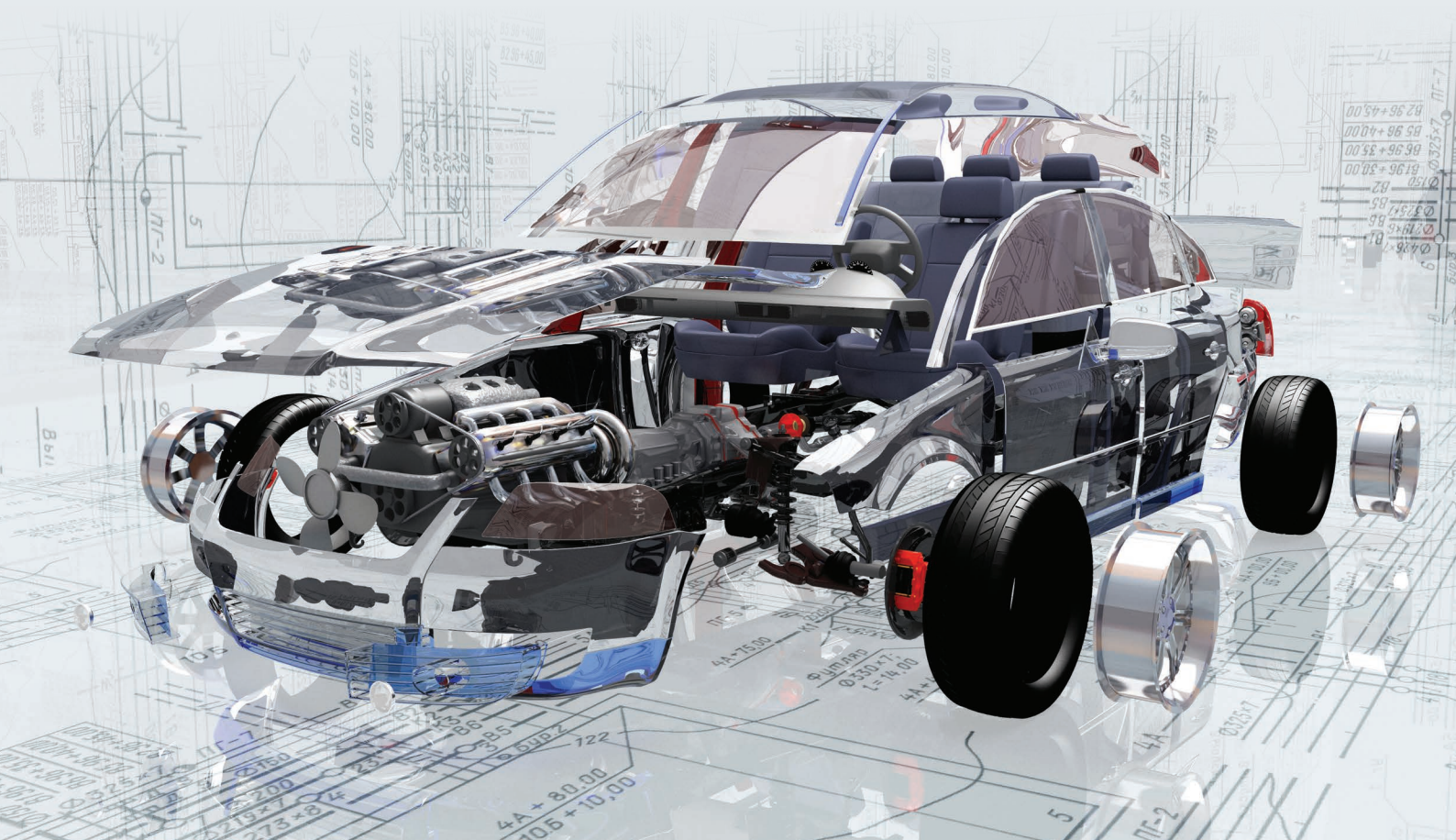
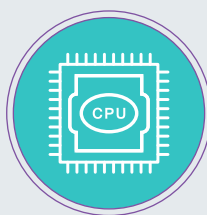


# THE AUTOMOTIVE INDUSTRY IN ISRAEL



**INVEST  
IN ISRAEL**



MINISTRY OF ECONOMY  
AND INDUSTRY  
STATE OF ISRAEL

**INVEST  
IN ISRAEL**



MINISTRY OF ECONOMY  
AND INDUSTRY  
STATE OF ISRAEL

## THE ISRAELI INVESTMENT PROMOTION AGENCY

Invest in Israel is an integrative body within the Ministry of Economy and Industry that serves as a one-stop shop for a wide range of potential and existing investors. Invest in Israel identify lucrative investment opportunities, map potential obstacles and help fast-track investment.

**Our advantage** lies in our ability to bridge between private client needs and to promote activities within the framework of the government.

### Foreign Investment Promotion

Forward-thinking  
conferences and delegations  
with key figures, businesses  
and government officials

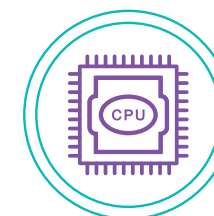
### Investor Guidance

Expert sector managers that  
leads potential investors  
from initial interest to  
successful investments

### Post- Investment Support

Providing ongoing assistance  
to overcome challenges,  
bureaucratic obstacles,  
expanding operations and  
promoting conducive  
environment for foreign  
investors

