting exemplary exporters in various industries, will surely also encourage other companies in the Turkish business world.

Kordsa Among Turkey's Top Ethical Companies for the 4th Time in a Row

Kordsa got listed among the most ethical companies in Turkey for the fourth time. Working in line with its principle of respecting laws and ethical values in the countries it operates, Kordsa won the ETİKA Turkey's Most Ethical Companies Award for the fourth time, given to create awareness about ethics and business morals by the Center for Ethical Values Association. Operating in a wide geography from Americas to Asia Pacific, Kordsa's commitment to "ethics" as one of its 7 values is rewarded once again.



Kordsa Among The Companies Who Add Value to the Turkey Brand



Kordsa has been given an award in the "Brand and Export Support" category at Brand Turkey 2017, which was organized by the Turkish Exporters Assembly and brought together the country's leading brands.

Kordsa, an affiliate of Sabancı Holding, has been given an award in the "Brand and Export Support" category at the "Contributors to Turkey's Brand Value and Turquality" awards ceremony at Brand Turkey 2017, which is organized by the Turkish Exporters Assembly. The event represents the intersection of Turkey's leading brands. Brands were given awards based on an evaluation of their work which has inspired Turkey's branding journey and enriched its brand value as a country.

Regarding the award, Kordsa CEO Ali Çalışkan stated: "We are proud to be among the global brands belonging to Turkey. Today, Kordsa exports technology from Turkey to the entire world. By transferring our 44-year tire reinforcement experience into composite and construction reinforcement technologies, we maintain our position in the global market with our title 'The Reinforcer'. Thanks to the Composite Technologies Center of Excellence which became operational last August, we have become the exporter of not only tire reinforcement technologies, but also composite technologies, from Turkey to the world. In this regard, we will keep adding value to the Turkey brand while continuing to reinforce wider areas around the world."

Kordsa Wins Leaders of Export Award

Kordsa won the platinum award in a ceremony by Istanbul Textile and Raw Materials Exporters' Association (ITHIB) that rewards the performance of companies' exporting their manufacture. Exporting its reinforcement technologies to 42 countries, Kordsa earned its place among the leaders of export.



Kordsa is the Winner of Creating Value Category at the Golden Collars



Kordsa left the Golden Collar Awards, organized for the 8th time this year, as the winner of four categories - including the "Creating Value" category -, an honorable mention, and a special award. Exporting technology to global markets with its mission to reinforce life, Kordsa celebrated once again its sustainable success and pioneering good practices with its employees. Kordsa will continue to reinforce the Sabancı Group with its novel technologies.

“The innovation process consists of anticipation, creation and implementation.”

“Efficient innovation is avoiding reinventing the wheel.”





The Need for Concrete Innovation

MATHIEU MOTTRIE

CEO CREA X

Innovation has become an indispensable part of modern-day business practice. Every company and organization has the word 'innovation' somewhere in its mission, vision or values statement. Even so, many of these companies and organizations still struggle to give concrete expression to innovation. They struggle even more to implement it successfully. This is a serious problem, because innovation is important—nay, crucial—for every enterprise, whether large or small, young or old. Part of the problem is that innovation has become a catch-all concept that means (too) many different things to (too) many different people. So how should we properly define innovation? And why is it so important?

Innovation: What and Why?

Innovation is the process of continually seeking to find more effective ways to carry out the functions we want to employ. As a consequence, it is important to think in terms of functions, not solutions. Consider, for example, the function of 'communicating'. People have always wanted to communicate with each other and will continue to do so in the future. But the solutions that make this possible have evolved over time: smoke signals, drums, telegrams, fixed-line telephones, etc. Nowadays, we fulfil many of our communication needs through mobile telephony. But even this solution will eventually change—and perhaps much sooner than we think. But whatever solution technology develops, the basic function—communication—will remain constant. You can easily think of many other examples. What about transport? Yesterday, the horse and cart; today, cars; tomorrow, drones?

The companies who think in terms of functions rather than the solutions are the companies that survive. And that is precisely why innovation is so vitally necessary: it ensures the future of the organization in the long term. Look at the detergent sector: are companies like Procter & Gamble and Unilever in the business of 'selling detergents' (solutions) or in the business of 'cleaning clothes' (functions)? We are already seeing electronics giants like LG, Sanyo and others bring washing machines to market that no longer require detergent. Technologies like electrolysis and acoustic cavitation are taking over the cleaning function, so the need for detergent will soon become obsolete.

An efficient innovation process consists of three phases: anticipation, creation and implementation.

Anticipation: The Need for an Innovation Strategy

In order to innovate efficiently, it is necessary to have a sound innovation policy. This must maximize the return on innovation and help the company to renew and improve. In the first place, an innovation strategy is the translation of corporate strategy into a concrete plan. This plan sets out clear actions which will make the most efficient use of scarce resources, time and budget. These actions, in turn, must make it possible to effectively carry out the organization's general business strategy throughout the short, medium and long term.

In addition to corporate strategy, a second important source of input for an innovation strategy is your knowledge of your own playing field, the sphere in which you operate. Who are the different players in your market? What are the most recent developments and trends? Who are the experts? And what new technologies are about to break through? Before an organization can renew itself (i.e. innovate), it first needs to know where it currently stands and what potential solutions already exist. This is a logical and crucial step, but one that is frequently overlooked. Why is it so important? Firstly, because we need to understand that innovation does not mean that we need to reinvent the wheel—although, sadly, this is what all too often happens. A second important reason is that companies need to try and differentiate themselves from their 'competing colleagues', and this is only possible if you know what other people in your sector are doing and investigate where potential points of differentiation might be found. This brings us to the third important input element for your innovation strategy: your company's specific 'core competencies'. A firm's core competencies are difficult for its competitors to mimic, allowing the company to differentiate itself.

Creation: Concrete Innovation Projects

Once you have an innovation strategy, it must be translated into concrete innovation projects. In this respect, there are three possible directions you can take: product innovation, process innovation and/or market innovation. Product innovation places the focus on the development of new products and technologies for existing markets. In process innovation, existing processes are refined and improved, so that the provision of products or services become more efficient and cost less. Market innovation involves seeking new markets and applications for existing knowledge, products and processes. It is possible to combine all three of these possibilities, or to have them running alongside each other.

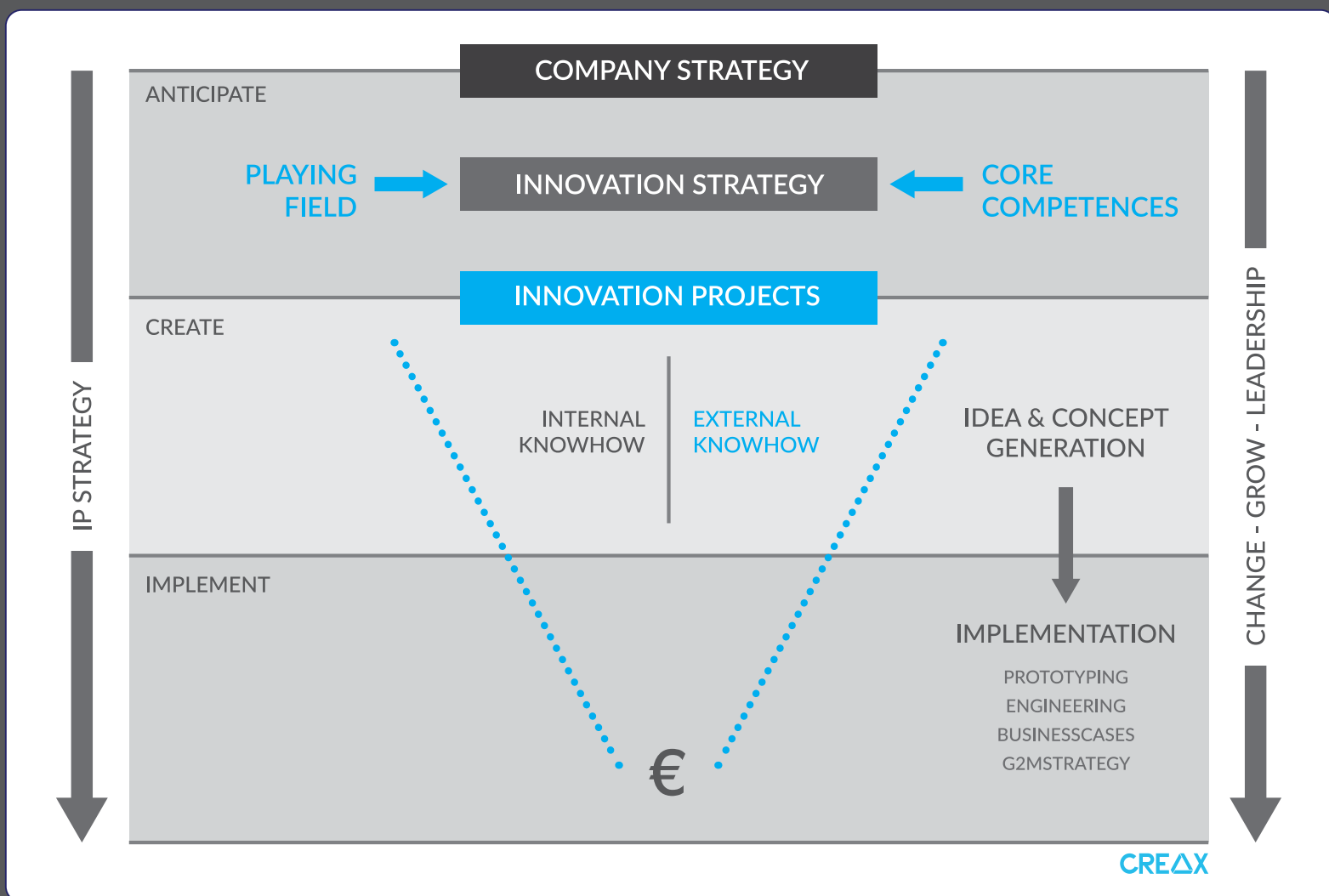
Implementation: Getting Things Done

Finally, it is necessary to draw up concrete plans for the implementation of your innovation projects. This is where the main difference is to be found between creativity and innovation. Successful renewal, whether of products, processes or markets, must be carried through in practical terms so that the necessary return can be generated as quickly as possible. The translation of concepts and ideas into workable products and services for the 'real world' can be a serious challenge. Technical, economic and consumer perspectives must all be considered and confirmed. It is only when the implementation has taken place and the new business configuration begins to yield a good return that we can speak of successful innovation.

