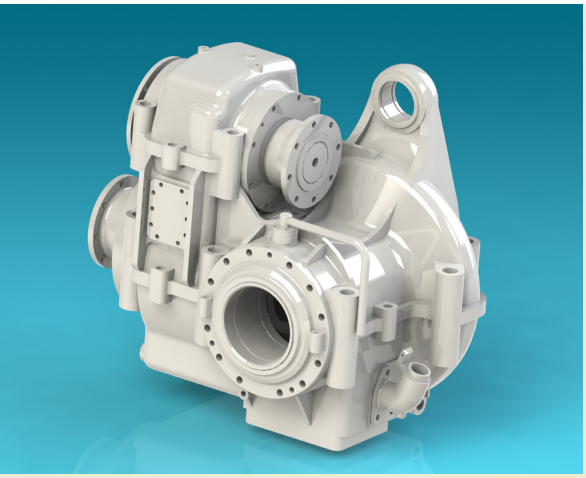
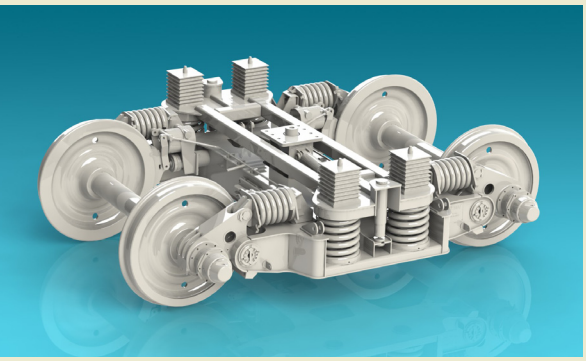
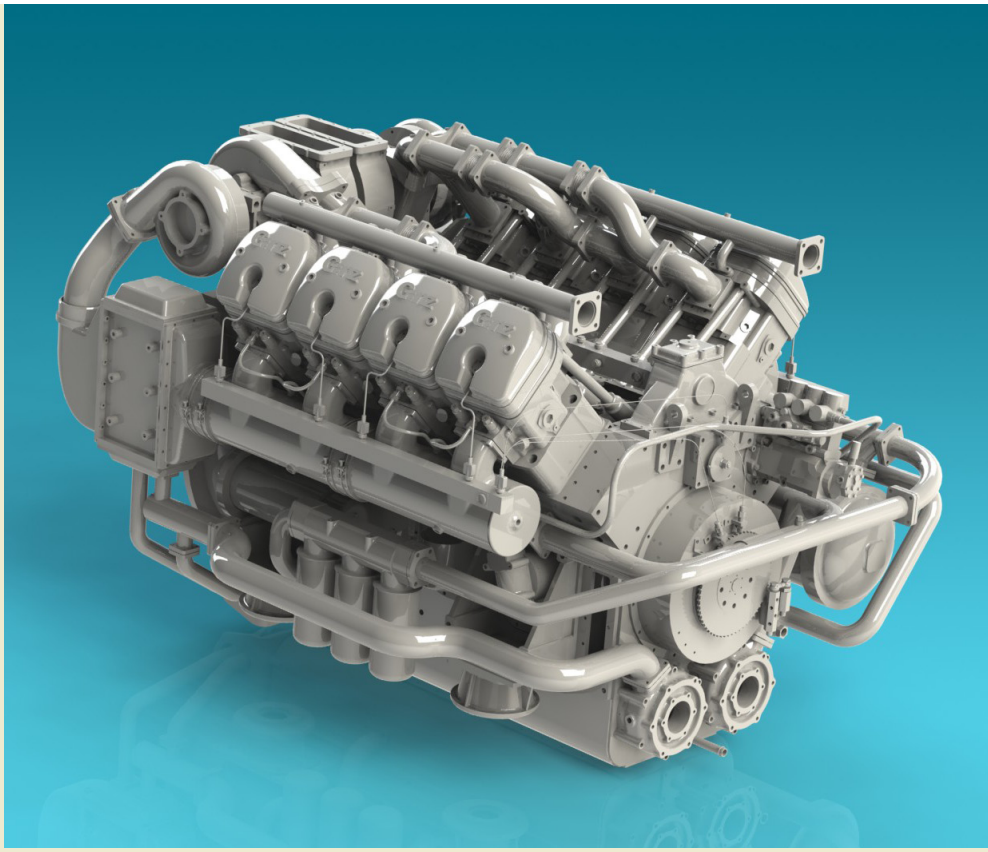
Ganz Motor Kft.