## THE AUTOMOTIVE INDUSTRY IN ISRAEL

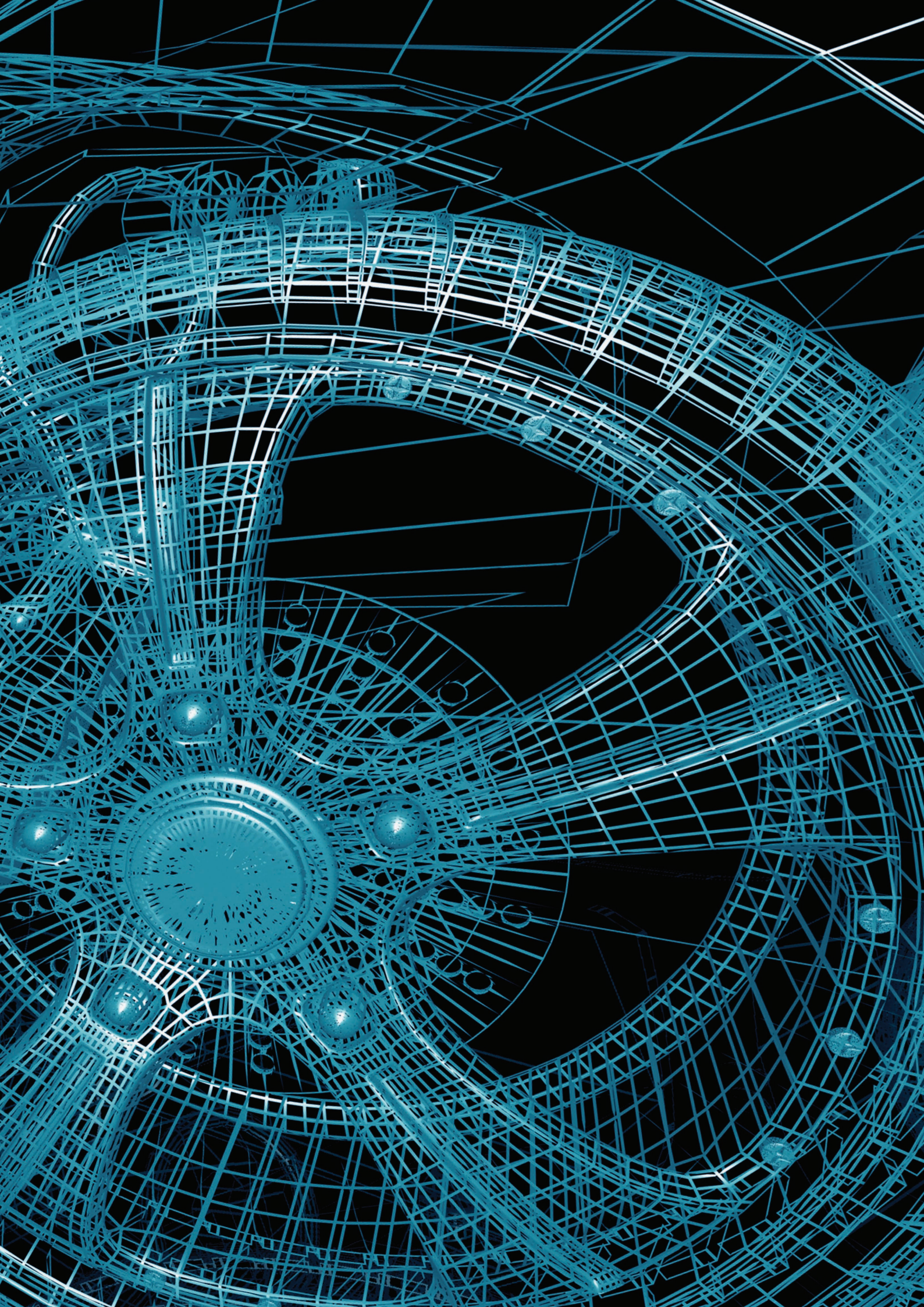


WHERE COMPANIES COME TO **SHINE**

# TABLE OF CONTENTS

<b>Defining the Automotive Industry</b>	<b>5</b>
<b>Segmentation of the Automotive Industry</b>	<b>6</b>
<b>The Global Automotive Industry</b>	<b>8</b>
<b>Global Trends in the Automotive Industry</b>	<b>10</b>
<b>The Automotive Industry in Israel</b>	<b>14</b>
Segments	14
Israeli smart transportation and alternative fuels developments	15
<b>Selected Israeli Companies</b>	<b>20</b>
<b>Footnotes</b>	<b>30</b>

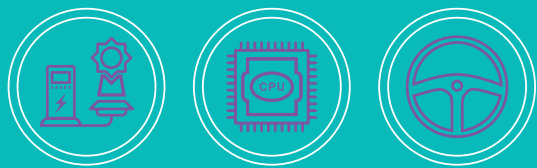




# DEFINING THE AUTOMOTIVE INDUSTRY

Traditionally, **the automotive industry** includes all the activities related to the manufacture of light- and heavy-weight vehicles, including the production of parts (such as motors and chassis), systems and technical units, but not including tires, batteries and fuel.<sup>1</sup> A broader definition includes the manufacturing industries, as well as wholesale, retail (of vehicles, parts, tires, and associated products), and repair and maintenance services.<sup>2</sup> Recently, with the increased global interest in smart transportation and alternative fuels, these areas are often included in automotive industry reviews and analyses as well.





The automotive industry is often segmented based on tiers. Automotive assembly is considered the starting point, while all other activities are described as "upstream" or "downstream" from assembly, based on their chronological position before or after assembly on the value chain. This segmentation includes the following<sup>3</sup>:

- 1. Original Equipment Manufacturers (OEMs)** – Companies that manufacture or assemble the final product. Automobiles that are manufactured under a certain brand name may include parts manufactured by multiple suppliers (e.g., tires, motor, brakes, etc.), but only the company that assembles the final product is considered an OEM.
- 2. Tier 1** – Tier 1 suppliers manufacture components used for final automotive assembly. These suppliers work with OEMs in order to manufacture parts (internal or external) as needed. These parts can be divided into two categories – Original Equipment (OE), which is sold to the OEM to be part of an entire automobile; and Aftermarket/Secondary Market products, which are either spare parts or accessories.
- 3. Tier 2** – Tier 2 suppliers manufacture value-adding parts for Tier 1 suppliers for the minor sub-assembly phase.
- 4. Tier 3** – Tier 3 suppliers provide more simple engineered materials or special services

for Tier 2 suppliers, such as steel sheets or heating services.

- 5. Tier 4** – Tier 4 suppliers provide basic raw materials such as iron and glass to Tier 3 suppliers. This tier is often included in the Tier 3 category.
- 6. Downstream activities** – Companies that are downstream on the value chain from OEMs and engage in the sale and distribution of automobiles, and the provision of maintenance and repair services.

Certain companies may supply products for multiple tiers, depending on the companies for which they manufacture their products, leading to their inclusion under two different categories simultaneously (see illustration 1).



The automotive industry is often segmented based on tiers. Automotive assembly is considered the starting point, while all other activities are described as "upstream" or "downstream" from assembly, based on their chronological position before or after assembly on the value chain.

In addition to this segmentation, there are other advanced industries that focus on innovation, software and streamlining production.<sup>4</sup>

- 1. Electronics, software, innovation and driver assistance** – Companies that specialize in developing hardware and software components that integrate vehicles into an advanced technological environment, enabling them to communicate with other

vehicles in the vicinity, and help drivers safely and efficiently operate their vehicles. The companies in these fields specialize in communication between vehicles, communication between vehicles and infrastructure, information security, voice commands, optical systems, biometric identification, and more.

- 2. Improving and streamlining production processes** – Companies that supply components and software for the automotive industry, which are designed for the companies and factories themselves and not for the automobiles that they manufacture. These include assembly line monitoring software, information security for communications between manufacturers and sub-suppliers, analysis systems for big data obtained from the use of vehicles, sales information and more.

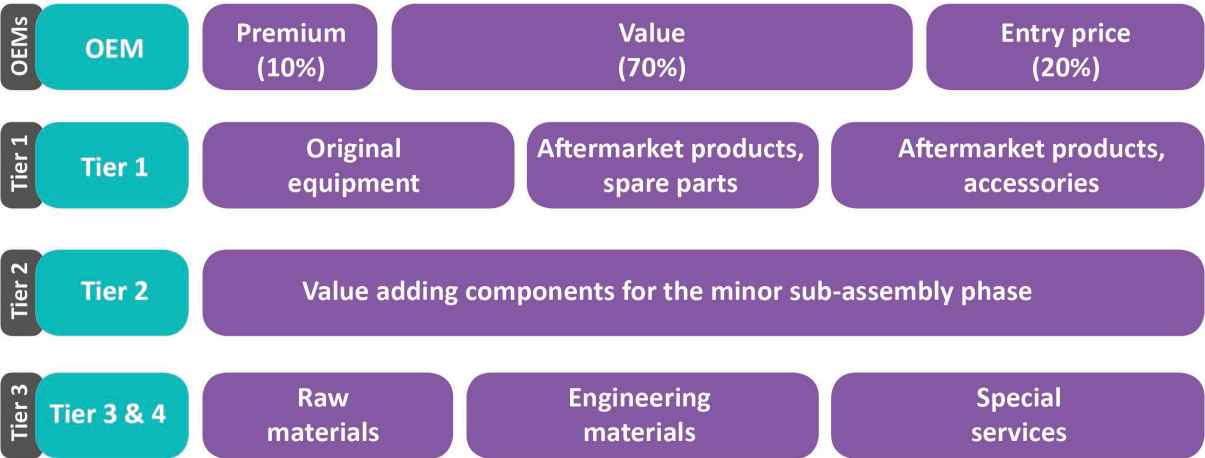
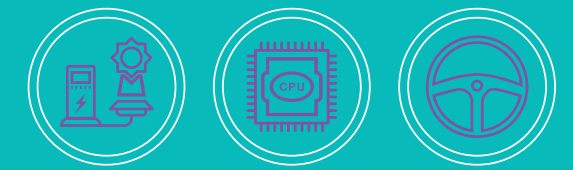


Illustration 1 – Segmentation of activities by tier and field

# THE GLOBAL AUTOMOTIVE INDUSTRY



## Background and economic importance

The automotive industry and automotive culture have reached every corner of the globe over the last century, and have significantly shaped economic development. The global automotive industry now employs tens of millions of people in many different countries worldwide, and the demand for additional vehicles is growing constantly. The automotive industry is constantly changing and experiencing technological, regulatory and consumer developments.<sup>5</sup>

The automotive industry generally spills over to other industries (such as metals, chemicals, textiles, etc.), which results in an estimated triple multiplier effect: each dollar invested in the automotive industry generates three dollars

of investment in a variety of other industries.<sup>6</sup> Similarly, each position in the automotive industry generates five additional jobs in related industries. Therefore, an estimated 9 million workers are employed in the automotive industry worldwide, while nearly 50 million are employed in jobs that are indirectly related to the automotive industry (manufacturing, services, etc.).<sup>7</sup>

The automotive industry and automotive culture have reached every corner of the globe over the last century, and have significantly shaped economic development.