Existing Knowledge as a Source of Innovation

A recent study into the future of innovation management concluded that knowledge management and 'high speed/low risk innovation' play an extremely important role in achieving efficient innovation.

Nowadays, everything is evolving at lightning speed. This makes it a



real challenge for companies to gain the key insights that they need, even in their own sector and industry. What's more, these insights need to be constantly monitored and updated. Today, we live in a so-called knowledge economy. Knowledge is present in abundance and is freely and easily available to all. As a result, the wheel continues to be reinvented—and that is an unnecessary waste of precious and limited resources.

If we want to innovate quickly and efficiently, we need to exploit this situation by matching external knowledge with internal expertise. It is important to stay aware that relevant and interesting knowledge is not only to be found in your own sector and industry, but in other sectors and industries as well. Most problems have already been solved somewhere. We therefore need to avoid the mistake of developing solutions and ideas that already exist. Instead, we should be exploiting existing ideas and solutions. Consider the following simple example. Imagine that we want to remove some water from a glass without touching it. This is a specific problem. However, we can translate this problem into the question 'how can we set a fluid in motion?' In other words, we can transform a specific problem into an abstract problem. If we then examine existing knowledge in this area—for example, patents, the professional literature, the internet, etc.—you will likely soon discover that there are already more than 50 solutions to this particular conundrum.

In the field of hair coloring shampoos, color fastness is the main challenge. But once again, this problem is not confined to a single sector. It is also important that clothes keep their color and that photographic paper does not fade. Different domains face the same challenges and have probably developed solutions. And there is a good chance that these solutions are transferable from one sector to another: this is what we mean by technology transfer. After all, hair fibers, textile

fibers and paper fibers all have similar characteristics. Another example: one of the irritating things about cutting cheese is that it always sticks to the knife. Food companies face this challenge on an industrial scale. In reality, however, cheese is an elastomeric material that is very much like rubber. As a result, research has shown that existing technology from the tyre sector for the cutting of rubber also offers an ideal solution for the more efficient cutting of cheese.

Everyone can and must Innovate

Many publications on innovation point to the examples of the Apples and Googles of this world. This does not always encourage the idea that everyone should modernize and improve. Quite the reverse; it actually frightens people off. This is not good. Every company and every organization can and must innovate.

Not new, but new for you. That is what it amounts to. By recycling existing knowledge and transferring it between domains and industries we can innovate in a much more efficient manner. More efficient means better targeted, faster and with more limited risk. What's more, we have little choice in the matter, certainly not in the current economic climate. Budgets are under pressure and are being cut everywhere. At the same time, the need for renewal and improvement has never been greater. If we do not innovate, there is a danger that we will miss the boat of economic progress. The solution to this contradiction lies in the reuse of existing knowledge. This stops us from trying to reinvent the wheel, reduces the level of risk and allows better use of the scarce resources that are still available.



It's Never as Simple as It Looks

PATRICK DE KEYZER

Partner, DeKep

Wikipedia defines innovation simply as a “new idea, device or method”, but where the simplicity stops is when you try to manage innovation in your company or business.

Despite reading many books, attending courses at prestigious business schools and over 30 years of experience at a global company that touted global market and technological leadership I still cannot come up with a clear answer to the question: “How do you manage innovation successfully?” However I can share with you what has worked the best for me: Innovation should be

1. Customer centered
2. Technology centered
3. People centered

1. The customer

Here I want to differentiate between internal (own company) and external customers (the market) that both need to be served through innovation efforts.



1.1. External customers

The first and only reason for a customer to innovate with you is to make him more profitable and/or competitive in the marketplace. This means that as a supplier you need to have a profound knowledge of his market(s) and the associated value proposition. It requires also a very good application knowledge: What is the function of your product, how is it applied, etc... When trying to enter new markets and create new applications for your products, the effort to acquire this application knowledge is almost always underestimated, since often it takes years of study and talking with customers!

While nowadays ‘open innovation’ is being broadly adopted by many companies, a customer will not haphazardly choose a supplier as a partner for their innovation efforts. In my experience it requires the following:

- Your current product supplies need to be QCD: top Quality at a competitive Cost with reliable Delivery. If you cannot meet this basic requirement, it is very unlikely that your customer will choose you as his or her partner.
- Proven technology market leadership. To reinforce your product leadership taking patents, participating in fairs and conventions, and publishing articles is very useful.
- Long term relationship. It is clear that the customer will only work with you if he can trust you to treat confidential information respectfully. While you might think that NDA offers the necessary protection there is always a strong one on one relationship needed of people that believe in innovation and cooperation. The NDA is then merely the formal expression of that relationship and trust.

Another challenge or issue is the time it can take to develop and commercialize the innovation. This is governed by the application itself and the customer’s testing and approval procedures. Unfortunately, the tire (reinforcement) industry has proven to be very slow in this regard. With customers that have a very strong brand reputation, it can be incredibly slow, and here we are easily talking about years! In this context and in order not to lose even more time, it is crucial that a rigorous stage-gate process is followed during the project. Taking shortcuts in this process will usually lead to failure and set you back for months if not years. The conclusion is that endurance, patience and systematic project management are your best chances.

Finally, very few customers will want to commit to a single supplier situation. This needs to be considered and discussed early on and can be solved through licenses or partnerships with other suppliers.

1.2. Internal customers

Internal innovation should be driven by the company’s own strategy to reduce the cost of quality (rejects, scrap, ...), the cost of manufacturing (cash cost, productivity,...) and capital employed (investment and working capital).

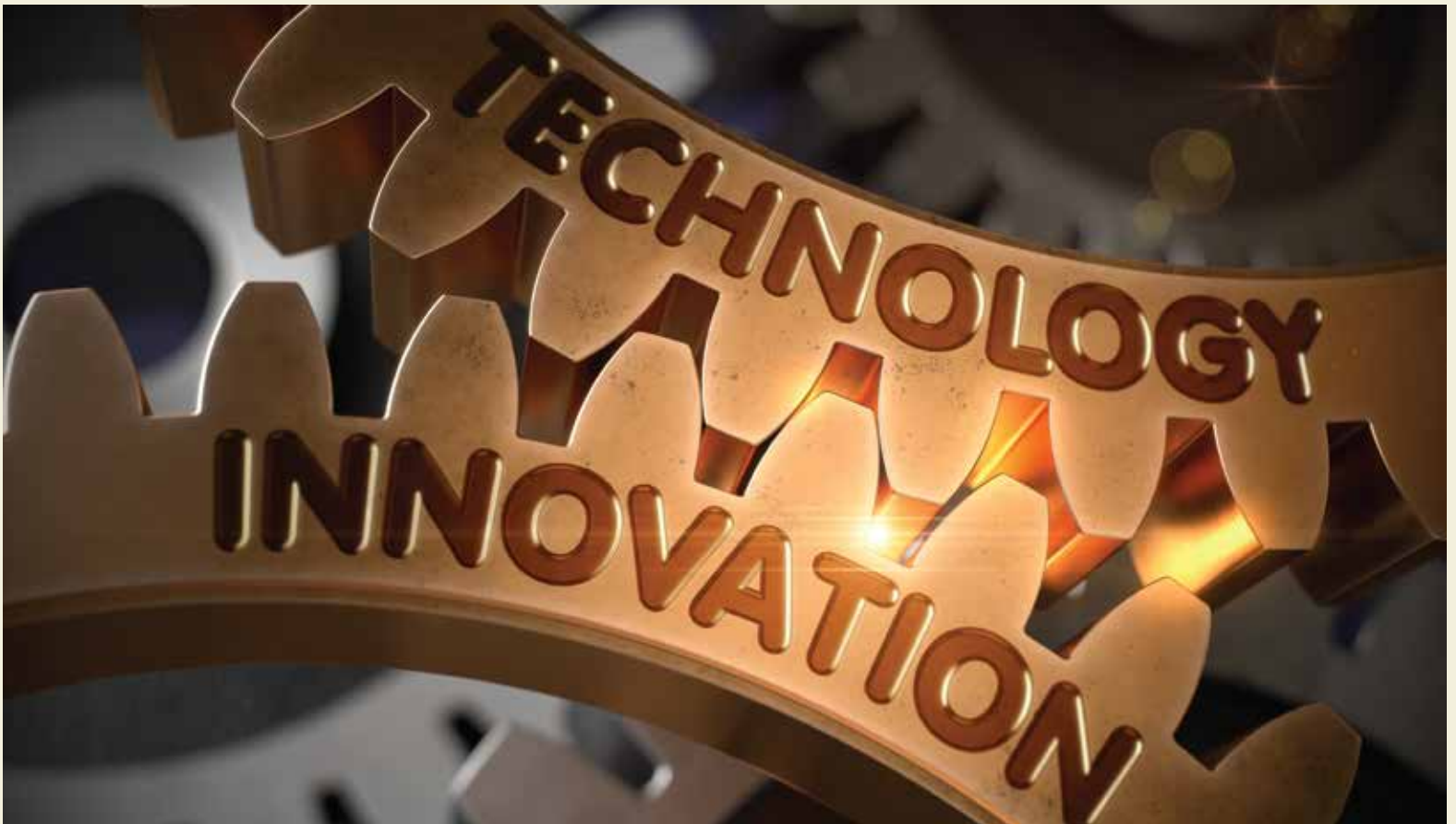
As with working with external customers the first step is to do a thorough VOIC (Voice Of the Internal Customer) and not to rely on pure technology!

Internal innovation projects are many times very rewarding since they tend to be faster and yield visible and tangible results. A good balanced project portfolio contains a minimum of 50 percent internal innovation projects

2. Technology

In an industry that thrives on technologically advanced solutions (such as tire reinforcement) it is obvious that technology is key in bringing innovative solutions to the market.

Technology is the complex interaction between Product x Process x Equipment. If you have the scale to have the three in-house, this is definitely a strong (competitive) advantage. However, you have to be clear in what you consider as your core technology. This comes from answering the question “which (process) technology gives my



company a competitive advantage in the marketplace?” While the easy and very often heard answer is “all of it”, this will result in a lack of focus and resources (people). So it is crucial to do an honest and in-depth exercise to determine your two or three core technologies and allocate the resources for it in the long term. Developments in non-core technologies need to be found with other parties.

Once a new technology (product, process, equipment) is developed, the next challenge is to get it introduced into the plant(s). A good practice is to do the first implementation in a ‘mother’ or ‘key learning plant’. This is a plant that has the necessary experience and (extra) resources to support this implementation together with the people from ‘central’ technology. It is very important that this plant has a KPI related to this development work so it gets recognised for this ‘extra’ work.

3. People

“It’s all about people” is one of my key beliefs and nothing can be truer when dealing with innovation, especially external innovation with customers. In working with customers you need the right blend of technical, commercial and interaction skills.

