

Company Presentation

Agenda:

- LCN Company Overview
- Key Products & Technologies within the LCN Group
- Heritage of LCN Steering Systems Division
- Product Scope & Team Experience
- Design & Test Capabilities
- Current Business & New Developments
- Summary LCN Steering Systems

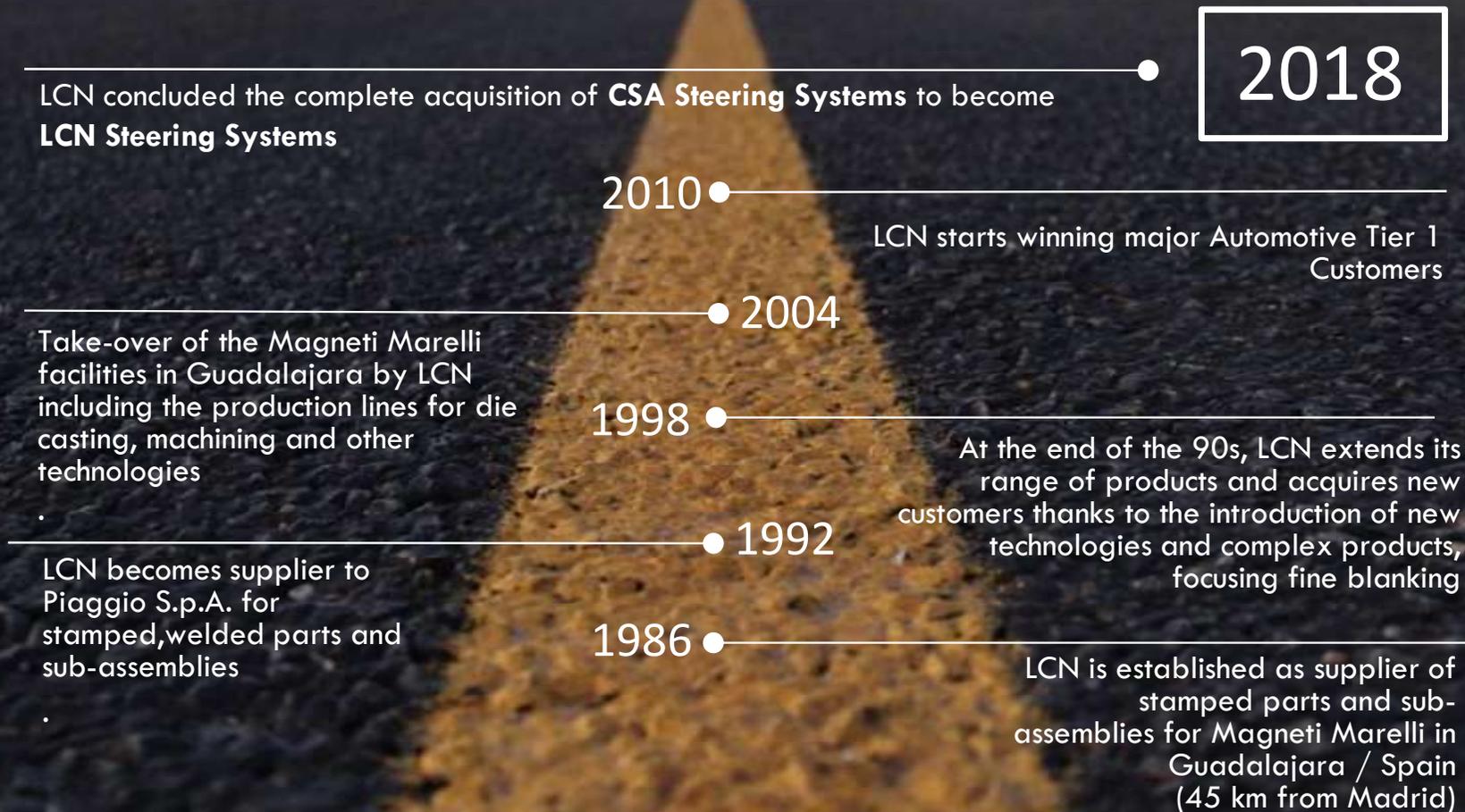
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 **LCN**

Company Milestones



Company Portfolio



FACTS



LCN has a production area of 18,000 m² with a state of the art machinery park and infrastructure.

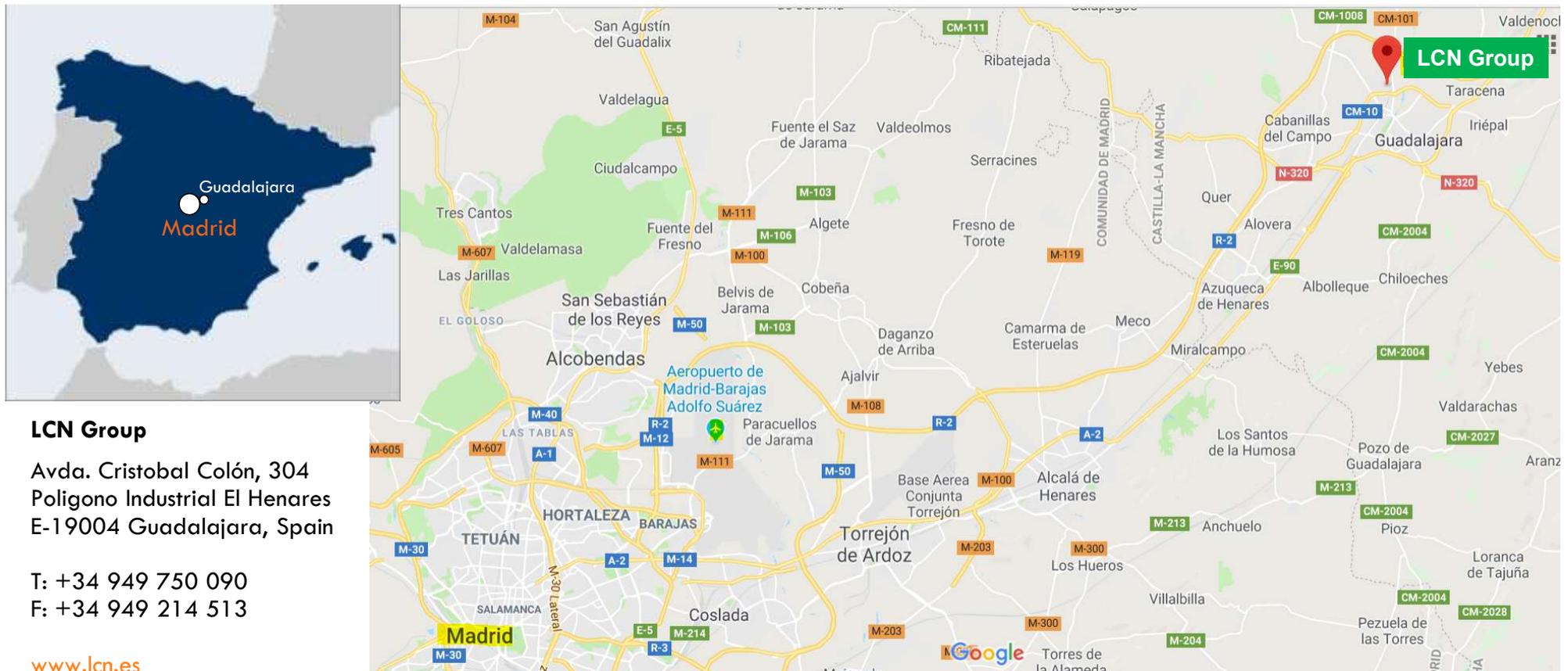
Our dynamic team develops and manufactures premium quality products in close co-operation with our customers at our plant in Guadalajara, Spain (near Madrid)

TECHNOLOGIES



- Fine Blanking
- Conventional Stamping
- Tube Cold Forming
 - Rotary Swaging
 - Axial Forming
- High-Performance Grinding
- Automated Welding
- Aluminium Die Casting
- CNC Machining
- Plastic Overmoulding
- Complex Assemblies
- Safety Critical Handbrake Systems
- Safety Critical Steering Systems
- Safety Critical Transmission Park Lock Systems

LCN Location



LCN Group

Avda. Cristobal Colón, 304
Poligono Industrial El Henares
E-19004 Guadalajara, Spain

T: +34 949 750 090
F: +34 949 214 513

www.lcn.es

LCN Staff

220 

EMPLOYEES



QUALIFICATION

LCN looks for systematic improvement in employee qualifications through continuous training, improving the conditions of employment for its workers and developing Quality through employee training and feedback.