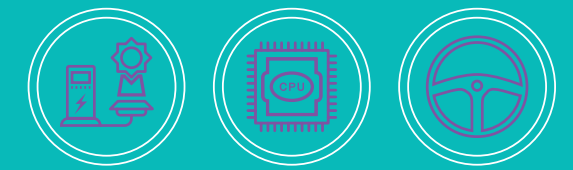
Worldwide automotive sales reached a record of 88 million units in 2016, an increase of 4.8% compared to the previous year.<sup>8</sup> In 2017, the global amount of revenue reached record highs at \$2,335 billion for manufacturers and \$620 million for suppliers. For both, this corresponds to a 5.7% increase in CAGR since the 2009 slump. The global automotive market continues to grow, with Asia leading the way as the largest contributor to sales growth, thanks to China and India.

Each position in the automotive industry generates five additional jobs in related industries.

Production in 2017 hit an all-time record of 97 million vehicles,<sup>9</sup> and by 2019, new vehicle registration worldwide is expected to exceed 100 million units.<sup>10</sup>







## Pollution reduction and green vehicles

This trend is evident both in regulatory changes in various countries, and in technological developments. From the regulatory perspective, automotive standards have become more rigid, and requirements to meet fuel consumption and pollutant emission targets have been introduced (e.g., Euro6 in Europe and CAFE in the US).<sup>11</sup> From the technological perspective, this trend includes the following:

**1. Reducing vehicle weight** – The use of alternative materials to manufacture certain automotive parts, in order to lower vehicle weight, reduce fuel consumption, and limit pollutant emissions. Heavy vehicles require a great deal of energy to accelerate, thus increasing fuel consumption while driving.

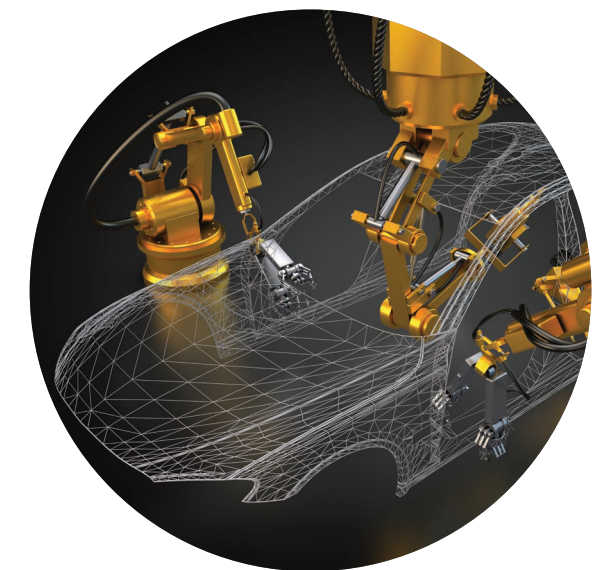
According to the US Energy Administration, reducing vehicle weight by 10% can reduce fuel consumption by 6%–8%. However, the use of alternative materials for vehicle production is limited by safety, reliability, comfort, cost and performance constraints, which are dictated by the regulator and by consumers. This creates the need to develop alternative materials that can replace iron and steel (the standard iron and steel alloys comprise 45% of the weight in average vehicles). For example, materials such as magnesium and carbon fibers can potentially reduce the weight of certain vehicle parts by up to 75%.<sup>12</sup> As such, in recent years there have been significant attempts to lower the weight of new vehicle models, in order to reduce fuel consumption and pollutant emissions.<sup>13</sup>



Several Israeli companies are currently in advanced stages of manufacturing vehicle components, using plastic, aluminum, various alloys (e.g., magnesium and zinc), and more. The demand for these products is constantly increasing, due to the ongoing necessity of reducing vehicle weight, reducing fuel consumption and minimizing pollutant emissions. These companies include Raval, Tadir-Gan, MPE, Omen Hatzor and Arkal.

**2. Alternative propulsion systems** – The use of different types of motors and fuels, which can replace the traditional polluting propulsion systems that operate on diesel and petrol. Highly pollutant propulsion systems and new rigid regulations led various automakers to develop alternative propulsion systems that use fuels other than diesel and petrol. These systems include electric ignition, the use of natural gas and liquid hydrogen, and more. Vehicles that use propulsion systems of this kind have been manufactured in the past and some are currently in use on a relatively wide scale. However, the existing solutions suffer from several significant disadvantages compared to the traditional propulsion system, such as high cost, storage difficulties, short driving range and lack of infrastructure. Work is underway to develop a propulsion system with advantages over oil-based ignition that overcome these disadvantages.<sup>14</sup>

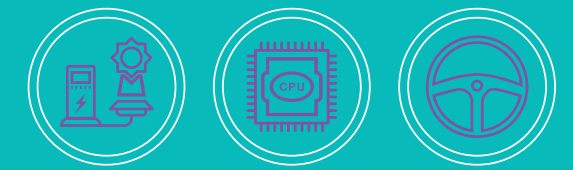
In Israel, the Israel Fuel Choices Initiative at the Prime Minister's Office has signed agreements with Fiat-Chrysler, Iveco and Magneti Marelli to



develop natural gas-based fuels, which may be the basis for international cooperation (see Israeli smart transportation and fuel developments chapter).

## Information technology in vehicles

Additional technological developments, particularly in communications and software technology, have resulted in the increasing integration of sophisticated components in vehicles. These developments are designed to improve driving safety, enable vehicles to



communicate with other nearby devices, support advanced analyses, and more. Trends in this field include:

**1. Driver-assistance systems** – Road accidents are a major cause of death in industrialized countries, and the risk of vehicle collisions increases significantly when the driver's attention is distracted from the road for even two seconds – and even while the driver is watching the road but is concentrating on other things. Driver-assistance systems that incorporate features such as sensors, cameras and warning devices alert the driver to potential threats on the road and facilitate certain driving functions. These include systems that alert drivers of deviations from their

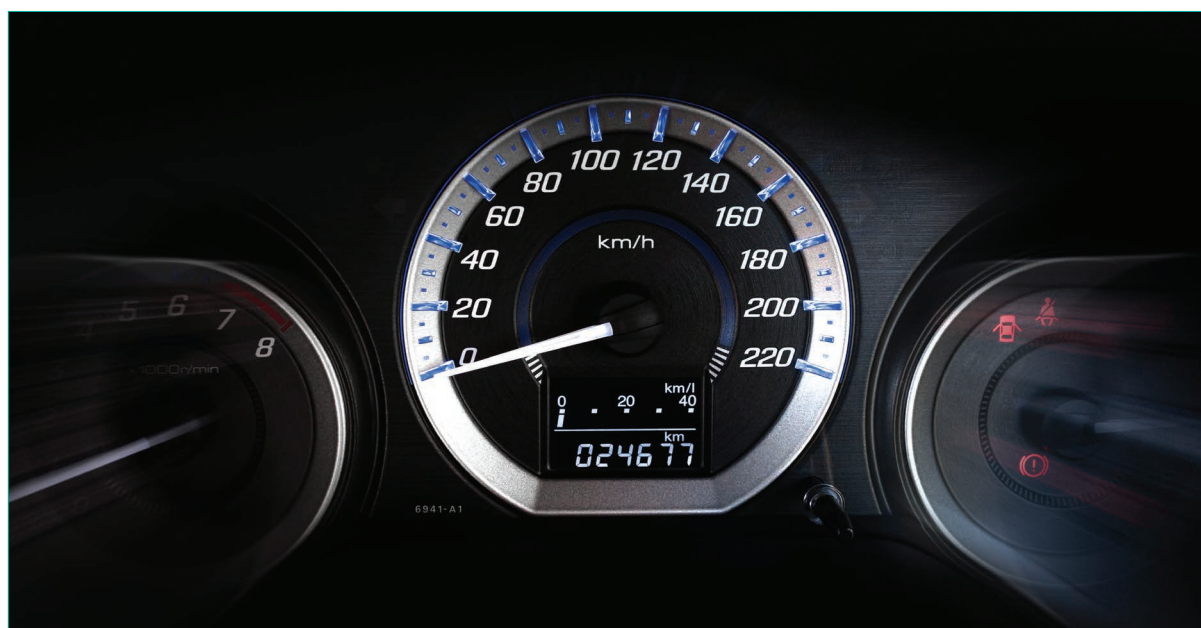
lane, or of their likelihood of colliding with another object, parking assistance, traffic light identification, and more. There are other systems that improve the human-machine interface and attempt to help drivers perform certain functions without taking their eyes off of the road or hands off of the steering wheel. These interfaces are based on voice commands, eye movement detection, and pop-up displays. Systems of this kind are supported by the regulators, and some (the more veteran systems) have become a mandatory part of safety regulations in the automotive market. Thus, in 2009, the EU required that Electronic Stabilization Programs (ESP) be installed in all vehicles, and that advanced