Ganz Motor Kft.

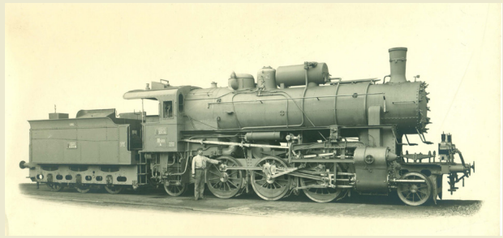
Company Review





INTRODUCTION

With a professional expertise dating back to more than 165 years, Ganz Motor Kft. is a Hungarian manufacturer of major engineering units for railway vehicles. The company is 100% owned by Ganz Holding Corporation.

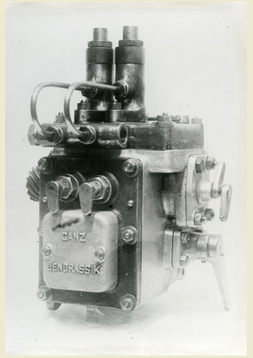


We feel important to mention the rich experience accumulated within the Ganz Holding Co. that is also our investment into the future. Among others this specialized knowledge – contributed by such outstanding and well-known experts as Mechwart András, Kandó Kálmán or Jendrassik György – allowed for Ganz companies to supply railway vehicles to 38 countries worldwide in all populated continents, for satisfaction of both operators and passengers.

The Ganz Group of companies founded by Ganz Ábrahám in 1844 and the 'Magyar Királyi Államvasutak Gép- és Kocsigyára' (Machine and Coach Factory of Hungarian Royal State Railways) established in 1870



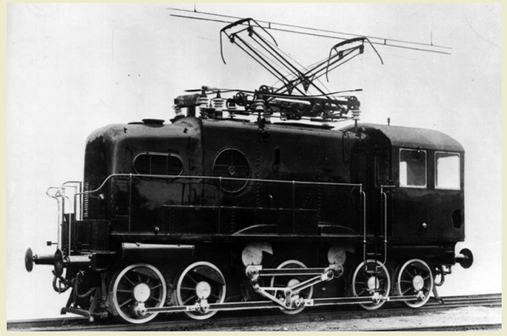
- that later on became the 'MÁVAG' - have played a basic role in the history of the company.
Starting from the manufacturing of steam locomotives, these companies - first apart, then after their merge in 1959 (establishment of Ganz-MÁVAG) by means of joint efforts and the application of the results of continuous innovations and that of the leading technologies reached the development of diesel and electric driven vehicles (locomotives, trainsets, trams, metros and LRVs). Apart from the development and supply of driven vehicles, diesel engines, transmissions,



the manufacturing of the hauled vehicles and that of passenger coaches and freight wagons was also continuous, and always in compliance with the highest technical niveau of the actual era.



When in 1988 the Ganz-MÁVAG split up, its manufacturing activities, technical traditions and intellectual heritage were passed on to its successor companies. Out of its main activities the railway vehicle manufacturing was continued in several steps by Ganz-Hunslet Rt., then Ganz Vagon Kft., while the engineering activity was continued by Ganz Gépgyár Vállalat. By means of the transformation of the latter company, in 1991 the Ganz Holding Co. came



into existence, incorporating production-, service-, development and trade companies, each of diversified profile.

In 1991 Ganz Holding Co. established Ganz Motor Kft. that also continues the activities of Ganz David Brown Kft. and that of Ganz Vagon Kft., which companies finished their activities in the meantime.

From technological point of view the company is featured of customised and small scale production.