Since we are mostly talking about technical solutions, it is obvious that we require technical and application knowledge. But to get the most value for your innovation you need commercial skills and market

knowledge. Interaction skills are needed to continuously check your value proposition with the voice of the customer. In my experience, the most successful people were ‘groomed’ in technology and acquired their commercial and interaction skills through training, exposure and mentoring by more senior people.

How do you recognise and reward people working in innovation projects? When the project is successful, there is not much discussion, but what if the project fails for (unforeseen) scientific or commercial reasons? The only way out is to consider not only the result but also the approach and way of working. A project that has been executed systematically with a good interaction with other people (external and internal) should be recognised as well! This approach will keep people challenged and above all not scared away from working on higher-risk projects.

4. Conclusion

It is extremely difficult to manage innovation from idea generation to successful market implementation. It is necessary to play very skilfully the dimensions of the customer, technology and people. The above suggestions and experiences in no way give the full answer to this complex question, but what remains unmistakably true is: “it is never as simple as it looks” and “it’s all about people.”



Global warming is a tremendous concern in modern times and the transportation sector was responsible for 14 percent of 2010 global greenhouse gas emissions.





The Effects of Capmax on Tire Rolling Resistance

BAHADIR KAYA

Project Leader, Global Technology Center

Global warming is a tremendous concern in modern times and the transportation sector was responsible for 14 percent of 2010 global greenhouse gas emissions. Fossil fuel use remains the main source of CO₂, and therefore reducing fossil fuel consumption will decrease CO₂ emissions. In order to minimize greenhouse emissions, stricter emission goals are being set by car manufacturers. By 2020, the EU CO₂ automobile emissions target is 95 grams of CO₂ per kilometer and the target for 2025 is in the range of 68-78 grams of CO₂ per kilometer.

In order to achieve this goal, car manufacturers have strict rules and select Original Equipment tires (OE tires) in order to limit CO₂ emissions. So, tire manufacturers are now enthusiastic to reduce tire weight and rolling resistance without losing other tire performance parameters.

While a tire rolls on the road, mechanical energy is transformed into heat due to the phenomenon known as rolling resistance. Hence, rolling resistance dramatically affects the total fuel consumption of any vehicle.

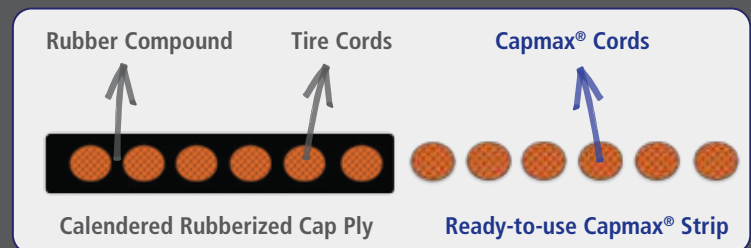
In *The Pneumatic Tire*, a book published by the US National Highway Traffic Safety Administration (NHTSA), rolling resistance is defined as follows:

“Rolling resistance includes mechanical energy losses due to aerodynamic drag associated with rolling, friction between the tire and road and between the tire and rim, and energy losses taking place within the structure of the tire.”

Various factors cause increased rolling resistance, including wind drag on the car, friction between the road and tread of tire and tire distortion due to hysteresis of tire materials during deformation. Hysteresis losses are the leading cause, and almost 90 percent of tire distortion can be connected to viscoelastic behavior, which means that tires dissipate additional energy in the form of heat when the cord and rubber components of tire materials are deformed [1]. It is well known that rubber compounds have a bigger effect on tire rolling resistance than tire cords. Adaptation of tire cords to reduce rolling resistance is mainly aimed at lowering tire rolling resistance by reducing the rubber volume in the crown area.

Three main deformation types are dominant on the contact patch of the tire: transversal bending of the crown, sidewalls and bead area, compression of the tread, and shearing of the tread and sidewalls. In generally, while 70 percent of energy dissipation occurs in the crown area, energy dissipation is equally distributed in the sidewalls and bead regions of tire structures. Several external factors affect rolling resistance as well: load, inflation pressure, longitudinal velocity, applied torque, tire radius, width, and tire’s operating temperature. It should be noted that load increase is almost perfectly correlated to increases in tire rolling resistance^[2-3]. So, many tire manufacturers intend to use low rolling resistance structures and tread compounds in order to reduce the weight and rolling resistance of their tires.

Looked at this way, Kordsa offers an innovative product for tire manufacturers. Kordsa has developed a ready to use cap ply solution—Capmax[®]—which is engineered as an eco-friendly replacement for calendered tire cord fabric as a cap-ply material. Capmax[®] strips can be directly applied to the tire during the manufacturing stage, reducing the use of rubber in cap-ply as well as eliminating many stages in tire production, such as rubber preparation & mixing, calendering and the slitting of rubber coated fabrics. Tires manufactured with Capmax[®] consume less resources, energy and raw materials and contribute to reducing the carbon footprint and rolling resistance of the tire.



For instance, when a 205/55 R16 91H tire is replaced with a Capmax[®] NY 940x2 construction, almost 280g of rubber compound is saved and rolling resistance of the tire is reduced by 3.5 percent when compared to calendered rubberized cap ply. The effects of Capmax[®] NY 1400x2 on rolling resistance can be given as another example: the amount of rubber compound is reduced by between 100-200 g when Capmax[®] is applied to one layer as a cap-ply. Also, the rolling resistance of the tire can be reduced by 2 percent when compared to calendered rubberized cap ply.

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- [2]- The Tyre - Rolling Resistance and Fuel Savings. (2015). 1st ed. [ebook] Michelin. Available at: <https://community.michelinchallengebibendum.com/docs/DOC-3212> [Accessed 8 Jun. 2017].
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We are the Reinforcers of Life!

OUR INNOVATIVE TECHNOLOGIES ARE VERY MUCH INTEGRATED IN OUR **EVERYDAY LIFE** TO MAKE IT **SAFER**, MORE **EFFICIENT, COMFORTABLE AND CONVENIENT**. AS KORDSA, THE REINFORCER OF 1 OUT OF EVERY 3 AUTOMOBILE TIRES AND 2 OUT OF EVERY 3 AIRCRAFT TIRES, STRIVES FOR MAKING LIFE MORE SUSTAINABLE BY **REDUCING THE ROLLING RESISTANCE** TO DECREASE THE FUEL CONSUMPTION WITH ITS TIRE REINFORCEMENT TECHNOLOGIES AS WELL AS **LIGHTENING THE VEHICLES** WITH ITS COMPOSITE TECHNOLOGIES AND OFFERING LOW CARBON EMISSION AND **LONG-LASTING DURABILITY** FOR SUCCESSFUL AND SUSTAINABLE CONSTRUCTION PROJECTS. OUR PRODUCTS NOT ONLY IMPROVE THE LIVES OF INDIVIDUALS, FAMILIES AND OUR LOVED ONES, BUT ALSO “REINFORCE THE LIFE”. AS KORDSA REINFORCERS, WE DECIDED TO TELL HOW WE **TOUCH EVERY ASPECT OF LIFE** AND KEEP WORKING TO IMPROVE PEOPLE’S LIVING CONDITIONS WITH OUR INNOVATIVE VALUE-ADDED TECHNOLOGIES. FOR THIS REASON, WE PUT A CAMERA IN VARIETY OF DEPARTMENTS IN DIFFERENT PLANTS AND EACH REINFORCER TOLD HIS OR HER REINFORCEMENT STORY. WE ARE PROUD TO SEE **OUR DEDICATED POWER TO CREATE VALUE**, AND WE WILL BE SHARING THOSE CONTENTS WITH YOU BY OUR ONLINE AND OFFLINE CHANNELS.

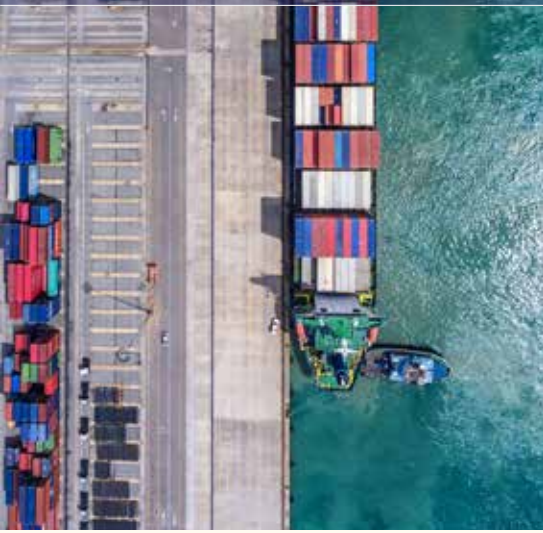


WE REINFORCE LIFE

WE REINFORCE LIFE



“ I REINFORCE LIFE
A REINFORCER SHOULD SHOW
HIGHER PERFORMANCE IN ALL
PROCESSES TO REACH
SUSTAINABLE SERVICE AND
SAFETY SO BEING A REINFORCER
IS TO TOUCH PEOPLE'S LIFE BY
GIVING THEM HIGH RELIABILITY
AND SAFETY. ”



WE REINFORCE LIFE



“ I REINFORCE LIFE
KORDSA PRODUCTS SHOULD ANSWER
THE NECESSITIES OF OUR CUSTOMERS.
MY JOB IS TO ENSURE THE QUALITY OF
OUR PRODUCTS TO REACH THE
CUSTOMER SATISFACTION. IN ORDER
TO DO THIS, I HAVE TO KNOW MY
PRODUCT AND MY CUSTOMER VERY
WELL AND MAKE AGILE AND
ATTENTIVE DECISIONS. ”



In the brake pads, suspension systems
and drive shafts of racing cars.



We're always with you in
every field of life.

WE REINFORCE LIFE



“ I REINFORCE LIFE
AS A PART OF HIS JOB, MY HUSBAND
HAS TO USE RIGGING AND FALL
PROTECTION EVERY DAY. IT GIVES
ME RELIANCE THAT HE USES
PROTECTION, WHICH ARE
REINFORCED BY KORDSA
PRODUCTS. THAT REMINDS ME
WHAT WE DO AS REINFORCERS
TOUCHES OUR DAILY LIVES! ”



WE REINFORCE LIFE



“ I REINFORCE LIFE
THE USE OF COMPOSITE
MATERIALS IN TRANSPORTING
VEHICLES IMPROVES THE
ENVIRONMENT IN MANY WAYS.
COMPOSITE MATERIALS ENABLES
OUR CUSTOMERS TO PRODUCE
MUCH MORE LIGHTER VEHICLES,
WHICH HELPS REDUCING
THE FUEL CONSUMPTION. ”



On the reinforced surfaces of the barrages
that produce our electricity.

