

IHS AUTOMOTIVE

Supplying General Motors

2016 edition

supplierbusiness.com



SUPPLYING THE OEMS

General Motors



Contents

Overview	7
Global market overview	8
Financial data	8
Financial overview	9
Product Strategy	10
Company history and strategy review	11
Major model programmes	14
– 1. Chevrolet Cruze	14
– 2. Chevrolet Silverado (including GMC Sierra)	17
– 3. Chevrolet Malibu	20
– 4. Chevrolet Aveo	22
– 5. Buick Excelle	24
– 6. Opel Corsa	26
– 7. Chevrolet Sail	29
– 8. Chevrolet Equinox	31
– 9. Opel Astra	33
– 10. Chevrolet Spark	36
Vehicle Platforms	38
Platform strategy	39
Major platforms	40
– 1. DELTA/D2XX	40
– 2. K2XX	41
– 3. GAMMA/G2XX	42
– 4. EPSILON/E2XX	42
– 5. THETA/TE	43
– 6. GM4200	43
– 7. TYPE 199	44
– 8. J100	44
– 9. Lambda	44
– 10. MINI/M2XX	45
Component sharing	46
Volume planning	46
Production Strategy	48
Production strategy overview	49
Manufacturing network	50
– United States	50
– China	52
– Mexico	54
– South Korea	55
– Germany, Poland, Spain, UK	56
– Brazil	57

– India	58
– Canada	59
Internal supply network	60
Modularisation strategy	61
Supplier parks	61
Cluster of reference	62
Strategies for manufacturing efficiency	62
Purchasing Strategy	64
Purchasing strategy overview	65
Levels of vertical integration and outsourcing	65
Purchasing organisation	66
Purchasing offices	67
Key purchasing personnel	68
Purchasing budget	69
Supplier Selection	70
Supply base development	71
Major and strategic suppliers	71
Supplier eligibility	72
Supplier evaluation criteria	73
Working with General Motors	73
Global Sourcing	74
Policy and plans	75
– NAFTA (GM North America)	75
– APAC (GM International, including China JVs)	76
– EMEA (GM Europe)	77
– LATAM (GM South America)	77
Pricing Policy	79
Cost reduction strategies	80
Raw material price management	80
Payment terms	81
Quality Management	82
Quality level	83
Quality management systems	84
Supplier integration into product development	85
Management of suppliers and sub-suppliers	85
Supplier awards	86
Technology	88
Technological positioning	89
Areas of focus	89
R&D organisation	90
R&D spending	91
Access to supplier technology	92
Approach to alternative fuels, electrification and fuel cells	92
Special vehicle development	93
Forward Model Programmes	95
Interview	97
Kim Brycz, Executive Director and Global Lead, Global Product Purchasing, General Motors	98

Supplier Relationship Survey	101
Introduction to the SuRe Index	102
Methodology	102
Executive summary	102
Performance review – General Motors	103
2014 SuRe survey results	103
– Top of the ranking: Trust and future potential drive harmony	103
– Middle of the ranking: OEMs push cost reduction	104
– Bottom ranking: Cost overrules quality	104
Profit potential	105
– OEM level	105
Organization	105
– OEM level	106
Trust	106
– OEM level	106
Pursuit of excellence	106
– OEM level	106
Outlook	106
– OEM Level	106
SuRe by region	106
– North America	107
– Europe	107
– Asia	107
SuRe by company size	107
SWOT Analysis	109
SWOT Analysis	110
Global Footprint	110
Major Suppliers	111
BUICK Verano [2015] (SHENYANG, CHINA) GLOBAL DELTA/D2XX D2SB	112
CADILLAC CT6 [2015] (HAMTRAMCK, UNITED STATES, OMEGA, O1SL)	113
CHEVROLET Cruze [2015] (LORDSTOWN, UNITED STATES, GLOBAL DELTA/D2XX, D2LC)	116
CHEVROLET Volt [2015] (HAMTRAMCK, UNITED STATES, GLOBAL DELTA/D2XX, D2JCI)	118
GMC Acadia [2016] (SPRING HILL, UNITED STATES, CHI, C1UG)	120
OPEL/VAUXHALL Astra [2015] (ELLESMERE PORT, UNITED KINGDOM, GLOBAL DELTA/D2XX, D2JO)	122
Future Model Programmes by Nameplate	126

Figures

Figure 1: Global light vehicle production, 2010-2019	8
Figure 2: The J400 2016 Chevrolet Cruze was unveiled in mid-2015	15
Figure 3: The 2016 Chevrolet Silverado 1500 Extended Cab	18
Figure 4: The 2016 Chevrolet Malibu is reported to be 300lbs (136kg) lighter than equivalent versions of the out-going model	21
Figure 5: The 2014MY Sonic saloon - the only car in its class to be produced in the United States (Orion)	22
Figure 6: Shanghai GM introduced the third-gen Buick Excelle in March 2015	24
Figure 7: The 2014 Opel Corsa – the new model serves as the basis for related variants around the world	27