The company disposes of universal machinery, qualified engineers and skilled workmen and by means of continuous developments a flexible background is available to satisfy the highest level of individual customer requirements.

Ganz Holding Co., as the successor and exclusive proprietor of the intellectual rights of the companies Ganz, MÁVAG, Ganz-MÁVAG, Ganz Vasúti Járműgyárt Rt., Ganz-Hunslet Rt. and Ganz Vagon Kft., has granted exclusive user rights for Ganz Motor Kft. regarding documentation, know-how and manufacturing rights connected with railway vehicles manufacturing.



Our company is committed to satisfy the customers' requirements primarily by means of cooperation and innovation, based on the more than 165 years of tradition and in compliance with actual and future challenges. Our aim is to turn to a remarkable factor of the Hungarian mechanical engineering in the 21th. century, to improve our competitiveness and to increase our international prestige.

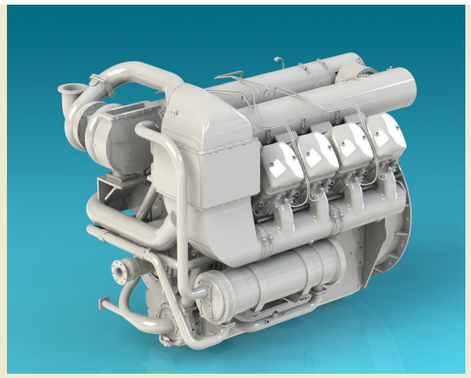


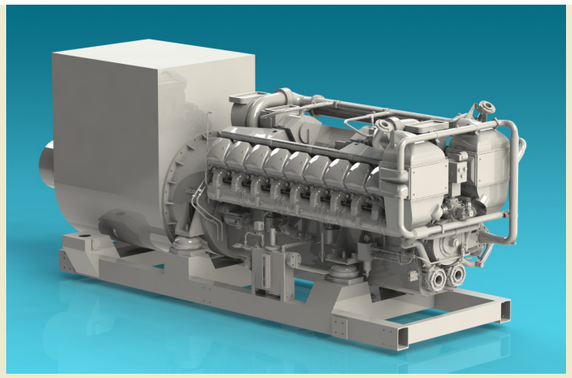
ACTIVITIES

- Design and development of diesel engines, hydraulic transmissions, railway bogies using up to date CAD/CAM system
- Expert review, survey and advice on the spot
- Production of railway vehicle components, spare parts, industrial transmissions and special equipments
- Diesel engine, transmission, gearbox installation and assembly on the site
- Running and load testing of diesel engines and transmissions
- Examination, refurbishment and repair of diesel engines, transmissions, bogies
- Modernisation, modification of our products to comply with specific demands
- Manufacturing of gears and other diesel engine parts, transmission or railway vehicle components as subcontractor according to customer requirements

Diesel engines

Ganz PA4V 185 VG engine family





Ganz diesel engines are designed for application in railway vehicles, electric power generating sets and power plants. Based on our experience of more than hundred years in manufacturing of internal combustion engines, the aim of our continuous development is to reduce fuel consumption, air pollution, heat load and to keep the engines up to date.

The main advantages of Ganz PA4V 185 VG diesel engines in brief as follows:

- reduced fuel consumption
- reduced exhaust gas temperature
- electronic governor system
- high efficiency turbochargers
- modular exhaust system
- highly efficient, modern injection pump
- reliable, long life construction