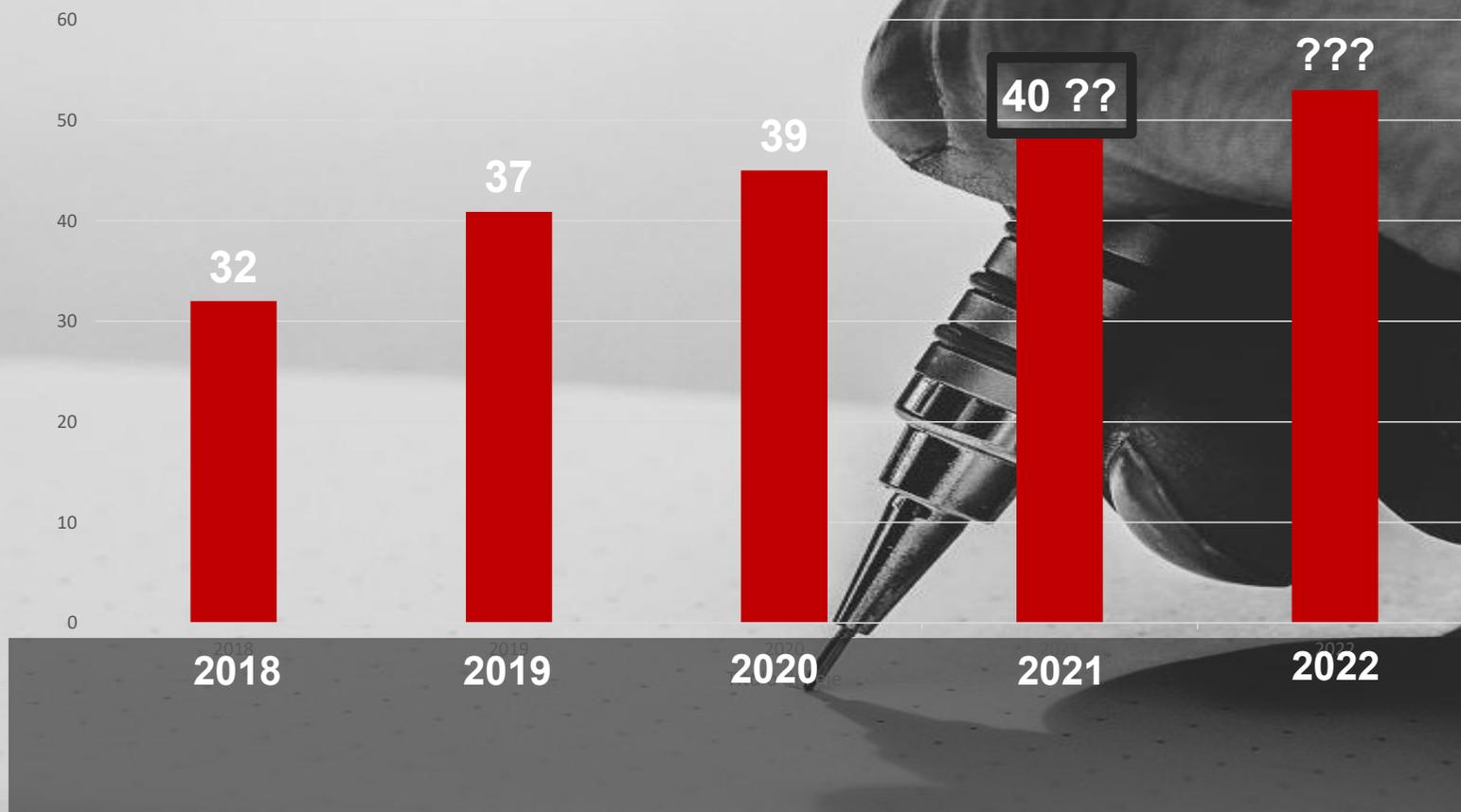
FLEXIBILITY

Flexibility: Depending on needs, LCN can use temporary workforce, up to 3 shifts



LCN Turnover

Millions €



LCN Quality

LCN is certified according to the Quality Standard IATF16949 & Environmental Quality Standard ISO14001.

Our technical testing includes the following:

- 3-D measurement and testing equipment.
- Optical measurement.
- X-ray testing equipment for the examination of aluminium porosity.
- Spectrometer.
- Roughness testing, profile projectors,...
- Steering Systems Test Lab

Bureau Veritas Certification



Certification
Awarded to

LCN AUTOMOTIVE EQUIPMENT SA & STEERING SYSTEMS S.L.
AVDA. CRISTÓBAL COLÓN, 304 P.I. EL HENARES - GUADALAJARA - ESPAÑA

Bureau Veritas Certification certifies that the Management System audited and found to be in accordance with the requirements of standard

ISO 14001:2015

Scope of certification:

MANUFACTURING OF SYSTEMS AND COMPONENTS FOR AUTOMOTIVE SECTOR BLANKED AND CONVENTIONAL STAMPED PARTS, ALUMINIUM DIE CASTING PARTS, MACHINED, GRINDED AND ASSEMBLED PARTS; MACHINED AND ASSEMBLED PARTS).

Certificate Number: E: 17
Original approval date: 17
Effective date: 17
Certificate expiration date: 01

This certificate is valid, subject to the general and specific terms and conditions of certification set out in the certificate.

Bureau Veritas Iberia S.L.
C/ Valportillo Primera 22-24, Edificio Caoba, 28008 Alcobendas - Madrid, España
1/A



Bureau Veritas Certification

Bureau Veritas Certification



Certificate of Approval
Awarded to

LCN AUTOMOTIVE EQUIPMENT S.A.
AVDA CRISTÓBAL COLÓN, 304 POL IND EL HENARES - 19004 - GUADALAJARA - ESPAÑA

Bureau Veritas Certification certifies that the Quality Management System of the above organisation has been audited and found to be in accordance with the requirements of

IATF 16949 - First Edition
and the applicable customer specific requirements



SCOPE
Design and manufacturing

PERMITTED EXCLUSION(S)
None

PRODUCT(S) DELIVERED
Systems and components such as fine blanked parts, conventional stamped parts, aluminium die casting and machined, grinded and assembled parts

Date Of Certification: 31-10-2018
Date Of Expiration: 01-05-2022
IATF Certificate N°: 340810

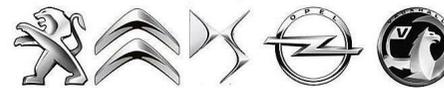
Bureau Veritas Certification Certificate N°: SPA-21480/1- IATF Revision:2

For Bureau Veritas Certification Holding, Le Triangle de l'Arche, 8 Cours du Triangle - 92800 Puteaux - France
(The official document is in English. Any translations of this document shall be used for reference only.)