WE REINFORCE LIFE



“ I REINFORCE LIFE
WITH THE PRODUCTS THAT WE'VE
DEVELOPED IN OUR R&D CENTER,
WE HELP TO SHORTEN THE
BREAKING DISTANCE AND
STRENGTHEN THE TIRE GRIP.
THUS, PEOPLE CAN USE MUCH
MORE SUSTAINABLE TIRES AND
SAFELY REACH THEIR HOMES
AND FAMILIES. ”



Our job is to
reinforce life!



WE REINFORCE LIFE



“ I REINFORCE LIFE
WHILE MAKING DECISIONS BY
CONSIDERING METICULOUS
APPROVAL PROCESSES AND
OPERATIONAL EXCELLENCE GOALS,
IT MAKES ME HAPPY TO KNOW
THAT DECISION IS NOT ONLY
TOUCH MY LIFE BUT ALSO
CHANGES OTHER INDIVIDUALS'
LIFE IN BETTER WAY. ”





Michelin View on Material

PATRICK COHEN

**Michelin Material Product Line
Reinforcement and Tissue Technical Director**

1. Introduction

“Sustainable mobility should be safer, more efficient, more accessible, clean, connected and more enjoyable.”

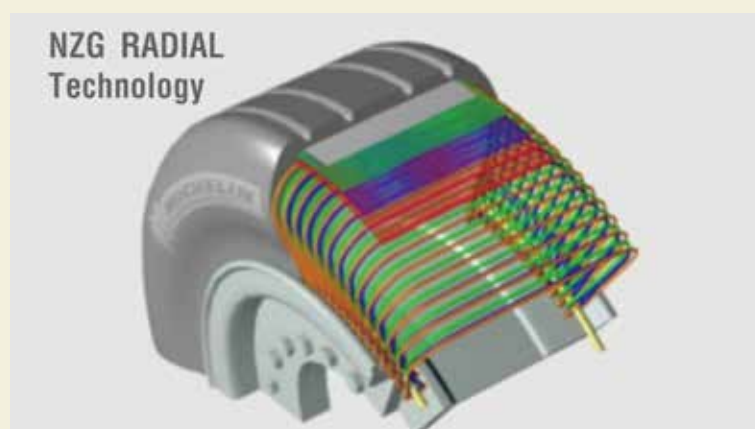


Reinforcing technologies are at the heart of tire advances, particularly their weight, rolling resistance, cost, endurance and road hazard resistance.

2. Textile in Tires. Continuous Technical Progress

The casing of the tire was for many years of natural origin (cotton) and then biosourced (rayon extracted from cellulose). The rise of synthetic thermoplastics such as nylon 66 and PET has made it possible to achieve a compromise of weight and performance, which is very interesting in terms of cost. Although this rise has increased the dependence on petroleum-based materials, this evolution has reduced the development of the complex chemistry required for the rayon process.

However, the specific characteristics of rayon in terms of rigidity of extension and resistance to temperature continue to make it a preferred fiber for high performance passenger car tires, as well as for high-temperature uses in run-flat applications. With this said, the mastery of polyesters has also reduced, little by little, the use of rayon. The weight and rolling resistance of the tire carcasses are also reduced when tire models are upgraded from multi-ply casings to single-ply casings. The ability to maintain resistance to road hazards is then obtained (but not exclusively) by an increase in the cord size of the reinforcements used. However, this evolution has its limits, in particular in manufacturing.



In the field of tire summit materials the major evolution in the last thirty years has been the addition of nylon zero-degree cap plies on top of the steel belt. For the high speed indexes, this addition has made it possible to reach the speed limit requirements. For the low speed indexes it was an important improvement to the endurance of the summit of the passenger tires. This technology capitalizes on the thermosensitive nature of the nylon, which makes it possible to reconcile tire performance and manufacturing of tires.

Starting in 2000, a new textile reinforcement developed by Michelin has significantly improved high-performance tires. This product is a hybrid aramid/nylon reinforcement. At the beginning, they were reserved for a specific tire process of manufacturing without the inflation stage. Then afterwards they were applied to the conventional processes. This invention allows an increase in speed limit while reducing the mass of the summit of the tire. It is also beneficial to many other performance indicators. Its development is limited by the cost of aramid fiber.

In the field of radial aircraft tires, Michelin Near Zero Growth technology, based on the replacement of nylon reinforcements by nylon aramid hybrids, has made significant progress in terms of weight, tire robustness and safety.

The use of textile reinforcements in the field of truck and bus tires remains marginal.



3. Sustainable Performance, a Major Issue

The sustainable performance of the tire is reflected in the 4 axes of the circular economy (Reuse, Reduction, Recycling, and Renewal), in particular through performance enhancement, more robustness, weight reduction and a longer life.



Textile innovation has been a major element in technical advances in passenger car tires in past years. Yet there are many other potential

areas of progress which also deserve attention. On the one hand, incremental progress paths will make it possible to optimize the efficiency of the material: in particular nylon 66, PET, or the large formulation field opened up by the hybrid cable constructions.

On the other hand, breakthrough innovations will allow for progress on either tire performance or on more sustainable supply bases than the oil industry.

Thus, it may be relevant to carry out research on new fibers, allowing us to achieve the same performance as with the aramid or hybrid cables at a competitive cost.

Biosourced or recycled fibers are also interesting fields of investigation. The rise of green chemistry, the development of the use of bio-resources and the search for sustainability of access to high-performance fibers leads to a demand for fiber that respects the environment and is independent of petroleum resources. As part of Michelin's 4R approach, future reinforcements will have a reduced environmental impact. Many publications present paths to obtaining biomass monomers. It remains to be seen which will become economically viable and able to compete with the current supply chain in terms of feedstock, processing, costs and purification.

Finally, the adhesive systems remain important for their initial performance and their durability over time and at high temperatures. Their industrial performance, in terms of hygiene, the environment, energy reduction and implementation costs, are also elements of the Michelin 4R approach.



Future Focus on Rolling Resistance

BURAK İLGÜN

Market Development, Manager /PCR

There have been many studies carried out with the aim of finding a solution to reducing rolling resistance, but only a few have related to the main reason why rolling resistance is important. It is time to remind ourselves how the Rolling Resistance story began and how far it has gone from a CO₂ emissions perspective through medium- and long-term scenarios.

A global perspective on tire reinforcement will help us to understand future challenges. It is obvious that both the heart of the problem and possible solutions to it are compound related. At first, it looks like reinforcement materials do not have as much of an impact on reducing rolling resistance as compounds do. However, when compounds and reinforcement materials are considered together, then reinforcement materials are an important factor. This is because thinner tire reinforcement cords mean less compound is used.

Another novel solution is the elimination of compounds and the application of tire reinforcements without compounds. Kordsa continuously strives towards either the reduction or the elimination of compounds in tire production to reduce rolling resistance.

Background

The main driver of the automotive industry is obviously CO₂ emissions. The EU target of reducing CO₂ emissions to 95gr/km by 2020 challenges both the OEM and tire makers. Even though today's average fleet emissions levels are not promising in the direction of 2020, EU authorities have discussed reducing emissions down to 70gr/km by 2025.

Today, it seems that there are two options to reach the EU targets: one is to try to totally eliminate CO₂ emissions and another is making efforts to reduce them; both of these options require different problems to be solved. Table 1 shows the two options and a road map towards reaching the target. We need to analyze these two options together with their solutions and the handicaps that we still have to work on.

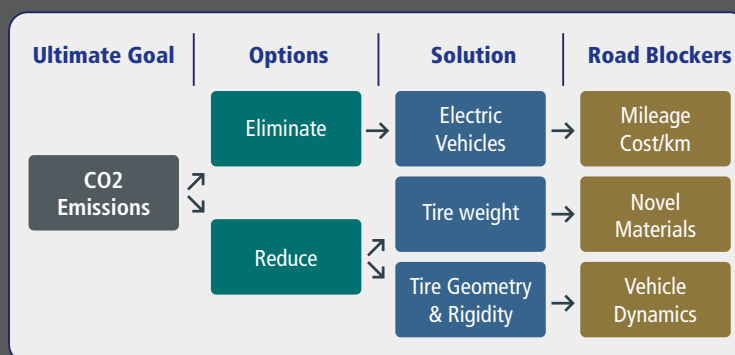


Table 1: There are different options and solutions to reach the EU target of reducing CO₂ emissions.

The elimination of CO₂ emissions through electrification: an obvious choice for the long term

As regulations are becoming stricter than ever, the options that can solve the emissions puzzle are becoming more limited. Although the total elimination of CO₂ emissions is a highly desired outcome, it seems that the only solution that would lead to total elimination is the use of electrical vehicles (EVs). EVs are not a new subject in the automotive industry, and moreover many improvements have already been made by the industry. For example, the current total mileage level is better than 5 years ago and battery packs are 65 percent cheaper. Nevertheless, EVs still have low penetration within the automotive industry: less than 1 percent in some markets.

It is obvious that any new technology introduced into the automotive industry will take many decades to become accepted. Looking to history, we see that automatic transmission, the airbag, navigation systems and hybrid vehicles have had a deployment cycle between 15 and 50 years. Therefore, a long deployment cycle is also expected for EVs. However, there is one very major driving force that will accelerate the deployment of EVs: mandatory regulations. As soon as CO₂ emissions authorities dictate newer and higher standards, car manufacturers will need to put more effort into building EV cars.

Some analysis suggests that if regulations mandate emissions levels of 70gr/km CO₂ by 2025, switching to electrical engines instead of investing in conventional engines will become a significantly more economic option. Recently, many major OEMs have either announced that they are investing in EVs, or have declared that they will not invest any more into internal combustion engines. A recent analysis by KMPG looking at surveys with auto industry executives the past 5 years rightly confirms that there is an inevitable trend towards EVs.

In future, while the automobile industry will be devoting more effort to the development of EVs, mainly triggered by CO₂ regulations, eventually the all-time star of tire industry research will regain the spotlight: "rolling resistance". Although shared mobility is believed to reduce the total cost of mileage in Evs, it is obvious that in order to increase mileage, energy losses should be avoided. Therefore, improved rolling resistance will improve mileage for EVs, which is vitally important. Today's efforts in reducing rolling resistance will carry the tire industry to the next level.