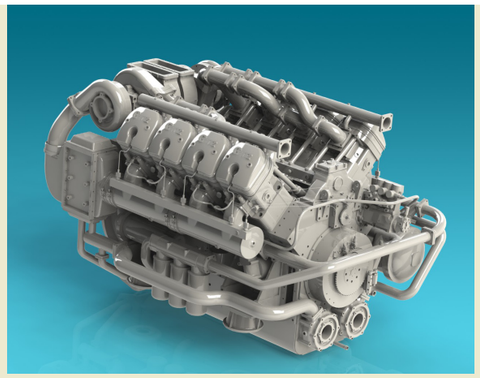


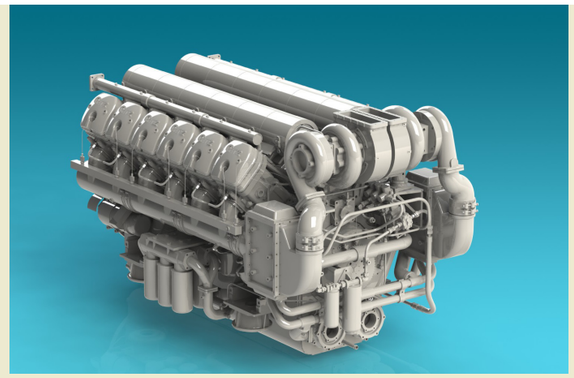
Engines data

Type	Cylinders	Power (kW)	Speed (rpm)	Emission
6 PA4V 185 VG	6	738	1500	UIC II
8 PA4V 185 VG	8	984	1500	UIC II
12 PA4V 185 VG	12	1476	1500	UIC II
16 PA4V 185 VG	16	1968	1500	UIC II
18 PA4V 185 VG	18	2214	1500	UIC II

Diesel engines

GM185V-VG-CR engine family





The brand name of Ganz GM185V-VG-CR engines are diesel engines those compile the latest requirements:

- low emission
- high efficiency fuel pump
- common rail injection system
- electronic governor system
- electronic engine diagnostic system
- reliable, long life construction

Engines data

Type	Cylinders	Power (kW)	Speed (rpm)	Emission
6 GM185V-VG-CR	6	750	1500	IIIA / IIIB
8 GM185V-VG-CR	8	1000	1500	IIIA / IIIB
12 GM185V-VG-CR	12	1500	1500	IIIA / IIIB
16 GM185V-VG-CR	16	2000	1500	IIIA / IIIB
18 GM185V-VG-CR	18	2250	1500	IIIA / IIIB

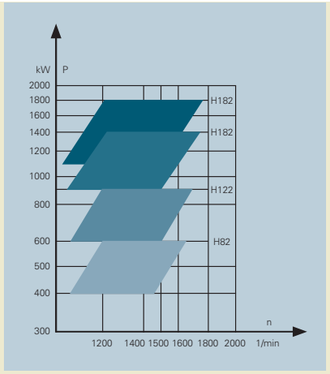
*EU Directive 2004/26 EC, stage IIIB with exhaust gas after treatment system

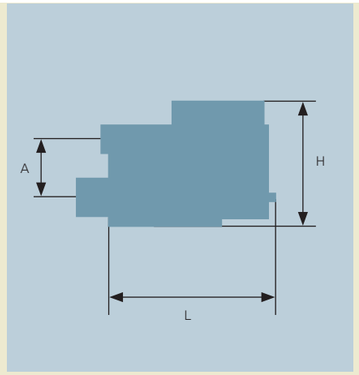
Applications

- Main line locomotives
- Shunting locomotives
- Diesel multiple units

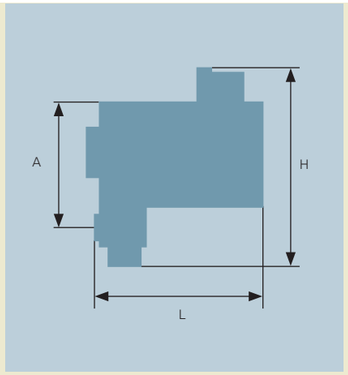
Transmisions

Hydrodynamic power transmissions equipped with mechanical or electronic control systems





H82



H182
H122

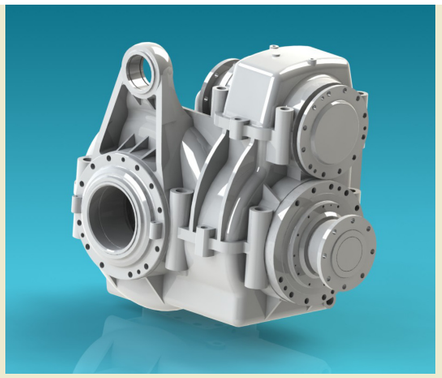
Applications
- Main line locomotives
- Shunting locomotives
- Diesel multiple units
- Rail cars of light and medium range
- Special rail vehicles