Bureau Veritas Certification

OEM Customers

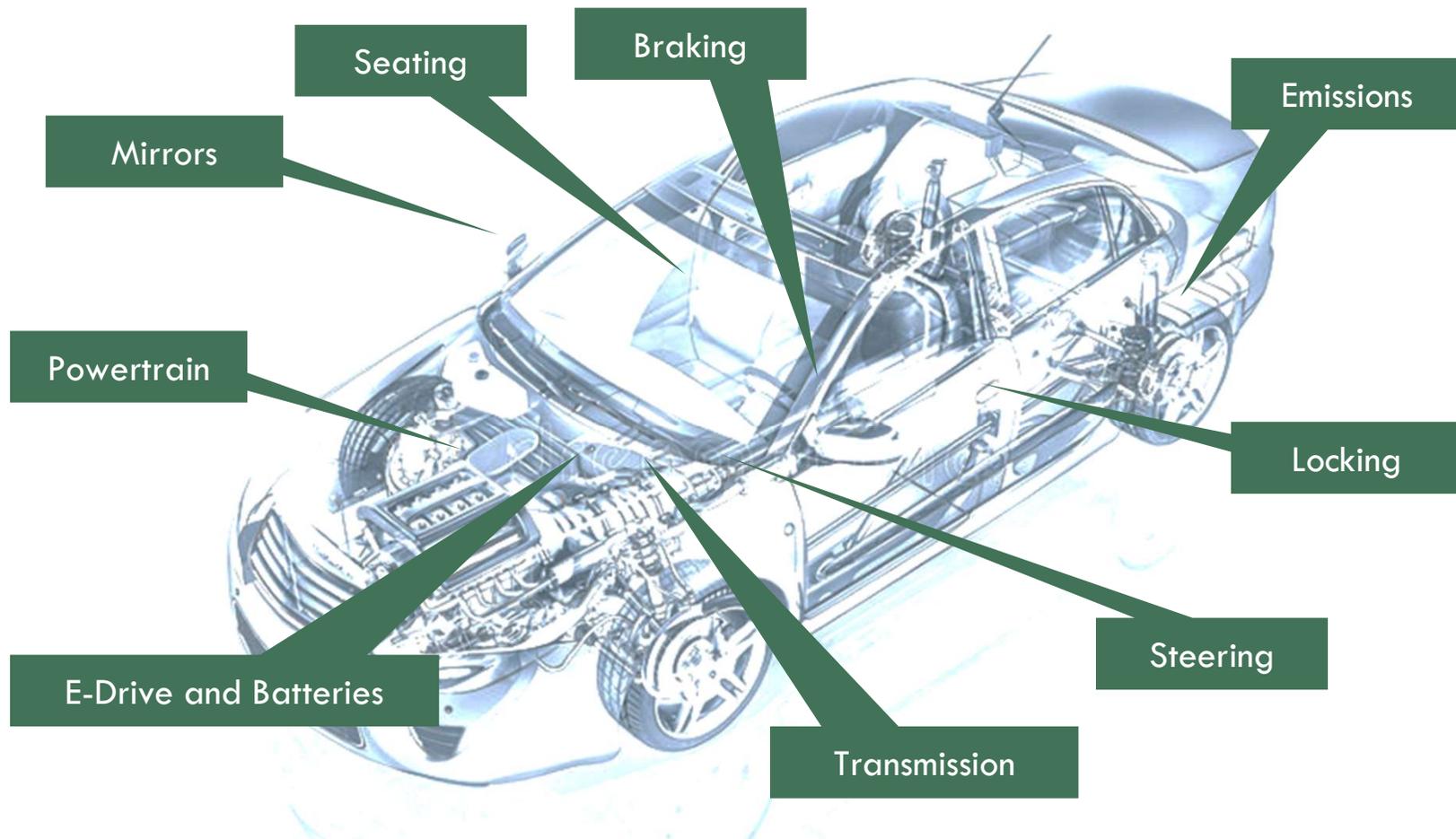




Tier 1 Customers



Vehicle Technologies



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Fine Blanking

LCN possesses many years of experience in the fine blanking process with machinery ranging from 80 T to 880 T.

In-house tooling development and manufacture.

Fine Blanking



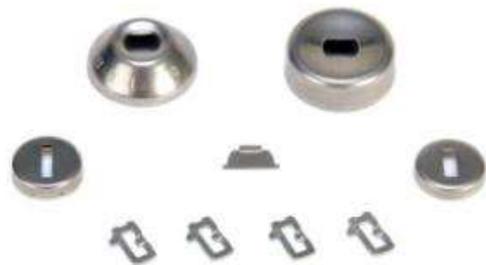


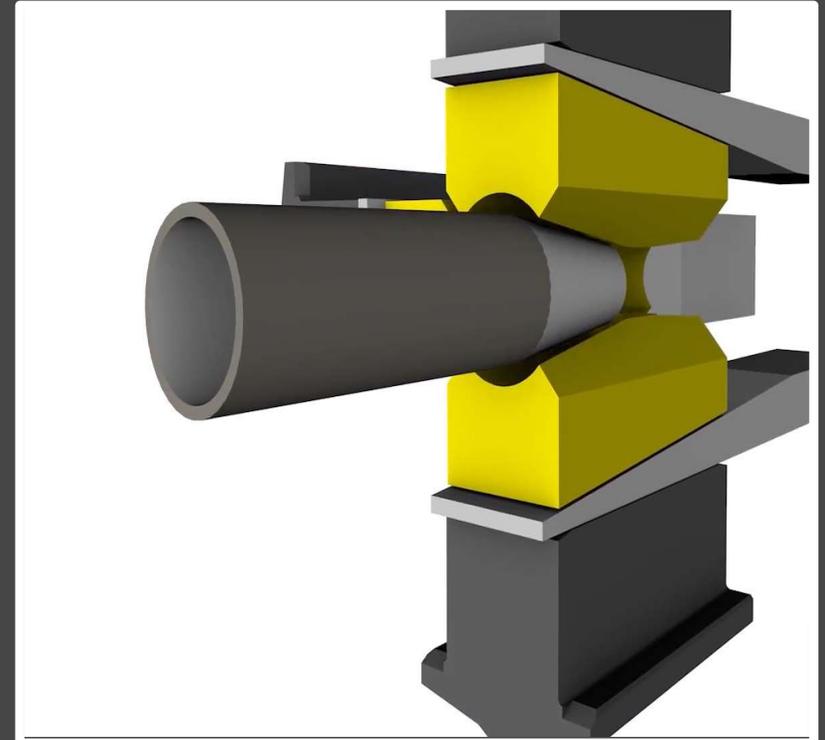
Stamping

Extensive machinery park with a capacity of up to 250 T.

Tooling Development takes place in-house at LCN and is manufactured externally.

Stamping





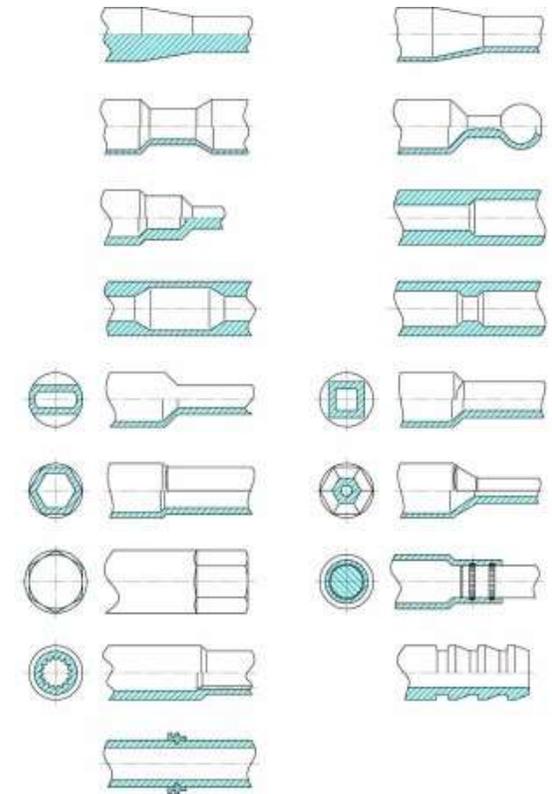
Tube Cold Forming

Wide portfolio of tube cold forming machines.

Rotary swaging, axial forming and proprietary forming technologies.

Tube Cold Forming

- LCN has many years of experience and Proprietary 'Know-How' in Cold Tube Formation.
- Rotary Swaging using 'State-of-the-Art' Machinery allows for reliable component manufacture to the highest precision and reduced cycle times.
- Precision Axial forming enables both internal and external design features as well as a wide array of profiles.
- A wide range of further processes are available to produce the finished part including diverse machining, end forming operations, hole cutting as well as spline formation (internal and external).
- LCN has the experience, 'Know-How' and Proprietary Technology to supply the most demanding of designs to the highest precision at a competitive cost.



Tube Cold Forming





High Performance Grinding

Grinding-wheel diameters up to 900 mm with real-time monitoring.