emergency braking systems and deviation alerts be installed in heavy vehicles.<sup>15</sup> Israeli companies such as Mobileye, VocalZoom, Redbend and Guardian Optical Technologies are developing advanced products designed to assist drivers and reduce the risk of road accidents. Their products use automation (e.g., detecting possible collisions), enhanced connectivity and voice commands. These products enable drivers to operate the vehicle and its accessories without removing their hands from the steering wheel or their eyes from the road, and even provide an additional layer of protection against collisions (using prior detection techniques).

**2. Smart transportation** – Integrating software and advanced communication capabilities in vehicles in order to connect multiple vehicles, infrastructure and external devices. This communication helps reduce road collisions, plan an optimal route, detect changing traffic lights, and even warns the driver of dangerous vehicles in the vicinity. Related technological perspectives are still being developed, as are the regulatory aspects of these developments. For example, opening additional communication channels for the vehicle to use to communicate with its environment can also increase the risk of malicious breaches of the system. In addition, communication between vehicles

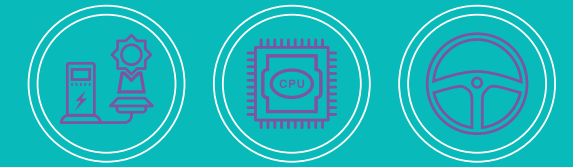
and infrastructure will require modification of the infrastructure itself. This is a complex and costly process, which will require suitable funding.<sup>16</sup>

**3. Information security** – In accordance with the communications and software trends described above, a growing number of automotive systems are based on software and on communication between various components. Alongside the advantages of these new developments, new risks are being presented by these systems, which leave vehicles vulnerable to hostile penetration.<sup>17</sup> These risks have triggered great interest in developing information security systems for vehicles, and have even resulted in government intervention. The US National Highway Traffic Safety Administration (NHTSA) published safety guidelines for 2016, urging automakers to work together in developing information security systems for vehicles. In addition, Fiat-Chrysler was forced to develop a software update for 1.4 million vehicles in July 2015, due to the suspected high vulnerability of these vehicles to breaches and unauthorized control. Large automakers such as Volvo, Mercedes, Ford and General Motors (GM) have already undertaken to comply with the NHTSA guidelines.<sup>18</sup>





# THE AUTOMOTIVE INDUSTRY IN ISRAEL



## Hot spot for high-end automotive technology

The interdisciplinary nature of the Israeli high-tech industry places Israel in an ideal position to be a major player in the new automotive industry. During the past few years, the interest of MNCs in Israel has been increasing with four new R&D centers announced in 2016, and five new R&D centers announced in 2017. Israel is home to hundreds of startups and newborn companies active across all sectors, ranging from new security vendors to optimization solutions for fleets, public transportation and smart cities. These companies are helping propel Israel to the forefront of an industry that is expected to soar over the next decade.

According to Crunchbase, While Silicon Valley is a known hotspot for autonomous driving, Israel is a pretty solid No. 2 for startup deals, with three of the ten largest investment rounds in self-driving technology startups in 2017. Intel's \$15.3 billion purchase of Mobileye, an Israel based startup, was the largest M&A deal for an autonomous driving-related company in 2017.<sup>19</sup>

## Segments

The Israeli market consists of both veteran companies that specialize in vehicle assembly and Tier 1, 2 and 3 supply, engaging in traditional and advanced manufacturing processes, and companies that specialize in innovation, advanced technologies and facilitation of automotive manufacturing processes.

### Vehicle assembly (OEM) and Tier 1, 2 and 3 supply

1. There are several manufacturers in Israel that assemble the final automotive product. These include buses, military vehicles and others (trailers, containers, fire-extinguishing vehicles, vehicle conversion).
2. Tier 1 aftermarket suppliers: Over 60 Israeli companies manufacture aftermarket products for the automotive industry. These include spare parts and accessories such as batteries, ventilation and airconditioning systems, fleet management systems, air brake diaphragms, electric starters and alternators, seals, thermostats, gears, gear pumps, bearings and motor valves, filters

and more.

3. Tier 1 OE suppliers: Over 50 Israeli companies supply components to OEMs and Tier 1 suppliers worldwide, using advanced technologies to manufacture various types of high-quality components that are tailored to their customers' needs. These technologies include forging, high-pressure ink injection, metal injection, coating and reinforcement, rubber injection, etc.

The Israeli market consists of both veteran companies that specialize in vehicle assembly, and companies that specialize in innovation, advanced technologies and facilitation of automotive manufacturing processes.

### Advanced technologies (electronics, software, innovation and driver assistance systems)

The Israeli automotive and smart industry is home to more than 550 companies, which develop systems and technological innovations related to autonomous driving. These companies design, manufacture and supply diverse products including safety and driving assistance systems, tracking technologies, navigation and control systems, inter-vehicle connectivity, cyber protection and voice recognition.

### Manufacturing processes to improve and streamline manufacturing

Over twenty Israeli companies supply services and products that facilitate production processes

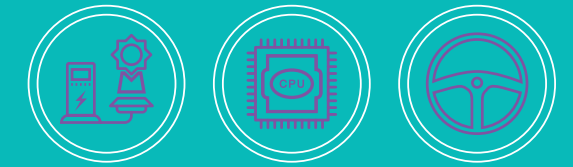


for OEMs and suppliers in the various tiers. These products and services include manufacturing control software, monitoring and assessment solutions, corrosion-preventing packaging products, advanced tools for metal work, software solutions for supply chain management, 3D printing solutions for accelerated prototype design and production, and automatic welding solutions.

## Israeli smart transportation and alternative fuels developments

### Smart transportation

Smart transportation is the use of different types of technology to streamline travel, by making it shorter, safer and cleaner. In most cases, the concept of smart transportation includes Intelligent Transport Systems (ITS) that use advanced technologies to achieve these goals. The definition of this new and developing field is not constant and is based on a variety of approaches (e.g., use of technology, activities performed by the system, goals of the system, and the design approach).



Smart transportation is the use of different types of technology to streamline travel, by making it shorter, safer and cleaner.

Israeli smart transportation companies have become world-renowned for their achievements in this field. These companies develop products based on software innovation and cutting-edge technologies, like products developed for the automotive industry.

Smart transportation is a rapidly growing field in Israel, with the establishment of many new companies in recent years. These companies are tightening connections with large global

corporations (such as IBM and Google) and are quickly building their reputation in the global smart transportation market. The most noted recent example is Mobileye, which was acquired by Intel in 2017. Following in its footsteps, many other companies in the field are growing and establishing international partnerships.

Israel is heading at high speed toward a promising future in the field. One example is the establishment of the EcoMotion community, which encourages and initiates activities related to smart transportation. The community was founded in cooperation with the Alternative Fuels Administration and other organizations, including the Israeli Innovation Authority, Ministry of Science, United Israel

Appeal and NGOs, as well as leading figures in the commercial and academic sectors. The community organizes conferences, professional workshops, introduction to new technologies, meetings with market leaders and investors, and more.

The companies that have joined the community include Elbit, Rafael, Phinergy, IAI, Mobileye, and international companies such as IBM and General Motors.<sup>20</sup> When the community was founded in 2013, there were approximately 70 Israeli startup companies developing smart transportation innovations. As of 2018, this number has jumped to over 600 startup companies.<sup>21</sup>

Smart transportation is a rapidly growing field in Israel, with the establishment of many new companies in recent years.