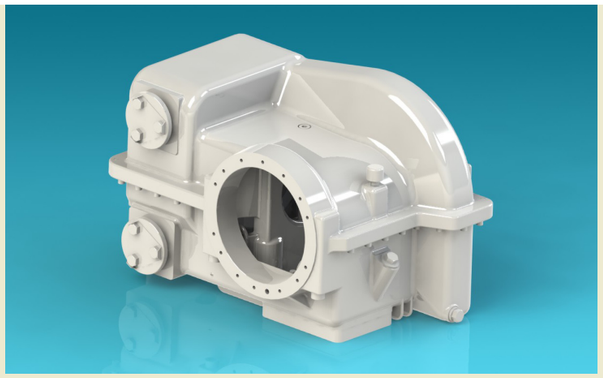
Type	Power range (kW)	A (mm)	H (mm)	L (mm)	Mass (kg)
H82	400..600	535	1160	1530	2700
H122	600..900	1064	1716	1340	3300
H182	900..1800	1245	1945	1446	4070



Transmisions

Axle dives





- Axle drives mounted directly on the wheel shaft
- Axle drives with reversing gear (reversible axle drives)
- Quill shaft axle drives for flexible suspension (flexible suspended quill shaft axle drives)
- Traction gears
- Auxiliary gearboxes
- Axle drives for special applications

Applications
- Main line and shunting locomotives
- DMUs and EMUs
- Rail cars
- Rail buses
- Metro cars
- Trams
- Special rail vehicles



Transmisions

Single stage axle drive

Type	Axle diameter (mm)	Axle load (t)	Ratio range	Mass (kg)
TE 117-	170	12	1,58..1,85	490
TE 1219-	190	12	1,68..2,60	600
TE 1518-	180	15	1,33..1,65	480
TE 2019-	190	20	1,70..2,60	600
TEK 1217-	170	12	2,14..3,00	380
TEK 1618-	180	16	2,14..3,00	450
TEK 2020-	200	20	2,14..4,00	580
TEK 15-170-	170	15	2,14..3,00	285
TEK 20-200-	200	20	2,14..4,00	670

Two stage axle drive

Type	Axle diameter (mm)	Axle load (t)	Ratio range	Mass (kg)
TK 117-	170	12	1,84..4,16	660
TK 319-	190	17	1,95..4,28	900
TK 1219-	190	12	2,18..5,93	800
TK 1518-	180	15	1,81..3,70	700
TK 2019-	190	20	1,70..4,29	800
TKK 1217-	170	12	2,14..9,42	550
TKK 1618-	180	16	2,14..9,66	650
TKK 2020-	200	20	2,14..9,75	780
TKK 15-170-	170	15	2,14..9,42	415
TKK 20-200-	200	20	2,14..9,42	960
TKH 9-140-	140	9	5,40..11,00	240

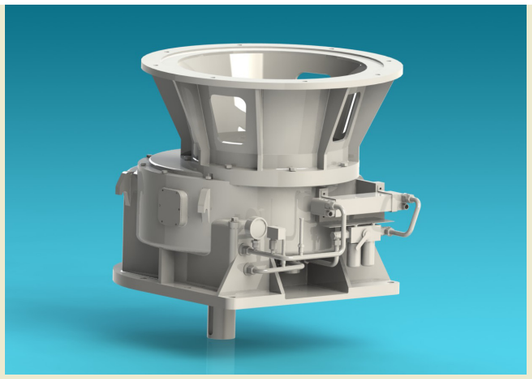
Quill shaft axle drives for flexible suspension