The reduction of CO₂ emissions through tire solutions: an eternal challenge

Tires are said to be the low-hanging fruits of the industry in terms of improving fuel efficiency and reducing emissions compared to the development requirements for improvements in other components. Tire industry has been dealing with rolling resistance for a few decades with all the parties in the supply chain pitching in. Rolling resistance was the "compromise" factor compared to other essential factors such as wet grip, mileage, etc. in tire production. Throughout



the years, these efforts have resulted in improved products, from raw materials to tire design.

There are OEM test results that declare an enormous leap—15 percent improvement—in rolling resistance with acceptable tire performance when they test tall and narrow tires. Although this is a very important reduction in rolling resistance level, the vehicle dynamics will be much affected. Vehicle design will be essential in avoiding the side effects of tall and narrow tires, slowing penetration of the development.

Although the efforts being put in are considerable, it is not that easy to reduce the average CO₂ emissions of an OEM's fleet. It is expected that most of the OEMs will not match the legal emission levels for 2020. This indicates that OEMs will be looking for emerging solutions to decrease their fleets' average CO₂ emissions. As discussed above, OEMs will stop choosing to invest in conventional engines. So, to improve the rolling resistance of internal combustion engine cars, tire technology will again take the lead to achieve these targets economically.

A reduction in tire weight will directly or indirectly prevent losses due to hysteresis. The hysteresis of the rubber compound is the controlling factor for rolling resistance, and therefore the reduction of the amount of rubber compound is essential. The most effective area to reduce it is the tread of the tire and most of the focus has been given to this factor over the years. Apart from the tread, rubber compound is also applied to cover reinforcement materials in the tire. The carcass, cap ply, steel belts, and bead are the components that are rubberized.

It is possible to decrease the amount of compound used by higher modulus NY66 cords in cap ply or higher tenacity PET cords in the carcass. Advanced NY66 cord designs that enable UHP performance are produced by the twisting of heavy dtex single yarns. This advanced

cord design results in 20 percent less cord gauge and a 35 percent higher modulus level that enables compound saving compared to regular NY66 1400/2 cord constructions.

The elimination of compound from reinforcement is possible with ready to use cap ply materials available in the industry such as Capmax by Kordsa. Due to the cap ply application type, an up to circa 300gr/tire weight reduction is possible. Since there is no compound to create hysteresis, a positive effect is observed in terms of a circa 4 percent reduction in rolling resistance. In outdoor test results, tires with Capmax performing equally as well as tires with conventional rubberized cap ply.

New reinforcement materials will play a leading role in shaping the future of the tire industry, both in the medium term and long term.

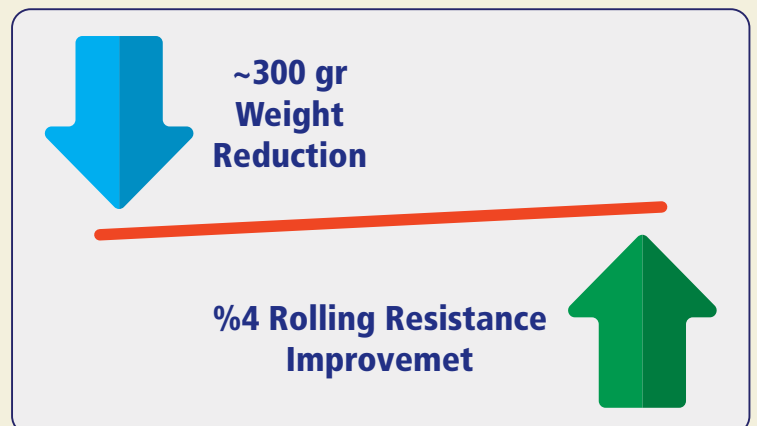


Table 2: The relationship between weight reduction and rolling resistance improvement when using Capmax by Kordsa.



Carbon Fiber Growth in the Automotive Market

GIACOMO DAL BUSCO

Sales Manager, Composite Reinforcement

This article is an introduction to carbon fiber sales growth in automotive programs, market trends, competition in the materials sector, client road maps, the boom in electrical cars and the Kordsa CM11 fast curing carbon prepreg solution.

1. Will Carbon Fiber Composites Find Extensive Uses in the Automotive Industry?

Carbon fiber-reinforced plastics (CFRPs) are finding their way into new applications as industries demand materials with ever-higher strength-to-weight ratios, corrosion resistance, and workability. Over the past years, CFRPs have been increasingly used to replace metal in applications where light weight has outsized value primarily for reducing fuel consumption and reducing CO₂ emissions, and in particular where it is capable of supporting prices that can reach an average of 60-70 Euro/kg.

CFRPs applications are present in high-value sectors such as sporting goods, the aerospace industry and supercars, but priced out of most large-volume markets, particularly the mainstream automotive industries. This will continue until emerging methods and materials speed up CRFP production and bring down high prices.

Kordsa has concentrated particular attention on reducing labour costs for both molding processes and the preparation (sanding and painting) of interior/exterior CFRP parts with the launch of the CM11 fast curing resin system, which, in parallel to the 3-to-5 minute press cycle, offers a great class-A surface finish without pinholes and carbon fiber print-through marking.

According to recent published reports, the usage of carbon fiber in automotive manufacturing is expected to nearly double from 2015 to 2020. According to these reports, global car production is expected to rise over the next couple of years to more than 110 million units in 2025, up from an estimated 88.7 million units in 2015. Much of this

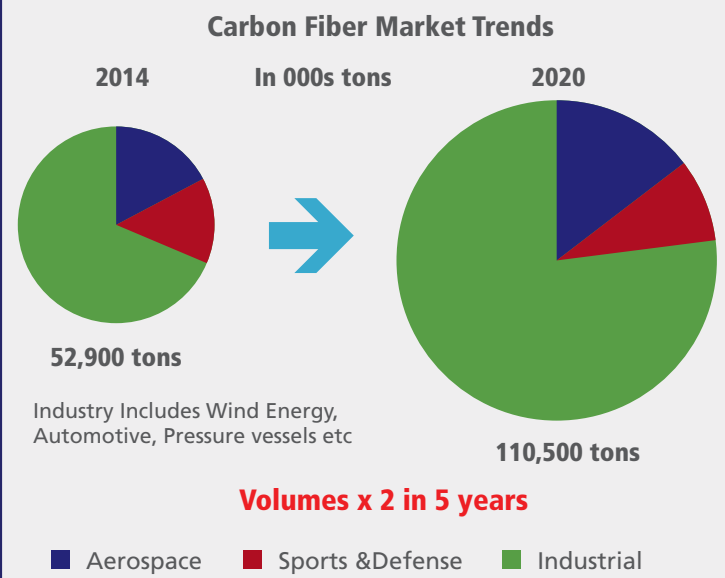
growth will come from the fast-expanding Chinese market. One report says the average car will incorporate nearly 350 kilograms (771.63 lbs) of plastics, up from 200 kilograms (440.92 lbs) in 2014.

“While metal and metal alloys are still critical to automotive design, automakers are finding innovative ways to leverage plastics and composites into their designs to help reduce vehicle weight and improve efficiency. We expect the use of plastics will only increase as the materials improve and production costs are reduced.”¹ This is driven by increasingly ambitious government goals of meeting Corporate Average Fuel Efficiency (CAFE) standards of 54.5 mpg by 2025. In order for those goals to be feasible, fuel economy must be improved by approximately 50 percent across the passenger vehicle fleet. The use of carbon fibers and polymer matrix composites enables car body-weight reductions of an estimated 25-70 percent compared to competing materials.

“Closures, which include doors, lift-gates and hoods, are the easiest options to significantly reduce vehicle weight, and we see significant opportunities for composites in those as well as non-critical structures such as seats, instruments, the under-tray etc.”¹

1: JEC Group Strategic Study “Carbon fibers: history, players and forecast to 2020”

FUTURE IN AUTOMOTIVE-LIGHTWEIGHT APPLICATION FOR EMISSION REDUCTION OPEN SIGNIFICANT FAST GROWTH ON COMPOSITE MATERIAL SALES

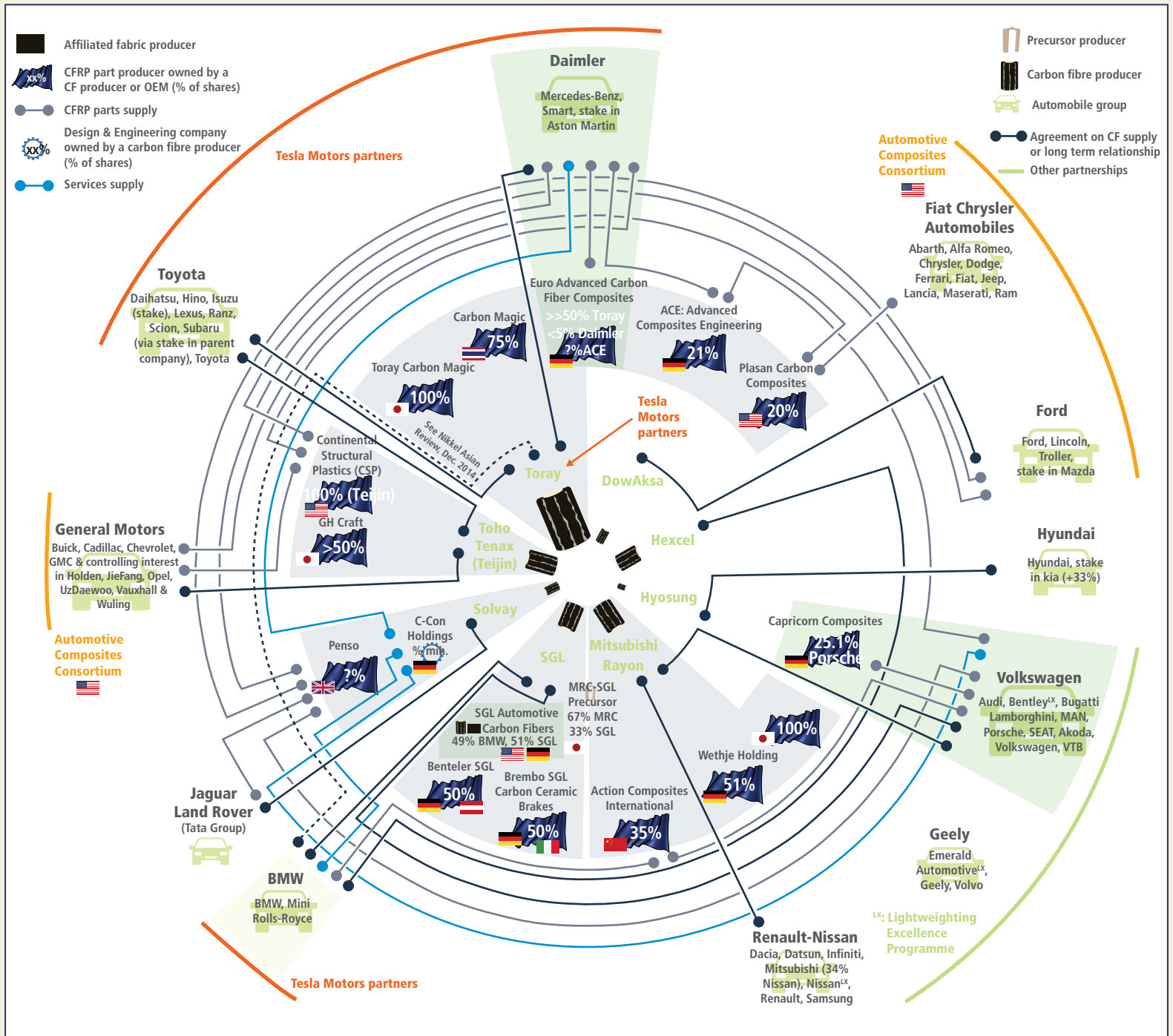


Source: JEC Group Strategic Study “Carbon fibers: history players and forecast to 2020”