Figure 8: The new Sail 3 was developed by the Pan-Asia Technical Automotive Center in Shanghai, China	29
Figure 9: Chevrolet Sail sales, Greater China region (by Sales Parent, Sales Brand) with segment competitors 2010-2019	30
Figure 10: The 2016 model year Chevrolet Equinox features more standard equipment across the range	31
Figure 11: Changes to the D2XX platform have helped to cut vehicle weight by up to 200kg in the new 2016 Opel Astra	34
Figure 12: Chevrolet will offer the 2016 Spark in more than 40 countries around the world	37
Figure 13: The 2017 Cadillac XT5 will be based on the new VSS-S platform system	43
Figure 14: Based on the Mini platform, the Opel Karl is manufactured in South Korea for European distribution	45
Figure 15: Lordstown produced the one-millionth Chevrolet Cruze in 2014.	51
Figure 16: Laser brazing on the Cadillac CT6 at the new SGM plant in Shanghai. The joining method is said to improve structural strength by up to 20%	53
Figure 17: The Chevrolet Silverado Cheyenne High Country is produced at Silao Assembly	55
Figure 18: Topping out ceremony in 2015 for new Powertrain Center at the Russelsheim facility	57
Figure 19: Aerial view of the Joinville engine plant in Santa Catarina, Brazil.	58
Figure 20: Mark Reuss, General Motors	68
Figure 21: Steve Keifer, General Motors	68
Figure 22: Sean Liang, GM China	69
Figure 23: Katherine Worthen, GM Europe	69
Figure 24: Main building of the Warren Technical Center	90
Figure 25: Magnesium components developed at the Advanced Technical Center in Shanghai, China	91
Figure 26: GM do Brasil developed the Chevrolet Onix, launched in 2012	91
Figure 27: The 2017 Chevrolet Bolt EV with chassis and battery pack	93
Figure 28: 2016 Chevrolet Caprice PPV	93
Figure 29: The Buick Avista concept could serve as the basis for a four-door saloon and two-door convertible	96
Figure 30: The Opel GT Concept has hidden door handles and no exterior wing mirrors	96
Figure 31: OEM Supplier Relations - Top of the Ranking	104
Figure 32: OEM Supplier Relations - Middle of the Ranking	104
Figure 33: OEM Supplier Relations - Bottom of the Ranking	105
Figure 34: OEM Supplier Relations - North America	107
Figure 35: OEM Supplier Relations - Europe	107
Figure 36: OEM Supplier Relations - Asia	107

Tables

Table 1: Key financial performance values for General Motors Corporation	8
Table 2: General Motors Top 10 best-selling global models (by Sales Parent, Global Nameplate) 2004-2009-2014-2019	14
Table 3: Chevrolet Cruze global sales (by Sales Brand, Global Nameplate) with segment competitors 2010-2019	16
Table 4: Chevrolet Silverado and GMC Sierra global sales (by Sales Brand, Global Nameplate) with light-duty segment competitors 2010-20	19
Table 5: Chevrolet Malibu global sales (by Sales Brand, Global Nameplate) with segment competitors 2010-2019	21
Table 6: Chevrolet Aveo global sales (by Sales Brand, Global Nameplate, Sales Nameplate) 2010-2019	23
Table 7: Buick Excelle sales, Greater China region (by Sales Parent, Sales Brand, Bodytype) with segment competitors 2011-2019	25
Table 8: Opel Corsa sales (by Sales Brand, Global Nameplate) with segment competitors 2010-2019	28
Table 9: Chevrolet Equinox sales, North America region (by Sales Parent, Sales Brand) with segment competitors 2010-2019	32
Table 10: Opel Astra sales, Europe (by Sales Parent, Sales Brand) with segment competitors 2010-2019	35
Table 11: Chevrolet Spark global sales (by Sales Brand, Global Nameplate, Sales Nameplate) with segment competitors 2010-2019	37
Table 12: General Motors' Recent Platforms	39
Table 13: General Motors Top 10 most used platforms (by Sales Parent) 2004-2009-2014-2019	40
Table 14: General Motors Global Top 10 production plants with annual output (by Sales Parent and Country) 2004-2009-2014-2019	50
Table 15: General Motors' United States plants	52
Table 16: General Motors' dedicated press locations in the United States	60
Table 17: General Motors' dedicated powertrain locations in the United States	60
Table 18: General Motors' component assembly locations in the United States	61
Table 19: Chevrolet Bolt forecast Global sales (versus BMW i3, Nissan Leaf) 2010-2019	72
Table 20: Recent GM recalls	83
Table 21: Automotive sales of SuRe Index survey repondents	108
Table 22: SWOT Analysis - General Motors	110
Table 23: BUICK Verano [2015] (SHENYANG, CHINA, GLOBAL DELTA/D2XX, D2SB)	112
Table 24: CHEVROLET Cruze [2015] (LORDSTOWN, UNITED STATES, GLOBAL DELTA/D2XX, D2LC)	116
Table 25: CHEVROLET Volt [2015] (HAMTRAMCK, UNITED STATES, GLOBAL DELTA/D2XX, D2JCI)	118
Table 26: GMC Acadia [2016] (SPRING HILL, UNITED STATES, CHI, C1UG)	120
Table 27: OPEL/VAUXHALL Astra [2015] (ELLESMERE PORT, UNITED KINGDOM, GLOBAL DELTA/D2XX, D2JO)	122
Table 28: GM Future Model Programmes by Nameplate	127