High Performance Grinding





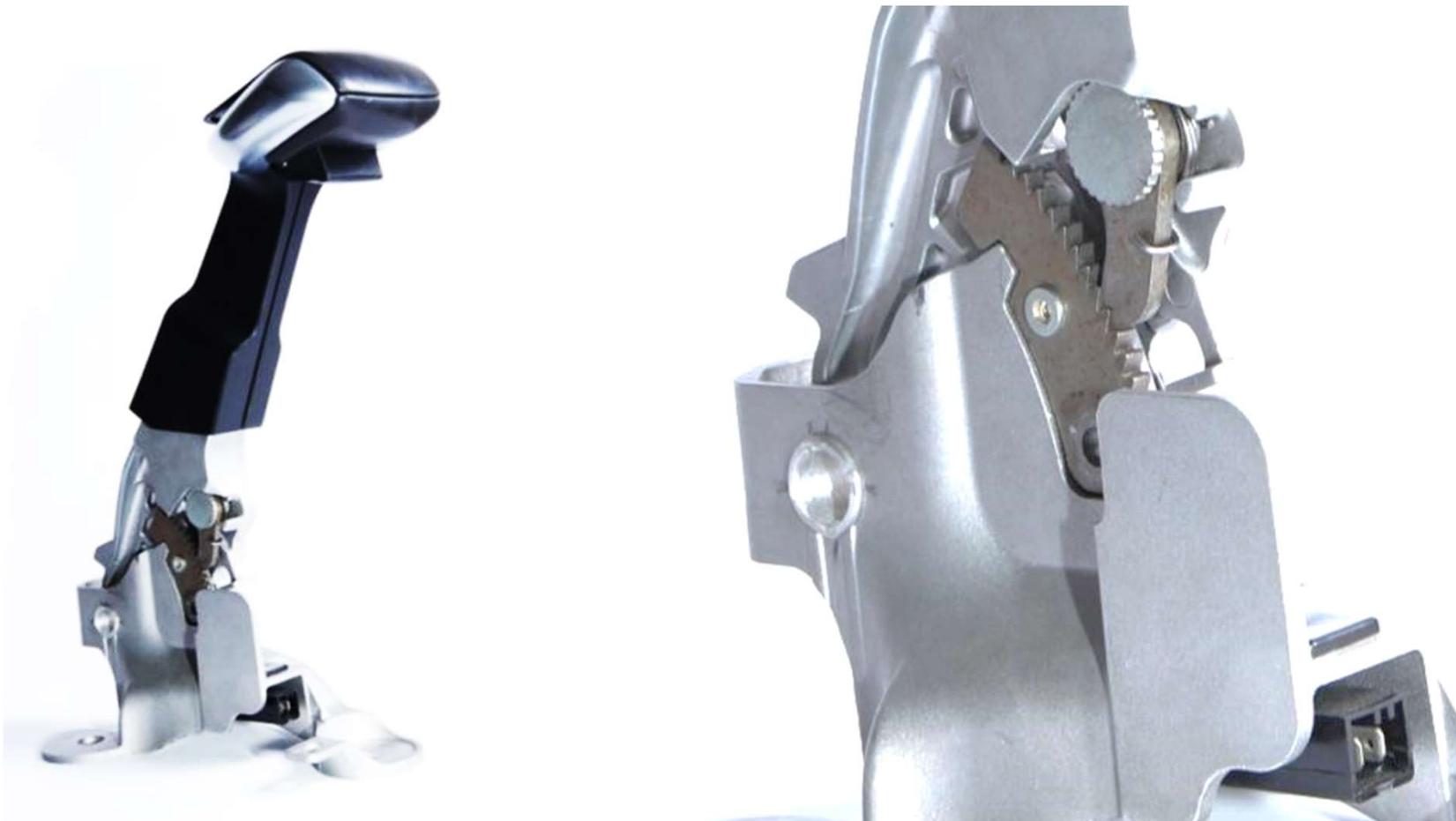
Aluminium Die Casting

Flexible production lines up to 1000 T.

Aluminium Die Casting



Handbrake Systems (Safety Critical)

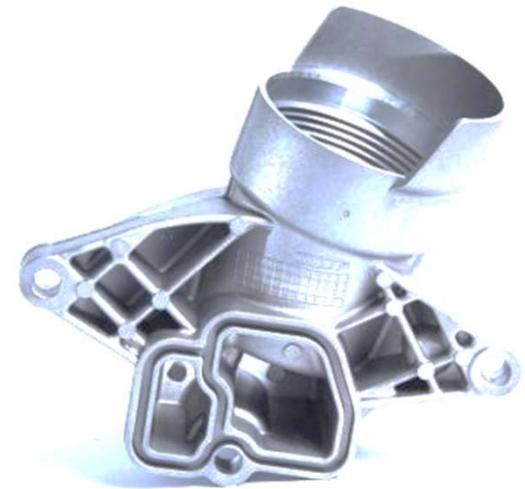




CNC / Machining

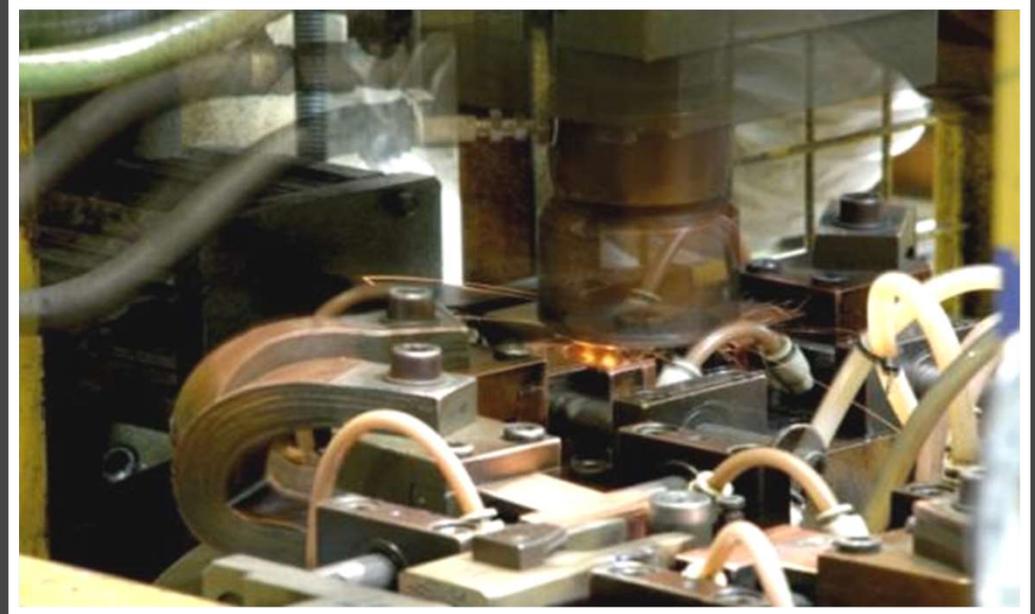
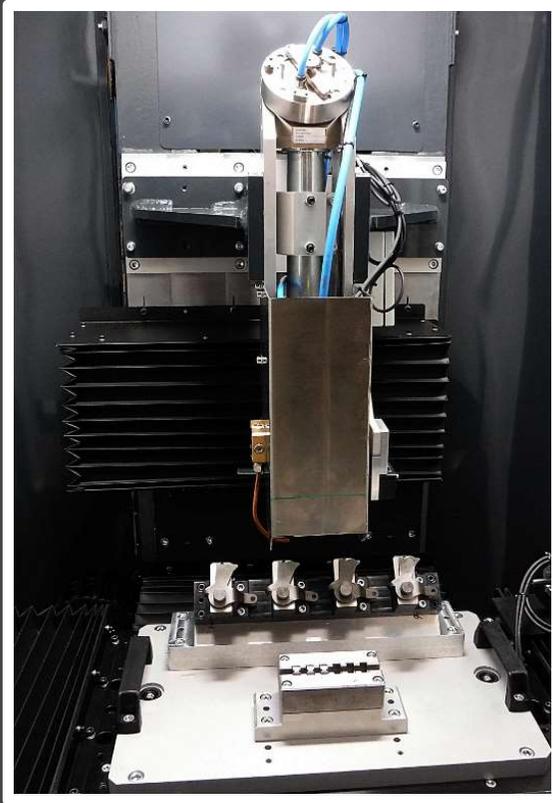
A range of 18 high-precision CNC machines suitable for all demanding machining requirements.

CNC / Machining



CNC / Machining





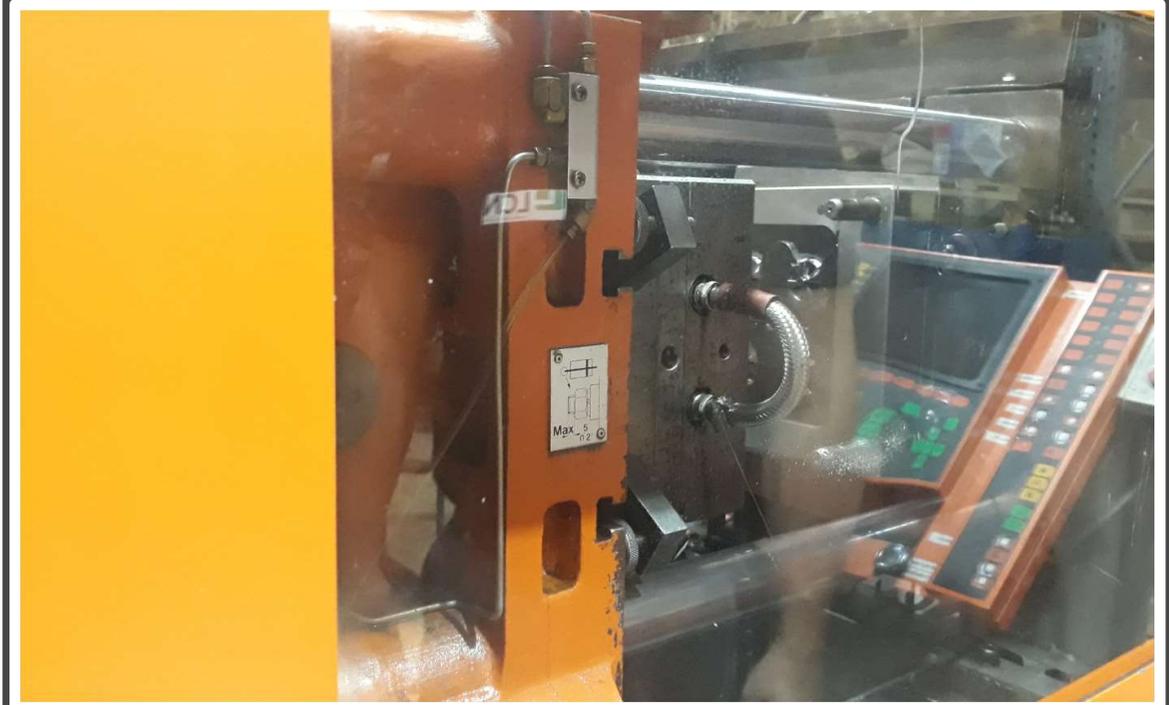
Automated Welding

LCN specialises in all types of welding.