The Capsule, The Smart Transportation Accelerator, was established in order to encourage smart transportation and alternative fuel entrepreneurs. The accelerator operates as part of the Center for Innovation in Transportation at Tel Aviv University, and it receives approximately NIS 1 million in annual funding. The program offers four-month development cycles for five initiatives at a time. During their time in the accelerator, the

entrepreneurs receive approximately NIS 100 thousand, as well as business advice and support from automotive, technology and business development experts.<sup>22</sup>



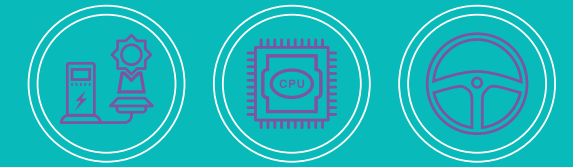
## Alternative fuels

Recent years have shown a significant increase in the development of fuel alternatives that are more efficient and less pollutant than the common oil-based fuels (diesel and petrol).

The Israel Fuel Choices Initiative was launched in 2011, and included the establishment of a dedicated administration in the Prime Minister's Office. The administration is responsible for







promoting the development and integration of fuel alternatives for transportation, in order to reduce Israel's dependency on oil for both security and sustainability reasons. The objective of this initiative is to reduce oil usage for transportation in Israel by 30% by 2020 and by 60% by 2025.<sup>23</sup>

The administration promotes the use of alternative fuels in various ways, including tax benefits, government investments, grants and more.<sup>24</sup> The scope of work performed by initiative partners within the various government ministries and related agencies is massive, affecting about 500 companies, 220 research groups, and hundreds of entrepreneurs.<sup>25</sup> The government also promotes research and commercial cooperation with various countries (US, Canada, Japan and various European countries), and with large international corporations.<sup>26</sup> As mentioned before, the administration has signed cooperation agreements for the development of natural gas-based fuels with Fiat-Chrysler, Iveco and Magneti Marelli.<sup>27</sup>

## Israeli Industry Highlights

**1. Innovation, software leadership, advanced technologies** – The Israeli industry is known worldwide for its ability to develop new, cutting-edge solutions for existing and emerging global needs. Consequently, many companies, such as General Motors, Renault and Daimler have

R&D centers in Israel. GM has been active for the last ten years and since 2016 is in the process of expanding its operations in Israel.<sup>28</sup> During 2017 and 2018, international players such as VW, Skoda, Seat, and Konnect opened centers, labs and campuses in Israel in order to benefit from the innovation resources.<sup>29</sup> Other companies send representatives to conferences and make other visits to Israel for this purpose.<sup>30</sup>

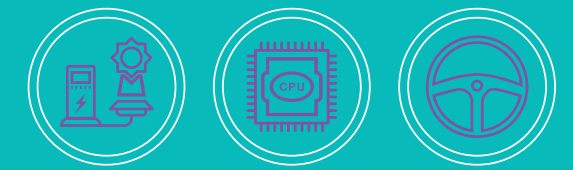
**2. Full product support** – The various manufacturing companies in Israel support product development cycles from the initial design phase to final production. This is a significant capability, with unique advantages over the low cost mass production that is available in other markets.

**3. Geographic location** – Israel is conveniently located between the Far East and western European markets. In addition, Israel has signed free trade agreements that facilitate commercial activity between it and many other countries and regions, such as the EU, US, Mercosur (countries in Latin America), EFTA (Iceland, Lichtenstein, Norway and Switzerland), Turkey, Mexico, Jordan and Egypt.<sup>31</sup>

**4. Experience and working relationships** – There are many local manufacturers that have supplied components and parts to large international corporations for decades. These long-standing business relationships have built confidence and close cooperation with international companies, and are an important consideration when selecting suppliers and ordering parts.



# SELECTED ISRAELI COMPANIES

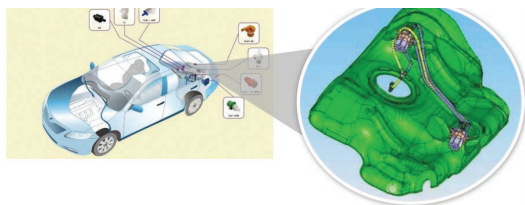


## Advanced manufacturing



The company develops and manufactures parts and mechanical and electromechanical assemblies and sub-assemblies using plastic injection (including parts that are reinforced with glass fibers) for the global automotive industry.<sup>32</sup> This is a unique field, with only four companies worldwide, as of 2015.<sup>33</sup> The company was founded in 1994 and operates today 12 facilities in North America, Western and Eastern Europe, China and Israel.<sup>34</sup>

In November 2017, Raval announced receiving orders for parts worth over €1.5 billion, supplied by 2030.<sup>35</sup> In that year, company's revenue 2017 reached €192.6 million, with the Automotive Systems section contributing 49% to its revenue.<sup>36</sup> As of 2018 the company employs 1,598 employees worldwide.<sup>37</sup> Raval



Plastic automotive components manufactured by Raval

manufactures several advanced products, such as fuel tank venting systems with unique innovative features, which can control and reduce pollutant emissions from fuel. In addition, the company continues to research and develop new and advanced venting systems.

### Arkal Automotive

Arkal develops solutions for replacing metal structural components in vehicles with plastic parts. This reduces weight and requires less assembly work, thus lowering production costs.<sup>38</sup> The company is a Tier 1, 2 and 3 supplier for companies such as Mercedes, Volkswagen, Fiat and others.<sup>39</sup> It was founded in 1997 as a subsidiary of Arkal Plastic Industries, which was founded in 1963.<sup>40</sup> In 2010, the company was acquired by Raval.<sup>41</sup> Arkal has manufacturing sites in Israel, Germany, Spain, US, Poland, France, Canada and China.<sup>42</sup>

In 2017, the company's revenue was €103.36 million, and its backlog under "framework agreement" at the end of 2017 amounted €650 million.<sup>43</sup> The innovative skill developed at Arkal for injection of thermoplastic, glass-filled materials into molds has enabled the company to manufacture strong plastic components for leading automotive companies. These components are adaptable and capable of encompassing several small metal parts that were originally installed separately into a single

plastic component.<sup>44</sup> In addition, Arkal and General Motors Europe have registered several joint patents.<sup>45</sup>



The company manufactures a variety of products for global automotive companies, including thermostats, pressure covers for radiators, pressure covers for fuel tanks, and more.<sup>46</sup> The company is a Tier 1 and 2 supplier for large automotive companies and suppliers, and manufactures parts for the secondary market as well. Its customers include companies such as Porsche, SAAB, General Motors, Jaguar, Land Rover and Audi.<sup>47</sup> It was originally founded in 1958 as a small tool and die factory named Fishman Engineering, and later began to manufacture thermostats for the automotive industry. Over the years, branches of the company were established in North America, Germany and Mexico.<sup>48</sup> In 2010, the Tene Investment Fund acquired majority ownership (66%) and in 2015, Fortissimo Capital acquired full ownership of the company.<sup>49</sup> In 2015, the company employed 250 people. MotoRad has been awarded the General Motors Supplier Quality Excellence Award for Assessment year 2015 and the AutoZone "WITTDJR" for the year of 2017.<sup>50</sup> The

company's products include unique advanced cooling systems and thermostats with innovative features that help improve fuel consumption and motor performance.<sup>51</sup> As a result, MotoRad was one of the first companies to supply its customers with patent-protected electronic thermostat technology. In addition, the company continues research and development in order to supply new and more advanced products.<sup>52</sup>



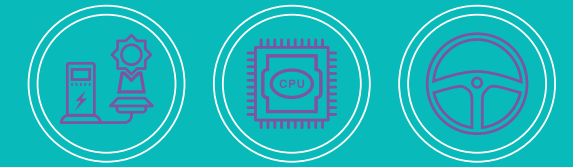
[Thermostat manufactured by MotoRad]



The group owns two factories in Israel – Ortal and TadirGan. Tadir-Gan manufactures parts using aluminum casting technology, while Ortal manufactures magnesium and zinc alloys using high-pressure diecasting technology.<sup>53</sup> The company is a Tier 1 and 2 supplier for large companies such as General Motors, Volkswagen, BMW, and more. It was founded in 1993 and went public on the Tel Aviv Stock Exchange in 2004. In 2006, it acquired the Ortal factory, and in 2013, it acquired factories in Germany and Poland that manufacture automotive parts using die-cast technology. The FIMI Investment



## SELECTED ISRAELI COMPANIES



Fund holds 63% of the company's shares since 2011. Tadir-Gan has approximately 629 employees in Israel, Germany and Poland. Its annual revenue for the year of 2017 was NIS 253.2 million.<sup>54</sup> Tadir-Gan specializes in manufacturing automotive components using unique aluminum and magnesium alloys that replace the iron and steel parts traditionally used in the automotive industry. This reduces the weight of the vehicles, conserves fuel and reduces pollutant emissions.<sup>55</sup>



[Upper oil pan manufactured by Tadir-Gan]

### Polyram

Polyram develops, manufactures and distributes plastic raw materials and thermoplastic compounds for various industries, including the automotive industry.<sup>56</sup> The company is a Tier 1 and 2 supplier for large automotive companies and suppliers<sup>57</sup>, including Opel and BMW.<sup>58</sup> Its plant was founded in 1986 by families that live in Ram On, an agricultural village. In 2015, 65% of the company's shares were acquired by FIMI Investment Fund.