By 2020, CFRPs are expected to comprise a \$35 billion market, including a \$6 billion slice of the automotive market. However, these automotive uses will be limited to luxury and racing vehicles. Analyses indicate that large-scale, mainstream CFRP automotive adoption before 2020 is unlikely. But sometime after 2020, the potential volume of CRFP used in cars and trucks could dwarf all other applications, potentially reaching hundreds of billions of dollars.

As a result, most major automotive companies and carbon fiber producers are forming partnerships, joining consortia, and conducting research to bring automotive CFRPs closer to commercial reality. The Carbon Fiber Composites Consortium remains the most connected entity on the automotive partnership map, with 23 OEM, Tier 1, and major material supplier partners.

2. The Future of the CFRP Automotive Market: the JDA Alliance Between OEM and Composite Material Suppliers



Source: JEC Magazine, no. 112, April–May 2017, p. 21

Table 2: In reality, most major automotive companies and carbon fiber producers are forming partnerships, joining consortia and conducting research to bring automotive CFRPs closer to commercial volume program applications. As you can see here, Kordsa have now begun making contacts and obtaining material test approval to begin similar JDA/technology partnerships with top automotive OEMs and Tier 1 CFRP components manufacturers.

In addition to advances in fiber production, suppliers throughout the value chain are developing faster, more efficient equipment and resins designed for automotive CFRP use, as well as scalable CFRP recycling methods. More recently, BMW has partnered with Boeing, a world leader in using CFRPs for aerospace manufacturing. The two hope to improve CFRP production and recycling. By leveraging both upstream fiber capacity investment and the knowledge of experienced players like Boeing, BMW is positioning itself to lead the way in both large-scale automotive CFRP manufacturing and automotive group technology partnerships with aerospace companies.

The future still remains uncertain. Development trends underway in fiber, resin, and composite part production strongly suggest that by the mid-2020s, it will be technically and economically feasible for

automotive OEMs to make mainstream vehicles that use significant amounts of CFRPs.

Fundamentally, the CFRP technology push toward automotive composites is predicated on the idea that reducing weight is a cost-efficient method for reducing fuel consumption. (A 10 percent reduction in weight typically leads to a 6 to 8 percent reduction in fuel consumption.) As a result, vehicles will gradually become lighter as fuel economy standards become stricter. Meanwhile, CFRPs—the materials with the highest weight-specific strength—will be waiting to be used when they get cheaper. Low-cost fibers may become a reality in the next 10 to 12 years, once the industry is able to adopt methods that facilitate low-cost, large-scale production processes. Additionally, recycling carbon fibers will boost adoption across industries in the medium to long term."

3. Market Trends

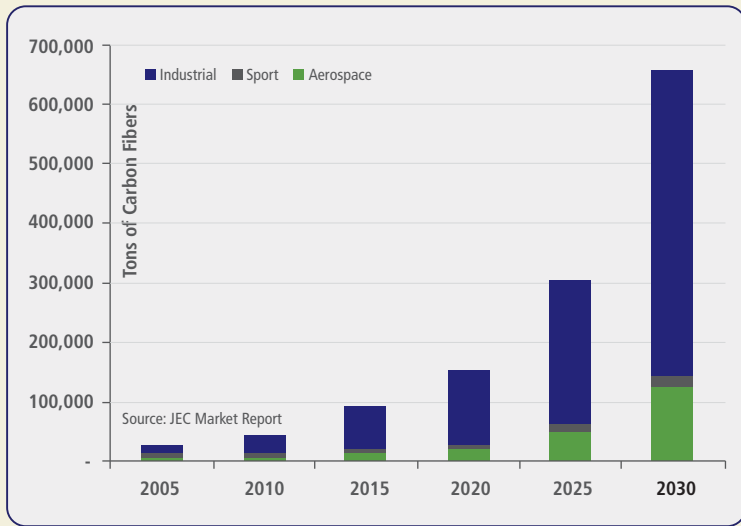


Table 3: Carbon fiber composites for industrial and automotive applications are the fastest-growing markets today, especially in mid-segment cars where there is the need to produce large volumes of geometrically complex structural/aesthetic parts at an affordable price.

The aim of Kordsa is to supply the best possible materials solutions for manufacturing large volume, low-cost, good quality composite parts through:

1. Vertical integration in semi-finished products (textiles, prepregs, pre-cutted preform): to be cost competitive and be able to supply material for both RTM and press molding processes,
2. To reduce drastically the time taken in the lamination step (the most time-consuming and costly step in composite manufacturing) by developing fast-curing prepregs like CM11 which is one of the fastest-curing press prepregs in the market, to support customers for suitable materials for automatic process of picking, deforming and placing prepregs/textiles to manufacture ready-to-mold pre-forms (essential materials for metal stampers),
3. Structure: introducing CM11 prepregs, carbon fabrics, materials library tests and solutions in order to be able to follow the programs of large industrial automotive corporations,
4. Goal: to create closer relationships with automotive plants and Tier 1 manufacturers in Europe and in future to follow up with growth in the Far East (China) and U.S.

4. Client Road Map and Carbon Components

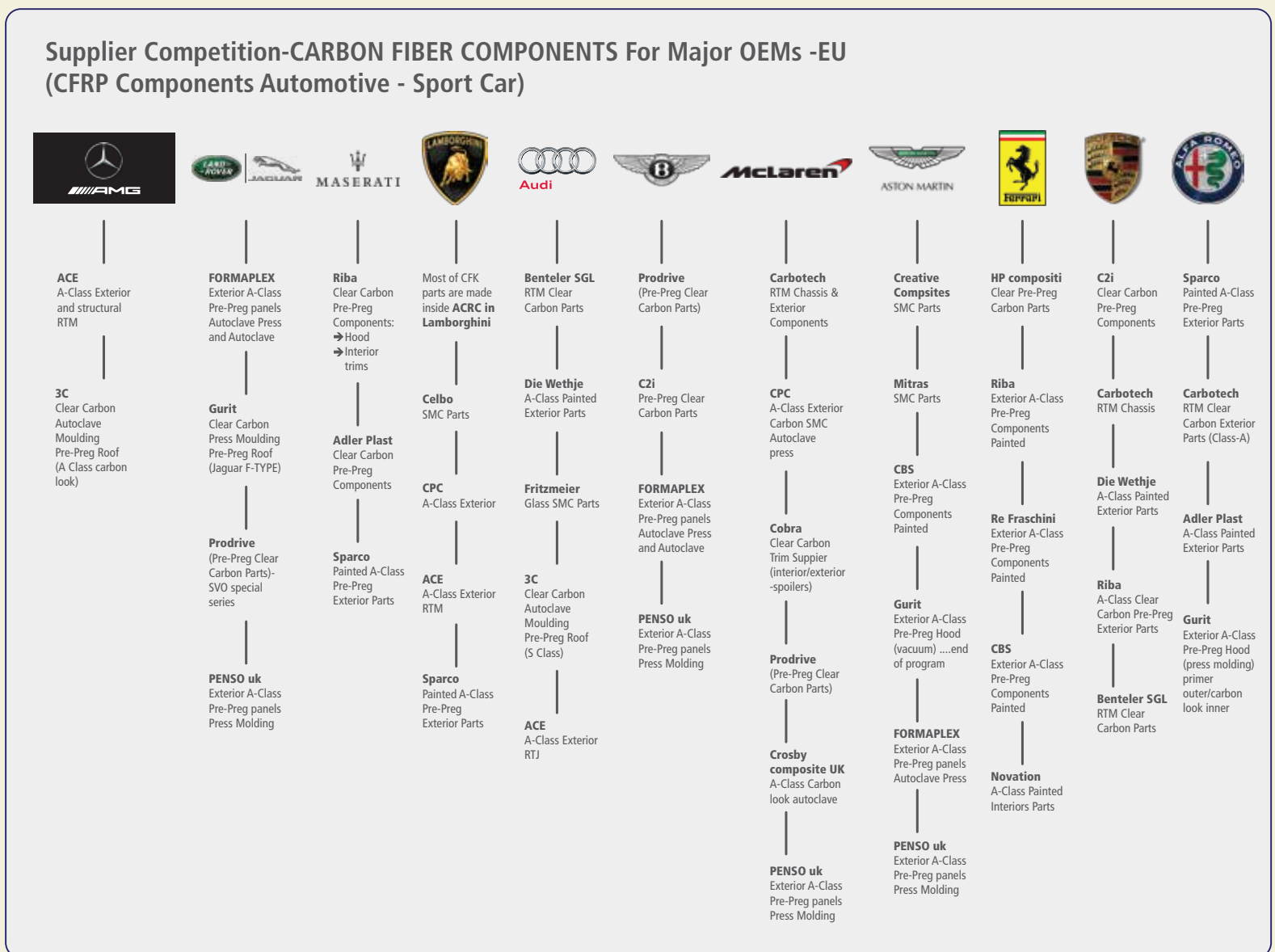


Table 4: The main Tier 1 and OEM road map is shown here. Kordsa focuses on supporting every step of this OEM supplier chain.