Laser welding, Resistance welding and Arc welding.

Automated Welding



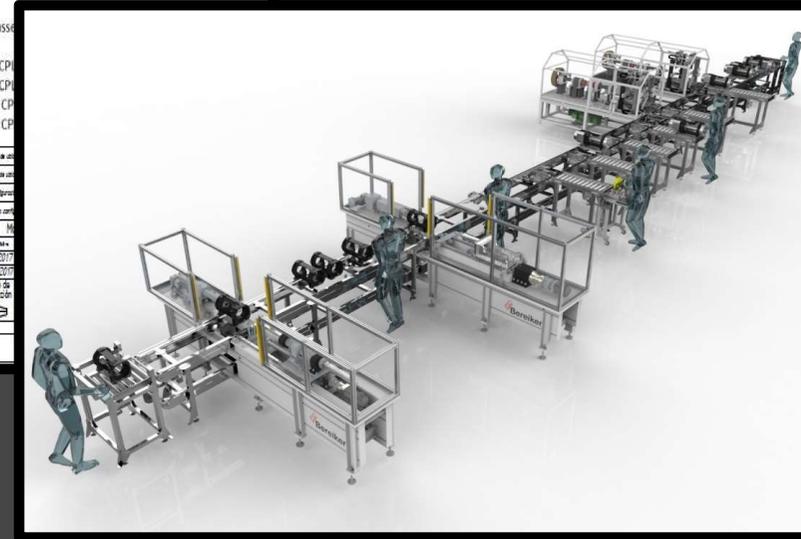
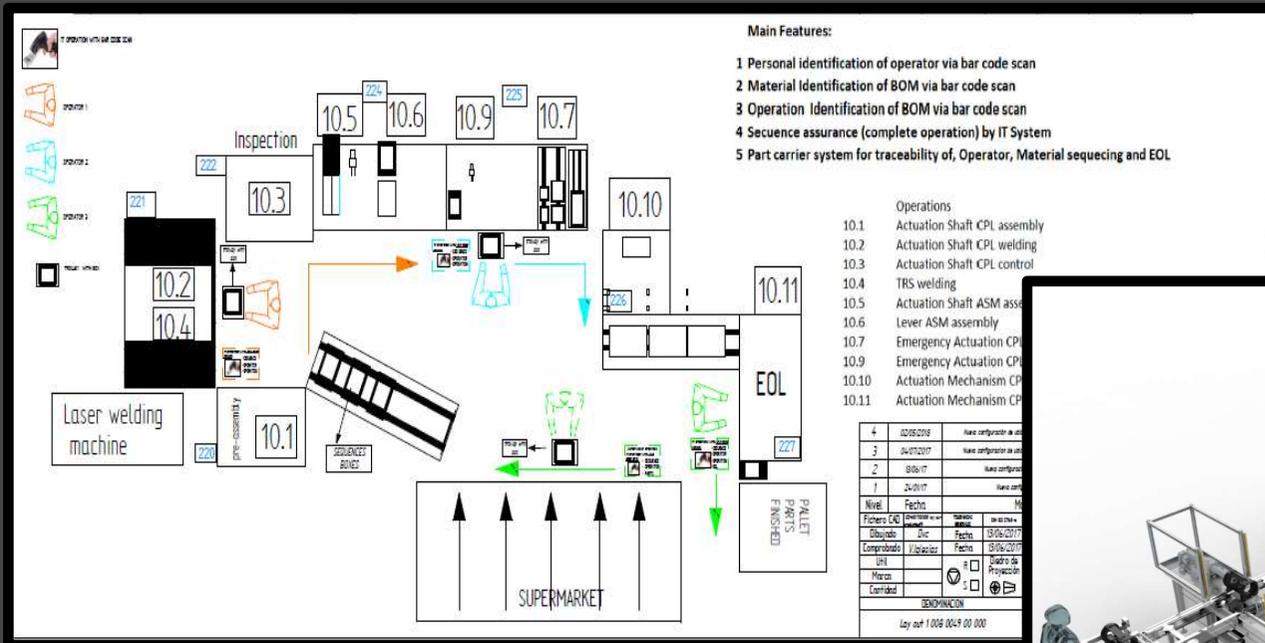


Plastic Overmoulding

In the field of plastic over-moulding, further processing of stamped and aluminium parts and small components for sub-assemblies.

Plastic Overmoulding





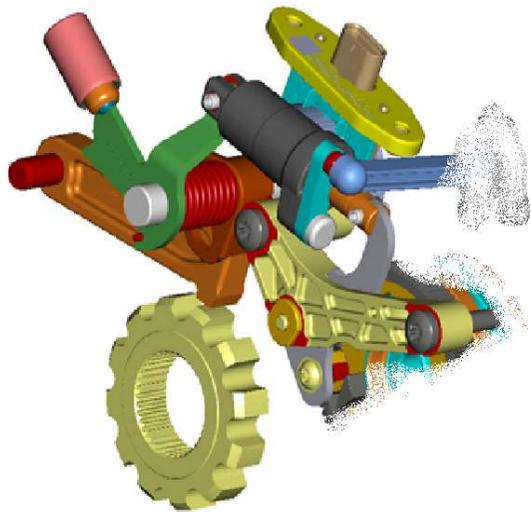
Assemblies

LCN can offer a wide range of assembly solutions to customers. We can integrate both components manufactured internally as well as many different types of components bought in – offering a completely flexible solution for our customers.

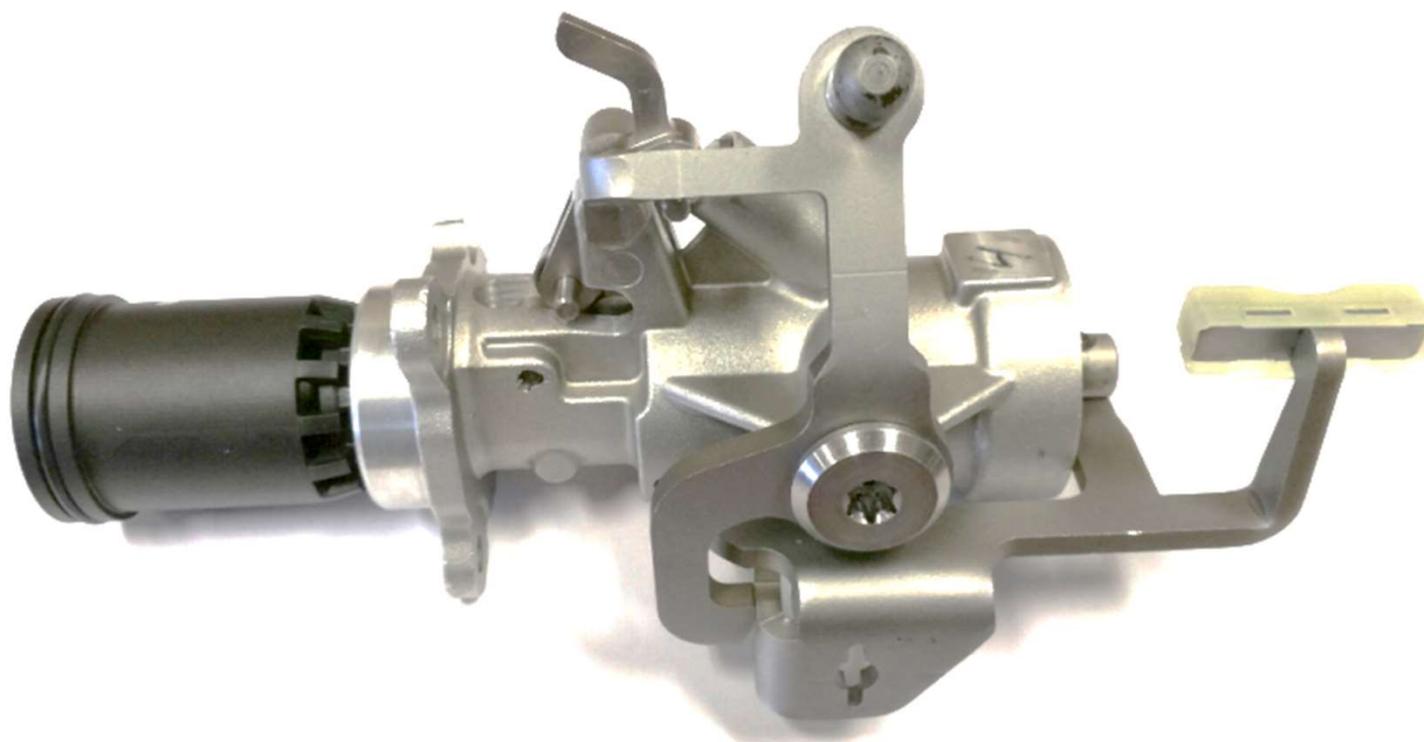
Assemblies (Safety Critical)