2. Chevrolet Silverado (including GMC Sierra)

The Silverado is a range of full-size pickups produced by Chevrolet. These compete with such models as the Ford F-150, Toyota Tundra, Nissan Titan and pickups now produced under the Ram brand (formerly Dodge Ram) by the Ram Truck Division of Fiat Chrysler Automobiles. Examples from the Silverado range are also marketed as the GMC Sierra. The Silverado nameplate was first introduced in 1999, replacing the out-going C/K pickups, where 'C' denoted a two-wheel drive and 'K' the four-wheel drive versions. It should be noted that 'Silverado' was a trim level of the C/K range before being selected as the latest range nameplate.

As with the C/K, the Silverado features a body-on-frame construction, with the fully-boxed chassis, cab and rear box made from a variety of steel grades. Later versions incorporate greater percentages of high-strength steel and aluminium, both to improve rigidity of the overall architecture (delivering better vehicle performance and improved NVH characteristics) and to help reduce body weight. In addition to the regular light-duty 1500, the Silverado range further incorporates Heavy Duty versions. Badged 2500HD and 3500HD, the numbers loosely relate to total payload capacity. Beyond this, these versions are primarily designed for towing heavy loads, which ties in with such features as dual rear wheels ('dually' axle), trailer brake controller and exhaust brake (the latter offered with the Duramax diesel only).

The light-duty range incorporates a full line-up of body styles, including two-door regular cab, four-door double (extended) cab and four-door crew cab. The range further includes chassis variants, delivered with an exposed rear box frame prepared for custom applications (box cube, flatbed, etc.). The double cab versions have shorter rear doors than the crew, which are now hinged at the front, rather than the rear. The addition of a B-pillar allows the rear doors to be opened independently of the front doors, while also providing additional body rigidity. The standard pickup bed length is now 5'8" (1,727mm), with 6'6" (1,981mm) and 8'0" (2,438mm) options – double cab versions are only available with the 6'6" bed length.

The standard Silverado powertrain uses a longitudinally-mounted, front-engine, rear-wheel drive set-up. Versions are also offered with four-wheel drive (4WD). These versions feature an electronic transfer case which can be adjusted while the vehicle is in motion (dependent on setting choice and speed). Settings include 2WD High (standard use), 4WD High (engages the front axle) and 4WD Low (front axle engaged, additional engine torque). Engaging 4WD Low

disables traction control and the StabiliTrak ESP system. A 4WD Auto setting engages the front axle and allows the vehicle to automatically deliver power to the wheels with the best traction.

In the United States and Canada, almost all Silverado models are fitted as standard with a six-speed automatic; diesel versions use the Allison 1000 transmission. For the 2015 model year, versions with the L86 6.2-litre V8 are paired with a new, GM-sourced eight-speed auto. In Mexico, locally-produced entry-level variants of the 1500 and 3500 are still offered with a five-speed manual gearbox. Front suspension uses an independent double wishbone set up with coil springs, while the rear has a non-independent solid axle with leaf spring arrangement – this is the only full-size pickup to retain rear leaf springs. There are also front and rear twin-tube dampers and stabilizer bars.

As mentioned earlier, the Silverado nameplate was introduced in 1999, replacing the out-going C/K Series. Having been in production since 1962, the C/K had built a considerable customer following, which GM supported by keeping the older pickup in production through 2000. GMC versions of the Silverado were badged Sierra, with the C/K models using Sierra Classic. The range featured a series of engines from the Vortec series, extending from the 4.3-litre V6 through to the 8.1-litre V8. Entry-level versions were fitted with a five-speed manual, while all others had a four- or five-speed automatic transmission.