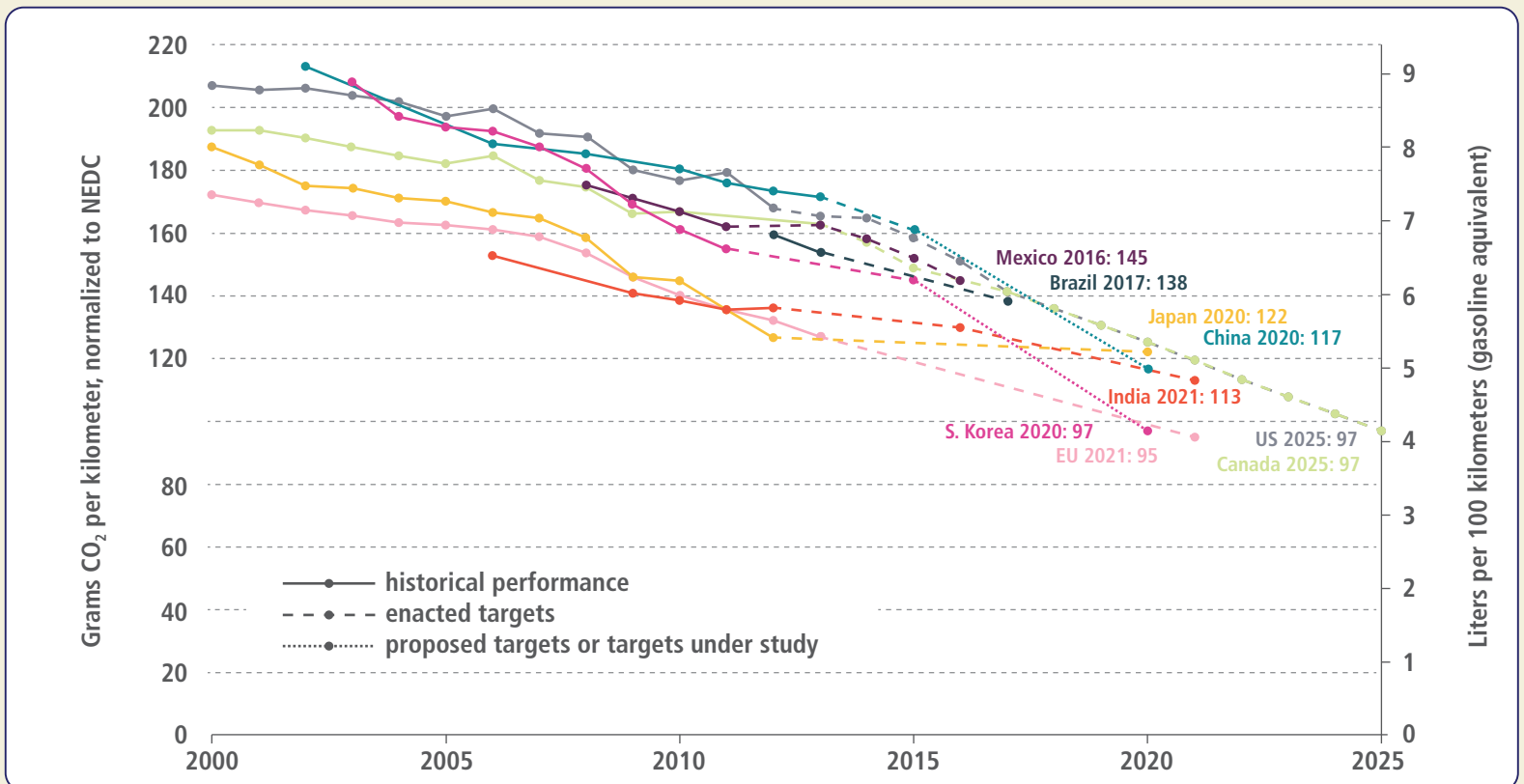
	Body-in-White (22%-25%)	Closures & Fenders (7%-8%)	Powertrain (24%-28%)	Suspension & Chassis (22%-27%)	
	CM 11	CM 11	CM 11	CM 11	
Key Applications	<ul style="list-style-type: none"> • Passenger Compartment Frame • A, B, & C Pillars • Roof Structure • Floor Structure 	<ul style="list-style-type: none"> • Front & Rear Door • Hood / Bonnet • Fenders • Tailgate / Liftgate 	<ul style="list-style-type: none"> • Engine • Exhaust System • Fuel Tank • Transmission 	<ul style="list-style-type: none"> • Chassis • Wheels • Steering Brakes 	<ul style="list-style-type: none"> • Seats • Instrument Panel • Insulation • Airbags • Windows • Glazing • Trim
	Key Materials	<ul style="list-style-type: none"> • Steel • HSS/AHSS • Aluminum • CFRP 	<ul style="list-style-type: none"> • Steel • Aluminum • GFRP • CFRP 	<ul style="list-style-type: none"> • Aluminum • Iron • Magnesium 	<ul style="list-style-type: none"> • Steel • Aluminum • CFRP

Table 5: Lightweight materials options in various applications and weight reduction percentages

5. Carbon Fiber Automotive Prepreg Sales Growth as a Result of a Lightweight Main Components Program: the Boom in Electrical Cars and CO₂ Emissions Restrictions

In electric vehicles, the payoff for reducing weight is even greater due to secondary cost savings from using smaller, lighter batteries. However, alternative methods of reducing gasoline use such as hybridization and using alternative fuels like natural gas, hydrogen, and biofuels, are gradually becoming less costly as their underlying technologies continue to advance.

Current trends still strongly indicate significant automotive adoption of CFRPs in the mid-2020s, and companies throughout the value chain must position themselves to take advantage of the coming shifts. However, those developing these technologies should consider that there could be a limited long-term window for penetrating the automotive industry.

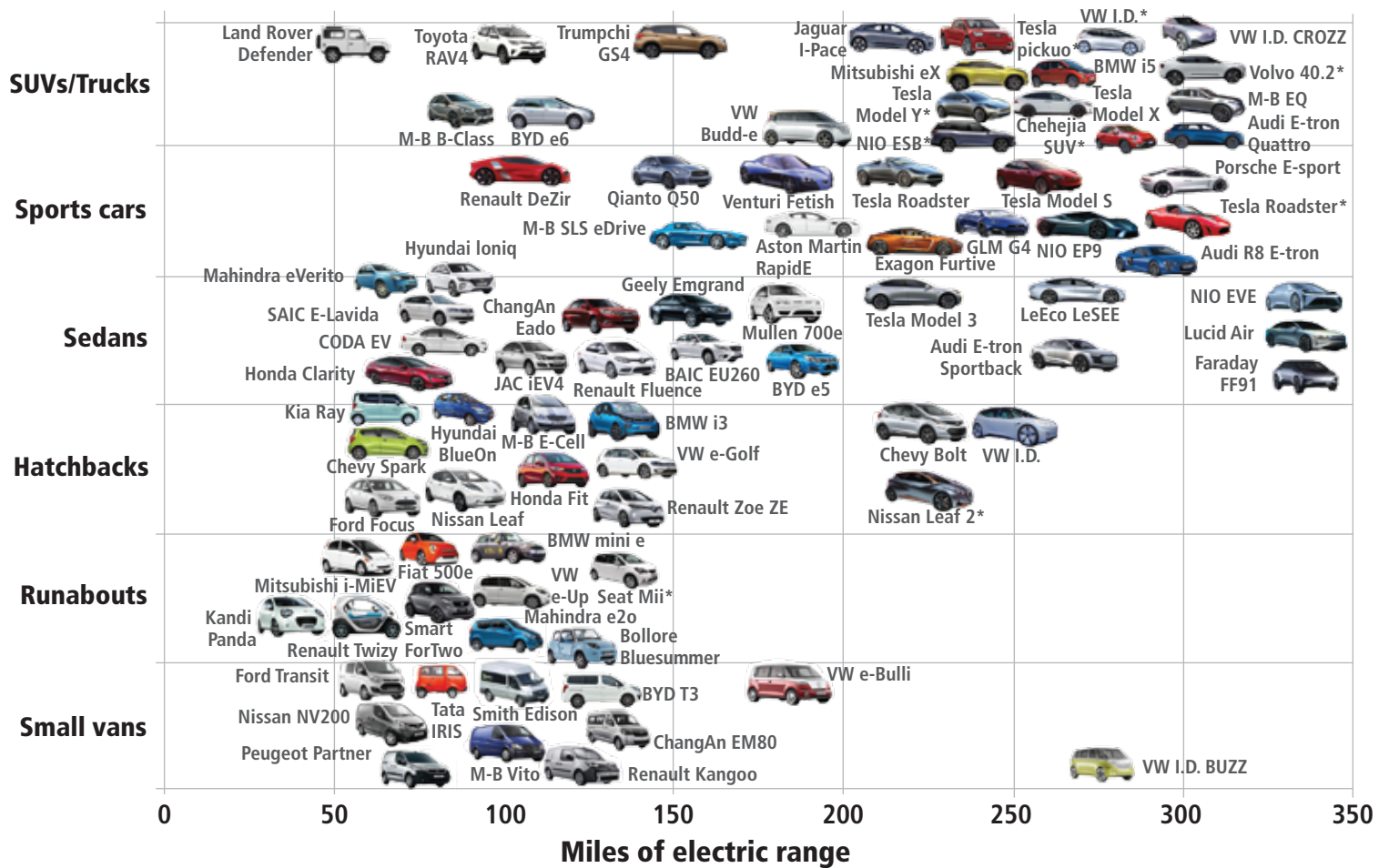


Source: <http://www.theicct.org/info-tools/global-passenger-vehicle-standards>

Table 6: This graphic clearly shows how drastic gasoline consumption and CO₂ emissions reductions in the automotive industry will be. Companies like Kordsa will offer new lightweight materials and engineering solutions every year to produce lightweight cars and lightweight solutions for future hybrid electrical cars as their sales boom in future. (Composite materials will help to compensate for the extra weight of installing batteries and electrical engines.)