Assemblies (Safety Critical)



Assemblies (Safety Critical)





Manufacturing and Distribution of Carburetors

LCN is the worldwide sole producer holding a unique licence to manufacture Weber and Solex carburetors. Currently, 4,000 carburetors of widely differing types are manufactured monthly for Classic Cars and Sport Cars. With this product, LCN is able to demonstrate its extensive experience with all types of complex assemblies.

Carburetors





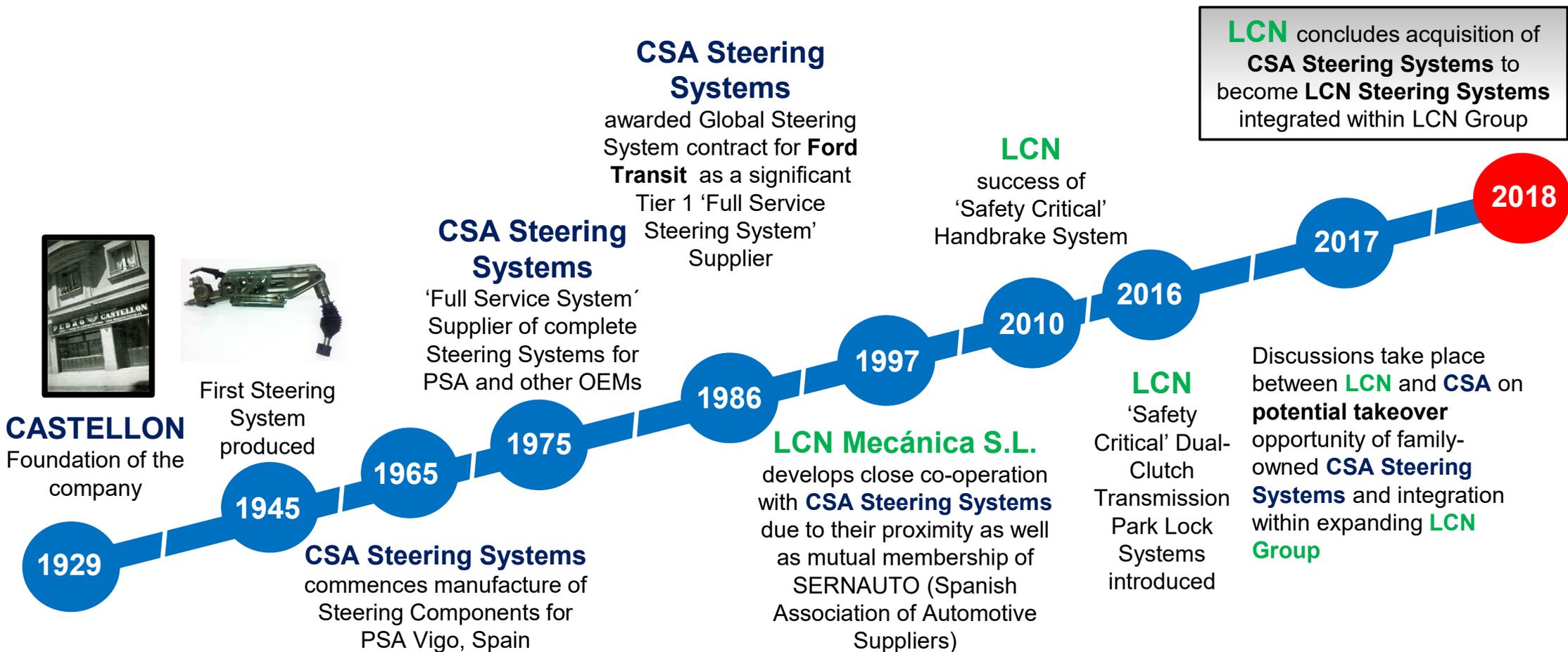
LCN Steering Systems Division

LCN develops and produces complete Steering Columns and I-Shafts as well as other Safety Critical Steering Components.

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Heritage of LCN Steering Systems



Heritage of LCN Steering Systems

- 1965** **CSA Steering Systems** based in Torrejón de Ardoz (near Madrid, Spain) commences manufacture of Steering Components for new PSA Plant in Vigo, Spain.
- 1975** **CSA Steering Systems** progresses to 'Full Service System Supplier' offering design, development and manufacture of complete Steering Systems for PSA and other OEMs.
- 1986** **LCN Mecánica S.L.** established in Guadalajara (north east of Madrid, Spain) and develops close co-operation with **CSA Steering Systems** due to their proximity as well as mutual membership of SERNAUTO (Spanish Association of Automotive Suppliers).
- 1997** **CSA Steering Systems** awarded Global Steering System contract for Ford Transit vehicle establishing itself as a significant Tier 1 'Full Service Steering system' supplier.
- 2010** Success of **LCN** 'Safety Critical' Handbrake System business leads to strategic decision to expand 'Safety Critical' business area.
- 2016** Introduction of LCN 'Safety Critical' Dual-Clutch Transmission Park Lock Systems.
- 2017** Discussions take place between **LCN** and **CSA** on potential takeover opportunity of family-owned **CSA Steering Systems** and integration within expanding **LCN Group**.
- 2018** LCN concludes acquisition of **CSA Steering Systems** to become **LCN Steering Systems** and new Steering System division is integrated within **LCN Group**.
- 2019** **LCN Steering Systems** debuts and is official sponsor of industry-leading "IQPC Steering Systems Conference" in Potsdam, Germany.

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Product Scope

- LCN is able to supply the following product categories on a Design or Build-to-Print Basis:

STEERING COLUMN



INTERMEDIATE SHAFT



STEERING COMPONENTS



Team Experience

➤ Team Track Record (STEERING SYSTEMS ONLY)

POSITION	YEARS	UNITS
DIVISION MANUFACTURING MANAGER	9	1
SENIOR PRODUCT ENGINEERING	5	1
SENIOR CAD CAE ENGINEER	25	1
SENIOR PROCESS ENGINEER	25	1
JUNIOR CAD CAE ENGINEER	2	2
JUNIOR PRODUCT-PROCESS ENGINEER	2	3
TESTING AND VALIDATION ENGINEER	12	1
SENIOR BUYER	5	1
SENIOR LOGISTICS ADVANCED PLANNER	10	1
WAREHOUSE MANAGER	4	1
QUALITY DEPARTMENT- SQD AND PROCESSsdddd AUDITOR	3	1
QUALITY DEPARTMENT- SQD AND CUSTOMER ASSITANCE	1	1
QUALITY MANAGEMENT SYSTEM	8	1
MANUFACTURING TEAM LEADER	15	1
MANUFACTURING TEAM LEADER	15	1
MANUFACTURING TEAM LEADER	15	1
MANUFACTURING OPERATORS	AVG. 10-15	15
	TOTAL	40