Other features of the new Silverado included four-wheel disc brakes with ABS (previously rear drum brakes), a low-haul mode designed to hold the transmission in gear when carrying/towing heavy loads and adjustable ride control. Yet as with all pickup truck ranges, the first Silverado underwent a series of variant launches and withdrawals over its production run. As an example, the 1500HD was introduced in 2001 only for the truck to be replaced by standard 1500 crew cab versions in 2004 as the 2500HD and 3500HD took over the Heavy Duty name. Beyond the fluid nature of the pickup truck market, the switch back to a light-duty 1500 crew cab highlighted the growing market for pickups as a direct replacement for passenger cars. Premium features for this model included dual-zone climate control, rear seat DVD player, XM satellite radio and a Bose sound system, all comparable with high-specification saloons.

In 2004, Chevrolet launched the Silverado and Sierra Hybrid versions into the general market (previously fleet only). This mild hybrid powertrain did not offer any pure electric driving range, but the motor was used in parallel with the petrol engine to achieve marginal fuel economy improvements. The electric motor further supported an early stop-start system, but because the motor was slow

to engage with the flywheel, the vehicle had a tendency to roll backwards if on a slope. In addition, the hybrid versions offered four 110V power outlets, effectively turning the pickup into a truck-based generator.

The second-generation Silverado was introduced in 2007. While the pickup featured an all-new box frame chassis with hydroformed front sections, rack and pinion steering and a redesigned front suspension, the range was most noteworthy for the step change in overall quality, with improvements made to the fit and finish and the quality of materials featured across the cabin. At launch there were five standard engine choices, ranging from a 4.3-litre V6 through to a 6.0-litre V8, the latter featuring Active Fuel Management that included a cylinder deactivation system. The 5.3-litre V8 was available with either an iron or aluminium small block engine (all were later aluminium), with or without FlexFuel E85 capability, while the range-topping GMC Denali/Silverado SS (first introduced in 2003) used the same 6.2-litre V8 fitted to the Cadillac Escalade full-size SUV.

Chevrolet launched the third-generation Silverado light pickups in 2013 for the 2014 model year (2500 and 3500 Heavy Duty versions were all-new for the 2011 MY). Exterior features include a twin-port grille design and a full-width bumper, leading around to bodysides incorporating flared wheel arches. Additionally, a new inset door design, in combination with triple door seals, helps to reduce road noise ingress. According to GM, the front end of the Silverado features improved sealing which supports more efficient cooling of the engine bay. For the first time, crew cab versions of the new pickup range will be offered with both the original 5' 8" and the new 6' 6" bed lengths. The standard front suspension uses an independent coil-over shock set-up, while the rear features a solid axle with semi-elliptic two-stage multi-leaf springs.

A key feature of the latest Silverado is the replacement of the cast iron Vortec engines with the new Ecotec3 range of all-aluminium engines, including the 4.3-litre V6, plus the 5.3- and 6.2-litre V8s. Driven via six- and eight-speed auto transmissions (dependent on engine and trim level), all versions feature direct injection, continuously variable valve timing and cylinder deactivation, now standard across Silverado and Sierra. Although new, these engines retain the basic pushrod, two-valve per cylinder set-up. This compares to the 'Hemi' engines used by Ram pickups, while the V6 turbo in the new Ford F-150 and the standard V8 in the Toyota Tundra both use a DOHC format.

The camshaft-in-block design used in pushrod engines offers various advantages, such as a lower centre of gravity. It is also far easier to incorporate cylinder deactivation in this engine in comparison to an OHC set-up (six- to four-cylinder). But OHC engines can achieve higher engine speeds and standard four-valve configurations allow greater air flow, both of which are routes to achieving efficient power gains. As other manufacturers have switched to OHC engines for their pickup ranges, it appears that Chevrolet (and by default GMC) is planning to differentiate itself by retaining time-tested features of previous-generation pickups. This plays into the hands of a loyal customer base which broadly regards innovation as a potential weak point in a vehicle which should be engineered for reliability and longevity.

Figure 3: The 2016 Chevrolet Silverado 1500 Extended Cab



Source: © General Motors

When Ford introduced the aluminium-bodied F-150 in 2014, some commentators considered it a foregone conclusion that General Motors and other pickup manufacturers would do the same. This has not happened and steel is expected to remain the material of choice for at least the next generation of volume GM pickups. As a company, Ford places a high priority on implementing technical advances, as highlighted by the decision to use an aluminium pickup body, but this is balanced by broader market scepticism – aluminium is still widely regarded as being weaker than steel, expensive to repair and (most importantly from the OEM perspective) expensive to source.

General Motors looks to be avoiding a head-to-head battle with its key competitors in the pickup segment. While other OEMs continue to update their pickup ranges, Chevrolet appears content to modify existing technology, to retain 'traditional' customers while also benefiting from the related cost savings. At some point in the future, an OEM will introduce a pickup which combines an