Electric-Car Boom

Models by style and range available through 2020



Source: Financial Times April 28, 2017 by Patrick McGee



6. The CM11 FastCuring Resin System: the Carbon Prepreg Kordsa solution for High Volume Production

Feature:

- $T_g \geq 170^\circ\text{C}$
- Low color fastening ($\Delta E \leq 2$) and gloss loss at 1000 hours of Xenon-Arc weathering and environmental climate chambers
- Compression molding cure profile suitable for isothermal curing at 120 to 150 °C, 10 to 50 Barr, hot-demoldable, 3-to-5 minute curing

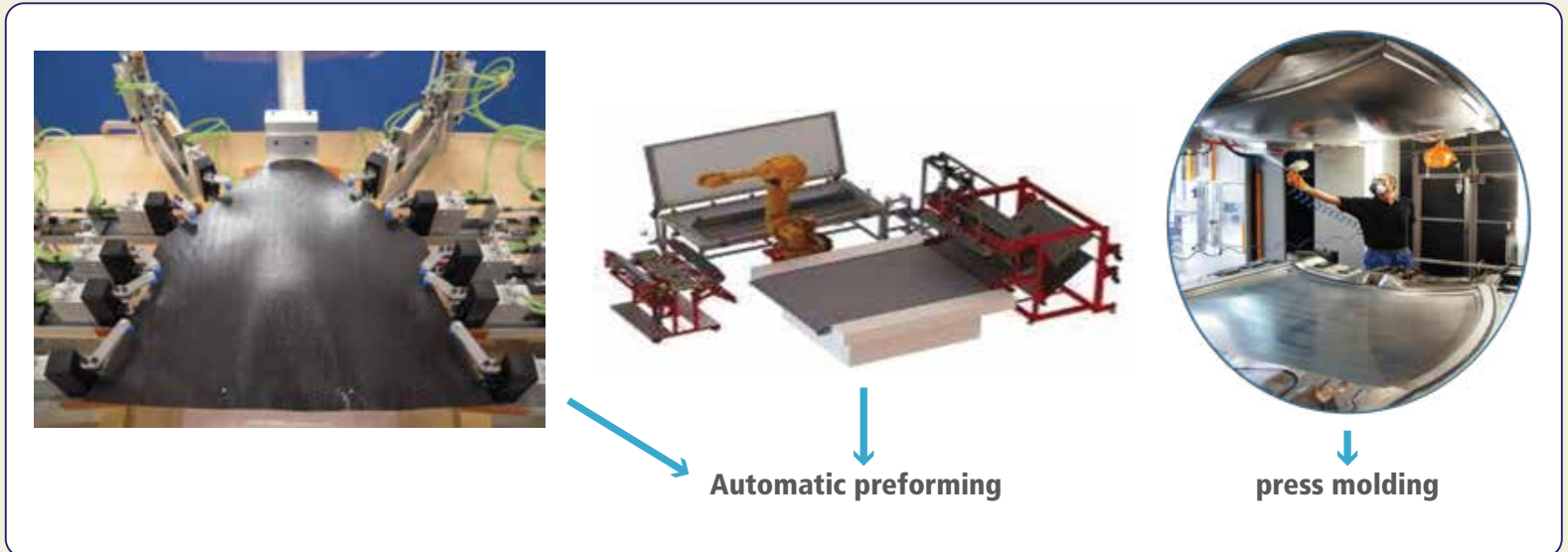
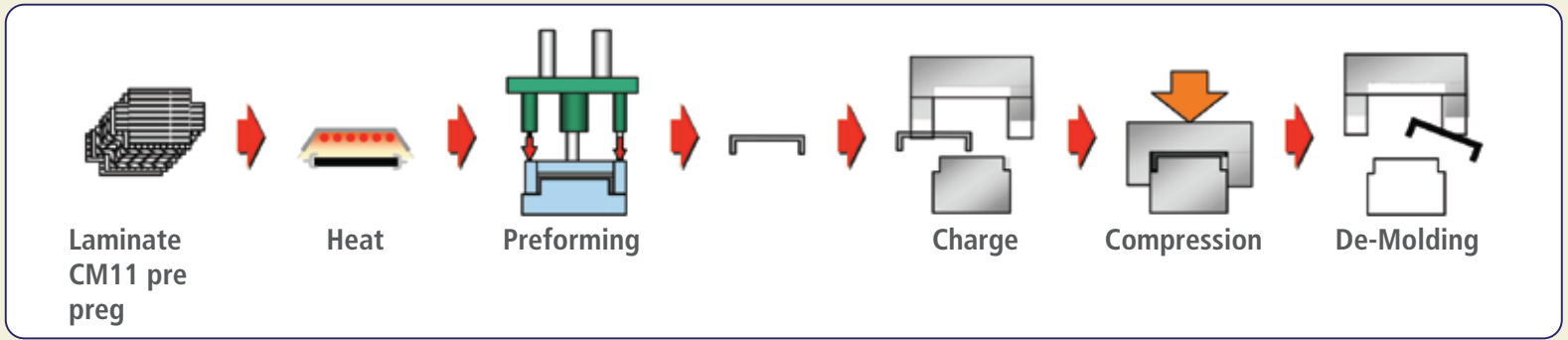
Demand: Automotive industry takt times are usually 30 to 120 seconds excluding luxury cars.

- The Past: Cutting patterns, preforms, and compression molding are consecutive processes. It is possible to produce one piece every 10 minutes.
- Now: With current bleeding-edge resin technology one piece can be produced every 3-5 minutes (with Kordsa CM11, the fastest-curing prepreg in the market)

- The Future: one piece will be produce at the takt time (30 to 120 seconds)

Benefits and Value Proposition: Quick cure compression moldable prepregs with class A surface properties:

- Kordsa is a local supplier and will produce custom designed prepregs for local customers, which is unheard of for prepreg composite producers.
- New resin systems will have oxidative and thermal stability, which customers demand. Kordsa has already has exceptionally good-looking carbon fabric weaving and customers are excited about the idea of a new resin composition with class-A surface quality.
- Right now, Kordsa delivers CM11 pre-preg to produce complex 3D shape parts which are suitable for automatic continuous preform and isotherm continuous molding systems (150C) to meet high production volume targets with high dimensional stability and a class-A surface finish.



Future Kordsa Materials Evolution: Tier 1 metal stampers prefer to use a semi-finished product which can be placed directly in a press, like metal sheets. In composites, such product are ready-to-mold pre-forms, and metal stampers prefer it in order to avoid having to relearn the lamination process from zero. The manufacturing and sales of ready-to-mold pre-forms (storable at room temperature) allow a company like Kordsa to reduce the time to market by delivering a semi-finished product that metal stampers can use as a reference for room temperature storage pre-form resin systems. Kordsa, following these requests, will develop a molding solution in future that works very closely with all the biggest Tier 1 metal groups.



Just like the automatic e-mail replies
we have today...





VAHE HANAMIRIAN

Global Accounts and Marketing Director

The Manager Hard at Work!

For salespeople, traveling is a big part of the job. Although we like traveling, one problem we have is tackling work at the office in parallel to our trips. Today this is not too difficult with all the electronics we carry with us, but in earlier days we did not have the chance to work remotely.

When arranging our trips in the sales department, we usually tried not to all leave the office at the same time; in order to be able to replace each other for urgent customer communication and service. This was usually not too difficult as there were three of us in the sales department in my junior days. We had different accounts, but knew some basics about each other's customers so that after a short brief before leaving, other colleagues could replace us. Rarely did all of us had to travel in the same week.

In one case, which was probably during the negotiation period in October or November, we were unable to avoid a situation in which all three of us had to travel in the same week. To repeat, those were times with no mobile phones, no internet and not even computers. If you wanted to communicate with the office, you had to use a hotel or a public phone. To reach the traveling sales people was even more difficult, as you needed to have exact information about where they were in order to get in touch.

So, we were worried, but were unable to find a solution, as it seemed that all of us had good reasons to travel. We decided to consult our manager. After all, the managers are there to find solutions. Our manager was a very calm and relaxed person and, as expected, he relaxed us. He said that for one week there would be no problem, as he was in the office and could reply to all the communications. We were not so sure, but there was no other solution—and he had the authority in any case.

Back in the office next Monday, we were a bit worried, but our manager welcomed us with his usual calm and smiling face. He said, "as you can see, there were no problems at all. I managed to respond to all the communications for all three of you."

We went to our desks to check the communication bundles. Nearly all the outgoing fax/telex messages from our dear manager were very similar:

"Currently I am traveling and will get back to you next week when I am back."

Just like the automatic e-mail replies we have today...

Serving the Customer

I had been at the company for just 2 months, when our Sales Director called me into his room. He was together with the Purchasing Manager of an important client from Eastern Europe.

The door was closed, so I knocked and entered. To my surprise the two gentlemen were sitting at the meeting table and on the table there were various examples of colorful ladies' underwear. Maybe this is not very unusual for a light textiles or garments branch, but for us it was quite interesting, as we were producing tire cord fabrics. The director's secretary, who came in to ask if we wanted any drinks, was even more shocked. I noticed that she seemed to want to leave the room to these perverts as fast as possible.

After a few minutes it all became clear. Our guest the Purchasing Manager had a friend in his country who was trying to import textiles for his underwear production facility. He was asking for prices for the textiles part of the underwear.

As a junior salesperson, my task was to check with various textile producers about the availability and price of the material. A little bit ashamed, I put the pink, blue and red slips in my pockets and went around Istanbul to carry out the research. All the time, I was praying that there would be no incident in which police had to check people and would find the underwear in my pockets.



WE REINFORCE LIFE



“ I REINFORCE LIFE
AS A MEMBER OF COMPOSITE
TEAM, I'M STRONGLY BELIEVING
THAT KORDSA WILL KEEP AND
FURTHER IMPROVE ITS SUCCESS
STORY BY TOUCHING EVERY
ASPECT OF LIFE, LISTENING THEIR
CUSTOMERS AND EMPLOYEES
THANKS TO ITS OPEN
INNOVATION CULTURE. ”



“ I REINFORCE LIFE
WE REINFORCE LIFE BY DELIVERING
THE BEST FABRIC TO OUR CUSTOMER,
WHICH WILL TRANSPORT OUR LOVED
ONES IN SAFETY EVERYWHERE THEY
WANT TO GO. BUT OUR JOB DOESN'T
FINISH THERE. WE CARRY OUT THE
REINFORCER VALUE IN EVERY ASPECT
OF OUR LIVES. TO PROTECT LIFE
ITSELF. ”



“ I REINFORCE LIFE
BEING A REINFORCE REQUIRES
CONSTANT DEVELOPMENT AND
IMPROVEMENT AS AN INDIVIDUAL.
LIKE THE FABRIC THAT WE USE FOR
REINFORCING TIRES, AS REINFORCERS
ALWAYS HAVE TO ACT OPEN MINDEDLY,
ACCEPT DIFFERENCES AND CREATE A
WORLD WITH NO SEGREGATION
AND DISCRIMINATION. ”



“ I REINFORCE LIFE
I'M WORKING IN CONSTRUCTION SECTOR.
BUILDINGS ARE AT THE CENTER OF LIFE.
FINDING A SHELTER AND BEING SAFE...
I BELIEVE REINFORCING CONSTRUCTION
IS TO REINFORCE THE LIFE ITSELF.
PROVIDING SAFER BUILDINGS WITH
INCREASED DURABILITY IS THE KEY POINT.
THAT'S WHY WE HIGHLY ASSOCIATED
WITH REINFORCING LIFE ITSELF. ”