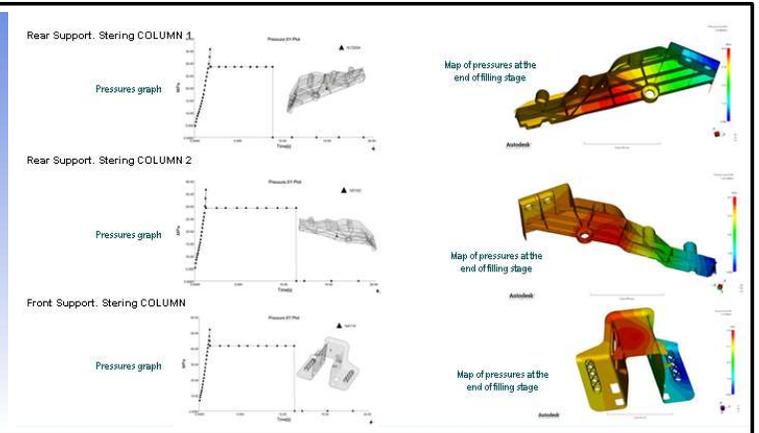
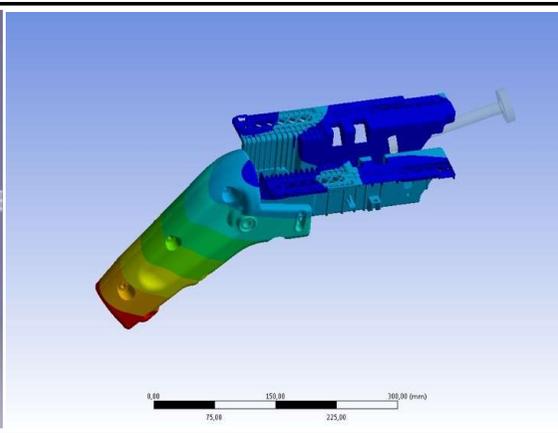
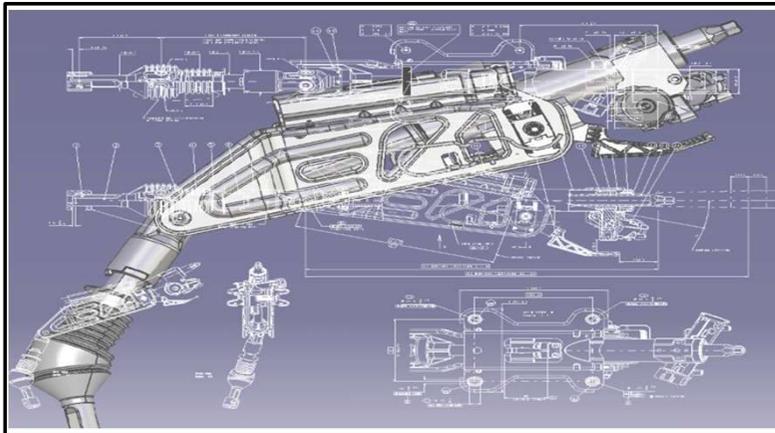


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'Full Service' Design Capabilities

➤ CAD-CAE Design Capabilities

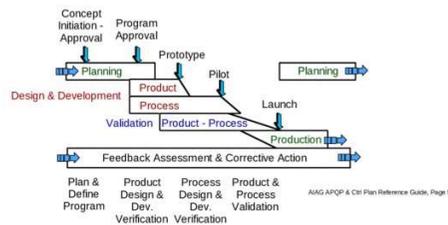


'Full Service' Design Capabilities

- Project Management:
Experienced 'Full Service Supplier' Project Management Team



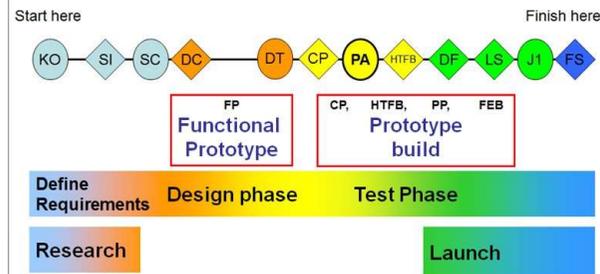
Advanced Product Quality Planning



- A structured method of defining the steps (process) necessary to assure that a product satisfies the customer
- The goal of APQP is to facilitate communication with everyone involved to ensure that all required steps are completed on time.
- Effective APQP depends upon top management commitment and support to assure that customer satisfaction is achieved

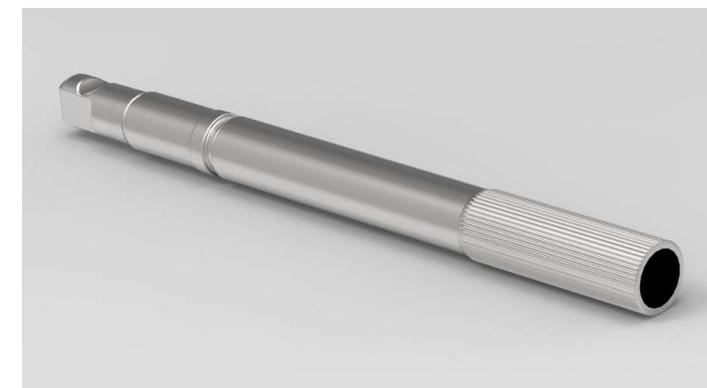
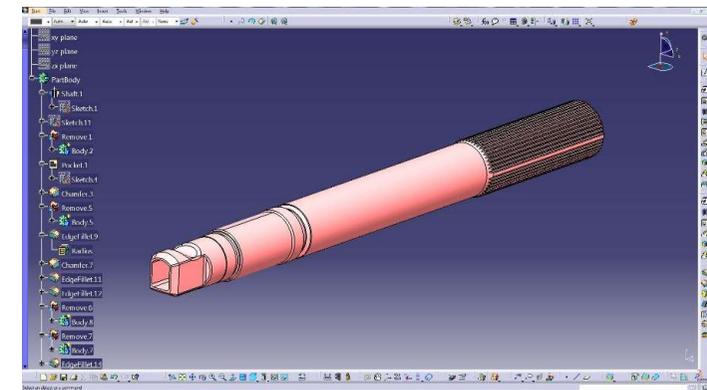
Advanced Product Quality Planning

Product development gateway guide



In-House Prototype Capability

- LCN is able to supply Steering Systems from initial Concept and Design through to Testing/Validation and Manufacture.
- All Prototype components and the following manufacturing processes are available in-house allowing a Faster Time to Market:
 - Fine Blanking/Stamping
 - Tube Forming
 - Grinding/Welding
 - Aluminium Die Casting
 - Plastic Injection Moulding / Overmoulding
 - CNC Machining
 - Complex Assembly & Testing
- LCN's unique Know-How & Experience in the Prototype Development Phase can help reduce both Development Cost & Development Time.



Test & Validation Capabilities

- Extensive In-House Testing facilities for Upper Steering Column and I-Shaft



Test & Validation Capabilities

- LCN can support complete OEM Testing and Validation Programmes



Test & Validation Capabilities

Testing and Validation List - STEERING COLUMN:

ENERGY MANAGEMENT TESTS

- Quasi-Static Steering Column Collapse Force
- Intrusion Compatibility
- Body block (OUTSOURCED)

STEERING MECHANISM TESTS

- Shaft Torque to Rotate
- Steering Shaft Torsional Stiffness
- Shaft Looseness in Axial Direction
- Shaft Looseness in Radial Direction
- Shaft Run-out
- Shaft Rotational Noise
- Shaft Axial Stick/Slip Evaluation
- Shaft Squeak and Rattle
- Lower Bearing Squeak and Rattle
- Steering Shaft Ultimate Torque
- Anti-Pull Apart Feature Strength
- Fabricated Connections Pull Apart Strength
- Steering Column to I-Shaft Axial Strength
- Telescope Adjustment Integrity
- Steering Shaft Static Fatigue
- Steering Shaft Rotational Wear

COLUMN STRUCTURAL TESTS

- Column Stiffness
- Steering Column Resonant Frequency
- Upper Bearing Push-Out Force
- Lower Bearing Push-Out Force
- Shroud/Switch Attachment Strength
- Vibration, Thermal, Durability, Squeak & Rattle testing
- Corrosion Test
- Lower Bearing Durability
- Entry/Exit Durability (OUTSOURCED)
- Steering Wheel Attachment
- Thermal/Humidity Cycle

REACH/RAKE SYSTEM TESTS

- Rake/Telescope Lever Efforts - Friction Lock Mechanism
- Rake/Telescope Lever Lash
- Rake Efforts
- Telescope Efforts
- Rake & Telescope Lever Actuation Noise
- Rake Adjustment Integrity
- Rake/Telescope Lever Strength
- Rake/Telescope Adjustment Mechanism Wear

Test & Validation Capabilities

Testing and Validation List – I-SHAFTS:

PERFORMANCE TESTS

- Shaft Torque to Rotate
- U-Joint Swivel Torque
- Shaft Rotational Torque Variation
- Steering Shaft Torsional Stiffness
- Steering Shaft - Component Torsional Stiffness
- Component isolator axial stiffness
- U-Joint Axial Lash
- Force to Slide with Torque and Temperature
- Axial Stick/Slip Evaluation
- U-Joint Articulation Angle
- Ultimate and Yield Torque
- Anti-Pull-Apart Feature Strength
- Fabricated Connections Pull Apart Strength
- U-Joint Bearing Push-Out Force
- Threaded Insert Integrity
- I-Shaft to Next Shaft Axial Strength
- Bearing and/or Seal Sleeve Axial Retention
- Water Plug Retention
- Slider Seal/Boot Retention
- Isolator Cold Deflection
- isolator Redundancy
- Whistle Notch Ultimate Strength
- False Engagement Physical Test

DURABILITY TESTS

- Steering Shaft Static Fatigue
- Heat Wear Test
- Stroking/Corrosive Wear
- Rotational Vibration Durability
- Axial Endurance
- Durability Axial Stick/Slip Evaluation Procedure
- Thermal Stick Slip Testing

ENVIRONMENTAL TESTS

- Shaft Boot/Seal Integrity (OUTSOURCED)
- In-Process Humidity Protection (OUTSOURCED)
- Seal Immersion Test (OUTSOURCED)
- Chemical Compatability (OUTSOURCED)
- Polymer Heat Aging (OUTSOURCED)
- Flammability (OUTSOURCED)
- Thermal Cycle
- Corrosion Test
- Environmental Test

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Current Business



GAZon Next

- ❑ Full Hydraulic Steering column
- ❑ Rake Adjustment
- ❑ Volume : 20.000 units per year



Current Business



GAZelle Next

- ❑ Full Hydraulic Steering column
- ❑ Rake Adjustment
- ❑ I-Shaft with 2 Universal Joints
- ❑ Volume : 75.000 cars per year

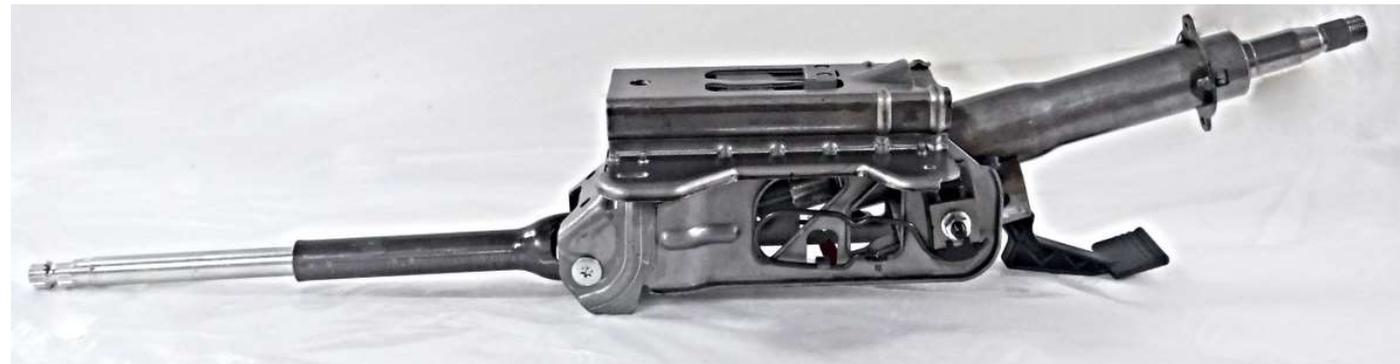


Current Business



UAZ Patriot

- ❑ Full Hydraulic column
- ❑ Rake and Reach adjustment.
- ❑ Collapsible System.
- ❑ Volume : 20.000 cars per year



Current Business - OE Spare Parts



Range Rover Sport & Discovery



Opel Meriva

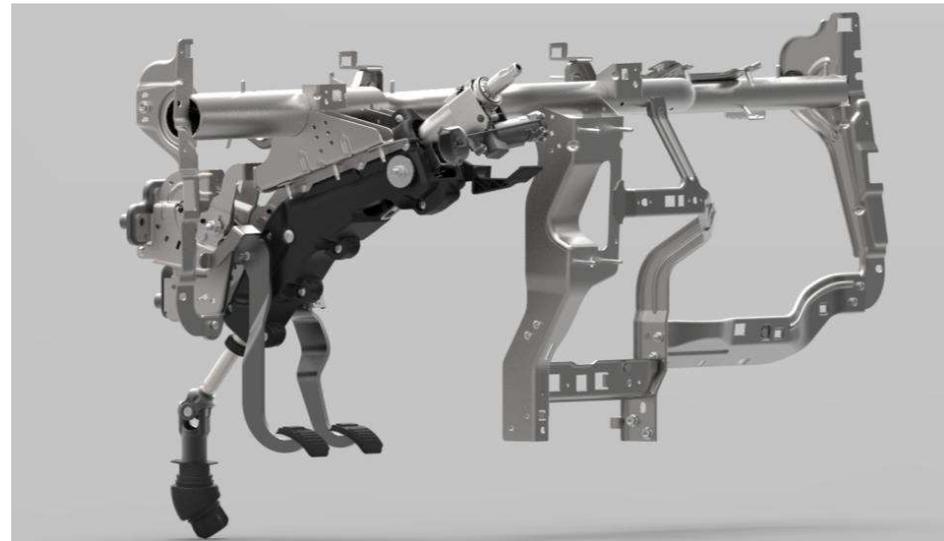


Programme – FORD TRANSIT



Ford Transit (V362-V363)

- ❑ Full Hydraulic Column
- ❑ 3 Cardan Joints
- ❑ Geometry with 3 Joints
- ❑ Collapse Function at 2,1 KN
- ❑ 5 Stars EURO NCAP



Programme – FORD F-150/350



Ford F-150 & F-350

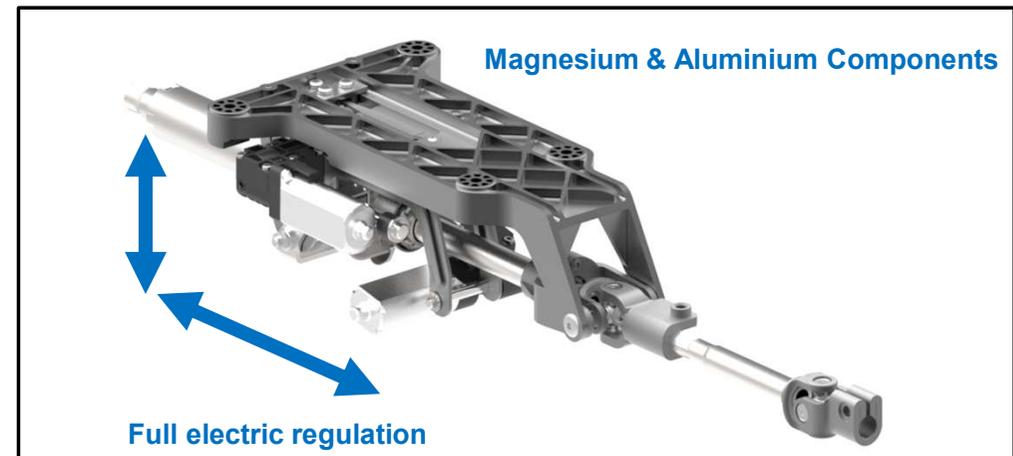
- ❑ Upper and Lower I-Shaft
- ❑ F-150 MY 2015
- ❑ F-350 MY 2015



New Developments (R&D)

R&D focused on:

- Full electrical regulation
- Weight reduction (magnesium/aluminum/plastic)
- Highly integrated designs
- EPAS



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Summary LCN Steering Systems

- Family-owned with solid financials and flat hierarchy enabling effective decision-making.
- A diverse range of manufacturing processes in-house offering synergies through a self-sufficient component and assembly Supply Chain.
- An acquired and fully integrated Steering System Heritage of over 55 Years.
- A 'Design for Manufacture' Philosophy with well-proven prototype capability.
- Flexibility and experience of satisfying low, medium and high-volume market requirements.
- Extensive Test & Validation experience & facilities.
- Proven capability as a Tier 1 'Full Service' Steering System Supplier offering the flexibility to supply components or sub-assemblies as a Tier 2.



Let's GO!!!!



Thank you for your attention !
Gracias por su atención !

Contacto:

Juan Carlos Garcia
LCN Sales Manager
Tel: +34 - 949 - 750014
jcgarcia@lcn.es

Poligono Industrial „El Henares“
Avenida Cristobal Colon, 304
19004 – Guadalajara
SPAIN