As of 2016, the plant employs 180 workers. In 2016, The company's total sales amounted to NIS 488 million.<sup>59</sup>

The company supplies standard and customized thermoplastic materials that incorporate glass fibers, glass beads and mineral fillers. The compounds are fire-resistant, damage resistant, heat and radiation stabilized, and can be modified and customized.<sup>60</sup>



### MPE (Metalplast Engineering)

The company develops unique parts that integrate plastic and metal.<sup>61</sup> The company serves customers in various industries, including the automotive industry, with customized solutions, from the planning and design phase to manufacturing and supply.<sup>62</sup> The company is a Tier 1 and 2 supplier for large automotive companies, such as BMW, Volkswagen, Peugeot, and others.<sup>63</sup> It was founded in 1999 as a subsidiary of two long-standing companies – Shiran Engineering (founded in 1986) and Rimoni Industries (founded in 1954).<sup>64</sup> In 2017, the group (Rimoni, Shiran, MPE and subsidiaries) had revenues of NIS 146.8 million.<sup>66</sup> The company manufactures high-quality precision plastic components, using sophisticated injection technology and advanced manufacturing processes. The manufacturing process includes product injection, plastic products that incorporate metal parts, printing on the product itself, and products

consisting of multiple injected components.<sup>65</sup> The company's development team and engineers often participate in advanced research, in order to implement new, cutting-edge technologies for the company's products.<sup>67</sup>



### Omen Casting Group

The company manufactures and supplies parts made of aluminum and brass alloys using high pressure die casting technologies, primarily for the automotive industry. The company develops multiple products, including components for gears, engines, steering systems and braking systems.<sup>68</sup> The company is a Tier 1 and 2 supplier for large companies such as Mercedes, Fiat, Volkswagen, Jaguar and more.<sup>69</sup> The plant was founded in 1946 in Kibbutz Hatzor and began to manufacture for the automotive industry in 1997. In 2006, 28% of company holdings were acquired by the Tene Investment Fund. Later, manufacturing plants were established in Portugal, Russia and North America.<sup>70</sup> As of 2016, the company employs more than 240 associates at facilities in Israel, Portugal and USA.<sup>71</sup> Revenue in 2013 was NIS 154.7 million.<sup>72</sup> The company supplies customized products, from the development phase to production. It uses advanced technologies to supply products with complex designs, which are tailored specifically

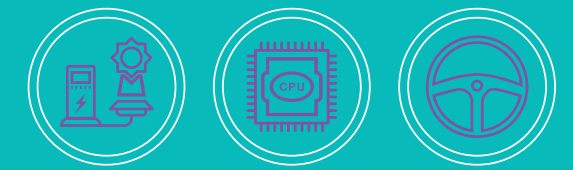
for the customer's needs.<sup>73</sup> The company competed against 35,000 companies around the world and won the Excellent Supplier award from Bosch, the giant German corporation.<sup>74</sup>



[Front cover manufactured by Omen Casting Group]

### Spectronix

Spectronix develops and markets innovative products for flame and gas detection for civilian and military customers. Its products include industrial flame, gas and fuel fume detection systems for civilian facilities (e.g., factories) and vehicles, as well as explosion suppression systems for military vehicles.<sup>75</sup> The company's primary military customers are AMEREX, distribution companies, large manufacturers of armored fighting vehicles (AFVs), and the defense ministries and armies of various countries worldwide. Most trade relations between the group and its customers are longterm ones.<sup>76</sup> The company was founded in 1967 and began to supply fire detection and extinguishing systems for IDF military vehicles in 1974. It went public in 1982, and in 1992 it began to manufacture systems for the civil industry as well. In 2008, the company started to supply systems for foreign militaries (NATO, US). In 2015 it was acquired by the Emerson



corporation, which committed to continue employing at least 159 employees at the Spectronix factory in Sderot, for 12 years after signing the agreement.<sup>77</sup> In 2017 the company employed 185 employees.<sup>78</sup> The company develops advanced products with innovative features for the unique niche of military-use vehicles. The products must meet high standards, which vary from one military organization or country to another. In addition, the company is constantly developing new products. One example is a series of containers for rapid dispersal of fire-extinguishing powder, which are operated by a gas propellant/generator used to extinguish fuel fires in seconds.<sup>79</sup>

## Advanced technologies – electronics, software, innovation, and driver-assistance systems



Mobileye develops and manufactures advanced driver assistance aftermarket products for vehicles, such as road collision prevention systems that are based on cameras with artificial visual capabilities. The company's product is called EyeQ and it can detect whether the

driver is inside the lane or has swerved, assess the distance between the car and the one in front of it (triggering an alert if the vehicles are too close), and more.<sup>80</sup> Large companies, such as Volvo, BMW, General Motors, Hyundai, and others, have chosen to integrate this technology into their vehicles, and systems are sold to the secondary market as well.<sup>81</sup> The company was founded in 1999, and in 2014 it completed the largest stock market offering in Israeli history until that time, valued at \$5.3 billion.<sup>82</sup> After being sold to Intel in 2017, in the third quarter of 2018, Mobileye achieved record quarterly revenue of \$191 million.<sup>83</sup> Mobileye's concept of integrated hardware and software systems is an innovative concept in the automotive market. The company won several prestigious international awards, including the International Fleet Safety Award 2011, Red Herring Top 100 Innovators, and Frost & Sullivan 2006 Entrepreneurial Company of the Year in the automotive category.<sup>84</sup>



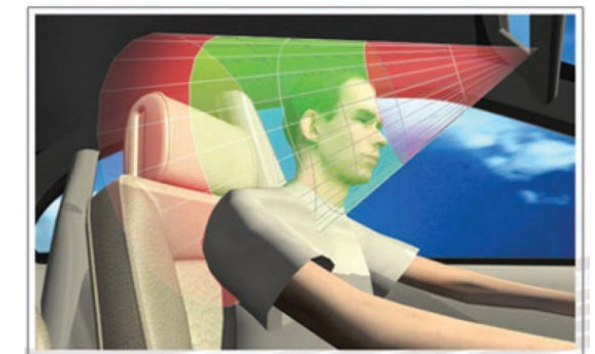
Mobileye accident prevention system



## VocalZoom

The company develops an electro-optic microphone designed to improve voice recognition in devices, in order to support voice control in noisy environments. This technology has several purposes, one of the most important of which is to enable a driver to give voice commands while driving a vehicle.<sup>85</sup> VocalZoom's development measures vibrations on the speaker's facial skin at a precision rate of hundreds of nanometers, using safe laser rays. The system analyzes these vibrations and generates data about speech timing and frequency, while distinguishing between the voice of the speaker and background noises. The optic microphone improves performance of the voice recognition engine in the vehicle, and supports features such as navigation, a calendar, contact person searches, and more. The information from the sensor is combined with information from the microphone, and it neutralizes background noises in order to obtain identification rates of 80%-90% accuracy. The system is located on the rear-view mirror in the vehicle or on the dashboard (in cases where there is cooperation with the auto manufacturer). VocalZoom markets its product to the secondary market and to other companies that manufacture speakers and similar products for the secondary market (e.g.,

the Chinese iFLYTEK company).<sup>86</sup> VocalZoom was founded in 2009. In 2010, it began to operate from the Iris incubator run by Maayan Ventures, and between 2012 and 2014, the company raised additional investments from large corporations such as 3M.<sup>87</sup> As of 2016, the company employs 23 employees.<sup>88</sup> The company is working with chip manufacturers for Audi and with auto manufacturers in order to develop the interface.<sup>89</sup> In 2017, Honda invested and partnered with the company in order to advance its speech recognition technology for automotive use.<sup>90</sup>



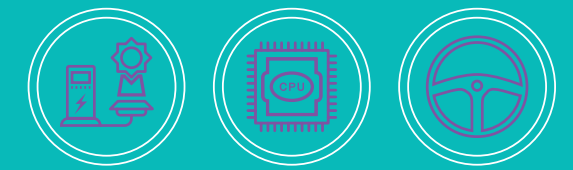
VocalZoom microphone noise filtering technology allows the system to focus on the driver's voice.



## Argus Cyber Security

The company helps vehicle manufacturers and secondary suppliers of intervehicle connectivity devices to protect connected vehicles from infiltration. Information security is critical for





modern vehicles, which use over 50 different computers to control their systems. There are currently no mechanical operations in a vehicle that are not controlled or monitored by software. In addition, the number of possibilities for a vehicle to communicate with external devices (e.g., smartphones), Internet, infrastructure and other vehicles is constantly growing. These are all potential breach points that carry the risk of external parties taking control of the car or using it contrary to the driver's intentions.<sup>91</sup> The company develops products for automobile manufacturers (OEMs) and Tier 1 suppliers, as well as for component manufacturers for the secondary market. One of the largest investors in the company is Magna International, a Canadian corporation that is the second-largest secondary Tier 1 supplier for the automotive industry in the world and the largest in North America.<sup>92</sup> The company was founded in 2013 and completed its first round of investments in 2014. Its development center is located in Israel, and the company has additional offices in the US, Germany and Japan.<sup>93</sup> In 2017 the company was acquired by the German tire and advanced car components company Continental, for approximately \$430 million. As of 2018, the company employs 130 employees.<sup>94</sup>



## Guardian Optical Technologies

The company develops tiny precision sensor systems designed for installation in the vehicle. These systems can intelligently identify people in the vehicle for several purposes: to send an alert if a child is left alone in the vehicle, to send an alert in case of a break-in, intelligent activation of airbags in case of a car accident, etc.<sup>95</sup> The company has signed its first deals with Tier 1 suppliers, including Delphi, Bosch, JCI and others.<sup>96</sup> The company was founded in 2014<sup>97</sup>, and as of 2018 employs 18 people.<sup>98</sup> The company has raised \$5.5 million to date (January 2019) from prominent automotive investors.<sup>99</sup> The sensors developed by the company are designed to replace the pressure sensors in the seats, seatbelt sensors, and standard driving cameras, as these sensors can detect the location, physical size and position of each passenger in the vehicle. The optic sensors developed by the company are based on patent-protected technology, which detects the presence of a person even without a direct line of vision. The depth sensors identify movement of objects, and a special algorithm classifies movements that are typical of human beings, animals and other objects. The sensor detects

even the slightest movement, and can therefore detect babies left in the vehicle with extremely high accuracy rates.<sup>100</sup>



## Tactile Mobility

The company's software product generates information for automotive systems based on road conditions, in order to help conserve fuel and offer other potential benefits.<sup>101</sup> Its software uses data collected from various sources, including crowd sourcing, sensors, vehicle computers, special driver-vehicle-road layers, and more. The mapping system offers a wide range of opportunities for streamlining automotive systems and fuel consumption, improving driving performance, reporting excess weight on trucks, reducing pollutant emissions, increasing driving safety, and many other possibilities.<sup>102</sup> Tactile Mobility, previously known as Mobi-wize, was founded in 2012. The company has signed paid Proof of Concepts (POCs) with five major OEMs, one of which is Ford, which brought the company's total funding to \$9 million.<sup>103</sup>

## Smart transportation

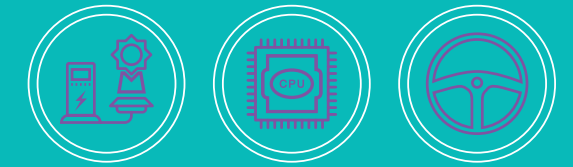


### Waze

The company has developed one of the most popular navigation applications in the world. The application is supported by smartphones, tablets and vehicle systems, and enables drivers to navigate the roads while receiving updates on traffic congestion, traffic police, road accidents, and more. This information is collected by other application users who input information. The company was founded in 2009, and over the course of several years it raised \$67 million from various funds and investors. Waze was acquired by Google in 2013 for \$1.1 billion.<sup>104</sup>



The company was founded in 2004 and provides information on traffic congestion, using information collected from anonymous mobile phones. The company's unique, patent-protected location system anonymously monitors all active mobile phones and detects their exact



location on the road or on a street once every 30 seconds, on average. This information is analyzed using big data processing methods, and can then be transferred to control centers for various purposes, including traffic management, research, traffic light operations, time-to-destination analyses, and more. This unique location system is capable of monitoring all significant incidents on the road within minutes, and of providing information that is equivalent to high-density installation of sensors on the road. The information is provided to the driver in text format, a voice message and an accurate map.



### Valens

Valens, established in 2006, develops HDBaseT technology and provides semiconductor products for the distribution of uncompressed, ultra-HD multimedia content. Its solutions have the potential to enhance the entire entertainment ecosystem, from CE/PC equipment manufacturers and audio/video connectivity product suppliers, through systems integrators and retailers, to installers and consumers. HDBaseT is the de facto standard for all-in-one connectivity between ultra-HD video sources and remote displays through a single cable, delivering uncompressed ultra-

high definition 4K video, audio, USB, ethernet, control signals, and up to 100 watts of power. Valens is also entering the automotive technology sector. The company plans to have a significant role in making onboard systems function faster and more reliably in connected cars.<sup>105</sup>



### Innoviz

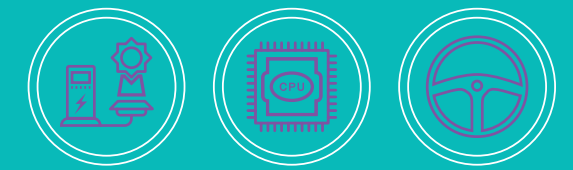
This start-up provides LiDAR remote-sensing solutions for fully autonomous vehicles. The company's flagship highdefinition solid state LiDAR, InnovizOne, enables smart, advanced 3D sensing. InnovizOne produces highly accurate realtime 3D images of the vehicle's surroundings. Driven by its proprietary hardware and software technologies, InnovizOne offers superior performance and accuracy, providing automotive-grade reliability while significantly reducing both cost and size.

Innoviz also provides computer vision solutions, including object detection, tracking, and classification as well as accurate mapping and localization. The company's growing team is composed of leading experts in fields including electro-optics, computer vision, MEMS design, signal processing, and system architecture. The company employs 75 people.<sup>106</sup>





# FOOTNOTES



- 1 ZEW, an independent, non-profit economic research center in Germany.
- 2 United States Department of Labor.
- 3 ZEW, an independent, non-profit economic research center in Germany; Houston Chronicle; Document published in 2010 by the US International Trade Administration, page 6.
- 4 Israel Export Institute review of the Israeli automotive industry, 2015.
- 5 McKinsey report on the global automotive industry – The Road to 2020 and Beyond, page 3.
- 6 OECD review of the global automotive industry, 2013, page 7.
- 7 Website of the International Organization of Motor Vehicle Manufacturers (OICA).
- 8 <http://www.oica.net/category/production-statistics/2015-statistics/>
- 9 [https://www.allianz.com/content/dam/onemarketing/azcom/Allianz\\_com/economic-research/publications/specials/en/global-automotive-bumpy-road-ahead-report-Sept18.pdf](https://www.allianz.com/content/dam/onemarketing/azcom/Allianz_com/economic-research/publications/specials/en/global-automotive-bumpy-road-ahead-report-Sept18.pdf)
- 10 Analysis of trends in the automotive industry from OECD-Observer; Euro6 standards from the website of the European Commission; CAFE standard from the US National Highway Traffic Safety Administration (NHTSA).
- 11 Publication by the US Energy Administration.
- 12 McKinsey report on reducing vehicle weight.
- 13 Published in MotorTrend, an online automotive magazine.
- 14 Published on the Avent website; Published on the EU website.
- 15 Published on the Digital Trends website and on the US government website.
- 16 Various publications on the Security Innovation website.
- 17 Published on the Mordor Intelligence website.
- 18 YNET, November 2013.
- 19 Information on the EcoMotion website, January 2019.
- 20 Published on the Tel Aviv University website in October 2014.
- 21 Online pamphlet published by the Israel Fuel Choices Initiative Administration of the Prime Minister's Office; Times of Israel, February 2015.
- 22 Online pamphlet published by the Israel Fuel Choices Initiative Administration of the Prime Minister's Office.
- 23 Jerusalem Post, September 2015.
- 24 Times of Israel, February 2015.
- 25 Online New Tech magazine, February 2016.
- 26 Online Automotive News magazine, August 2015. Roland Berger, Israel's automotive and smart mobility industry: Electrified, autonomous and intelligent, October 2018.
- 27 Jerusalem Post, January 2016.
- 28 Interview with Uri Pachter, Director of the International Projects Department at the Export Institute, February 2016;
- 29 Trade agreements from the Ministry of Economy website.
- 30 Review of Israel's automotive industry (2015), Israel Export Institute.
- 31 Company presentation for the capital market.
- 32 <https://mayafiles.tase.co.il/rpdf/1183001-1184000/P1183693-00.pdf>
- 33 <https://www.themarket.com/markets/1.4231611> <https://www.themarket.com/markets/1.5791336>
- 34 <https://www.themarket.com/markets/1.6612876>
- 35 <https://mayafiles.tase.co.il/rpdf/1183001-1184000/P1183693-00.pdf>
- 36 Review of Israel's automotive industry (2015), Israel Export Institute.
- 37 Article in Calcalist, April 2011; Appeared in Bizportal, May 2015.
- 38 Article in Calcalist, April 2011.
- 39 Article in The Marker, December 2013.
- 40 Company website.
- 41 Company website.
- 42 <https://trade.bankleumi.co.il/TRADE/net/netutils/handlers/getetfpdf.ashx?FileId=1868218>
- 43 Packer Steel website (former company owner).
- 44 Review of Israel's automotive industry (2015), Israel Export Institute.
- 45 Review of Israel's automotive industry (2015), Israel Export Institute; Company website.
- 46 Company website.
- 47 Calcalist, September 2015.
- 48 <http://www.ffcapital.com/motorad-receives-award-general-motors/> <https://www.underhoodservice.com/motorad-honored-autozones-wittdtjr-award/> <https://motorad.com/>
- 49 Company website.
- 50 Company website.
- 51 Review of Israel's automotive industry (2015), Israel Export Institute.
- 52 Company presentation for the capital market, December 2014.
- 53 Company website; Article in Calcalist, April 2015.
- 54 Export Institute website.
- 55 Publication in Bizportal.
- 56 <https://en.globes.co.il/en/article-plastics-co-polyram-to-set-up-us-plant-1001196561>
- 57 Company website.
- 58 Review of Israel's automotive industry (2015), Israel Export Institute.
- 59 Company profile on EPICOS.
- 60 Company profile at the Export Institute.
- 61 Company website.
- 62 Rimoni Industries financial statement, January 2019 <https://maya.tase.co.il/company/76>
- 63 Rimoni Industries report for 2012.
- 64 Company website.
- 65 Review of Israel's automotive industry (2015), Israel Export Institute; Article in Calcalist, August 2014.
- 66 Article in Calcalist, August 2014.
- 67 Company website.
- 68 Article in Calcalist, August 2014.
- 69 Company profile at the Export Institute.
- 70 Article in NRG, August 2015.
- 71 2014 annual report, page 4; Appeared in Chiportal, June 2015.
- 72 2014 annual report, pages 37-38.
- 73 Appeared in Chiportal, June 2015; OS-Capital website, November 2010; ListofCompanies website.
- 74 <https://www.themarket.com/career/1.4255334>
- 75 2014 annual report, page 39.
- 76 2014 annual report, page 36.
- 77 Company website; Review of Israel's automotive industry (2015), Israel Export Institute.
- 78 Company website.
- 79 Article in The Marker, August 2014.
- 80 Intel Earnings Results Q3, 2018 <https://www.intc.com/investor-relations/investor-education-and-news/investor-news/press-release-details/2018/Intel-Reports-Third-Quarter-2018-Financial-Results/default.aspx>
- 81 Company website.
- 82 Company website; Review of Israel's automotive industry (2015), Israel Export Institute; Article in The Marker, November 2012.
- 83 Company website; Report by the venture capital fund that operates the incubator for the Israel Securities Authority.
- 84 Maayan Ventures financial report for 2014, page 27; ; Article in The Marker, November 2012.
- 85 <https://www.calcalist.co.il/internet/articles/0,7340,L-3700629,00.html>
- 87 Maayan Ventures financial report for 2014, page 28; Chiportal website, April 2015.
- 88 Company website; Review of Israel's automotive industry (2015), Israel Export Institute; Article in Walla, March 2015.
- 89 Company website; Article in The Marker, September 2015.
- 90 Company website; Article in The Marker, September 2015.
- 91 Article in Walla, March 2015.
- 92 Globes article, September 2018. <https://www.globes.co.il/news/article.aspx?did=1001254132>
- 93 Company website; Review of Israel's automotive industry (2015), Israel Export Institute; Publication on the Ministry of Economy website, May 2015.
- 94 Company presentation.
- 95 Company LinkedIn profile.
- 96 Geektime article, June 2018. <https://www.geektime.co.il/guardian-raised-3-1/>
- 97 Guardian Optical Technologies company website
- 98 Company LinkedIn profile.
- 99 Review of Israel's automotive industry (2015), Israel Export Institute.
- 100 Company website.
- 101 Article in Globes, January 2015.
- 102 Article in Globes, January 2015.
- 103 Review of Israel's automotive industry (2015), Israel Export Institute.
- 104 Company website; Document by the Export Institute on smart transportation; company website page.
- 105 <https://www.prnewswire.com/news-releases/tactile-mobility-launches-tactile-sensing-and-data-analytics-for-superior-driving-with-9-million-raised-300719187.html>
- 106 Company website.
- 107 Article in Globes, June 2013; Article in Globes, March 2016.
- 108 Article in YNET, February 2011; Information about the company from the website of the Innovation Conference for Smart Cities held in The Hague in February 2016; Company LinkedIn profile.
- 109 Article in Globes, July 2015; Article in Calcalist, September 2014; The Car online magazine, April 2015.
- 110 <https://www.strategyand.pwc.com/trend/2017-automotive-industry-trends>
- 111 <https://techcrunch.com/2017/11/04/quantifying-the-driverless-startup-boom/>
- 112 <http://www.fuelchoicesinitiative.com/our-mission/January-2019>
- 113 <https://www.msn.com/he-il/money/stockdetails/financials/finance/fi-292.1.IS-TDGN.TAE.TDGN>
- 114 <https://www.pal-item.com/story/news/2016/01/26/many-100-jobs-coming-richmond/79349988/>
- 115 <https://www.timesofisrael.com/israels-vocalzoom-honda-show-voice-control-tech-at-ces/> <https://www.businesswire.com/news/home/20170105005855/en/VocalZoom-Joins-Honda-CES-Demonstrate-Optical-Sensor>
- 116 [https://finder.startupnationcentral.org/company\\_page/valens](https://finder.startupnationcentral.org/company_page/valens)
- 117 [https://finder.startupnationcentral.org/company\\_page/innoviz-technologies](https://finder.startupnationcentral.org/company_page/innoviz-technologies)
- 118 <https://techcrunch.com/2017/11/04/quantifying-the-driverless-startup-boom/>

The Foreign Investments and  
Industrial Cooperation Authority

Phone: +9722-6662410

Email: [InvestInIsrael@economy.gov.il](mailto:InvestInIsrael@economy.gov.il)

The information included in this guide is relevant for January 2019. The content included is intended to provide only a general outline of the subjects covered and it is necessary that specific professional advice be sought before any action is taken.