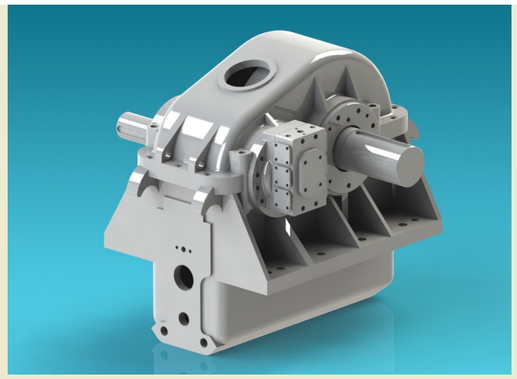
Type	Axle diameter (mm)	Axle load (t)	Ratio range	Mass (kg)
RTE 2032-	320	20	2,2..6,5	730
RTK 2032-	320	20	2,2..8,0	1060

Axle drives with reversing gear

Type	Axle diameter (mm)	Axle load (t)	Ratio range	Mass (kg)
TEKR 12-160-	160	12	2,5..4,20	570
TKKR 16-200-	200	16	2,5..5,00	590

Transmisions





Industrial gearboxes fitted with helical gears

- Power range: up to 8300 kW
- Input speed max.: 3000 1/min
- Output torque max.: 131000 Nm
- Centre distance: 140–630 mm
- Number of reductions: 1–3
- Ratio range: 1,2–130

Applications:
- Horizontal–base mounted
- Horizontal–shaft mounted
- Vertical–flange mounted
- Oblique mounted

General features:
- Case hardened and finish ground helical gears
- Roller bearings
- Shaft seals: radial packing ring or non wear labyrinth
- Lubrication: splash or pump
- Cooling: natural, fan, cooling pipe, oil to water heat exchanger, or combined
- Input: shaft
- Output: shaft, flange, quill shaft

Industrial gearboxes with spiral bevel gears

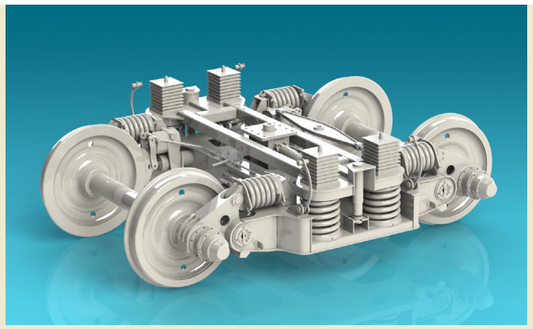
- Power range up to 2260 kW
- Output torque max.: 102000 Nm
- Centre distance: 140–450 mm
- Number of reductions: 1–3
- Ratio range: 5–96

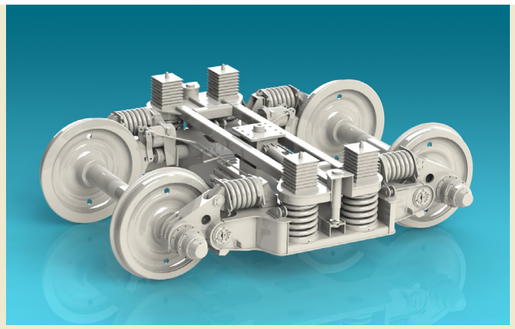
Applications:
- Horizontal - base mounted
- Horizontal - shaft mounted
- Vertical - flange mounted

General features:
- Case hardened and finish ground helical gears
- Case hardened and hard finished cut spiral bevel gears
- Roller bearings
- Shaft seals: radial packing ring or non wear labyrinth
- Lubrication: splash or pump
- Cooling: natural, fan, cooling pipe, oil to water heat exchanger, or combined
- Input: shaft
- Output: shaft, flange, quill shaft

Bogies for railway vehicles

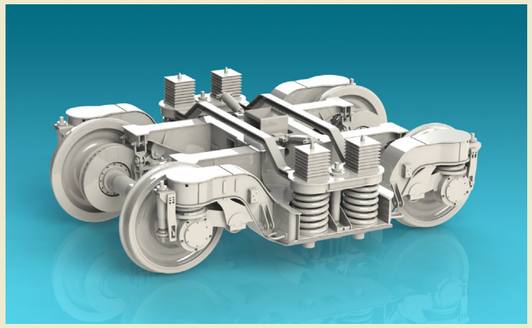
Ganz Universal type bogies

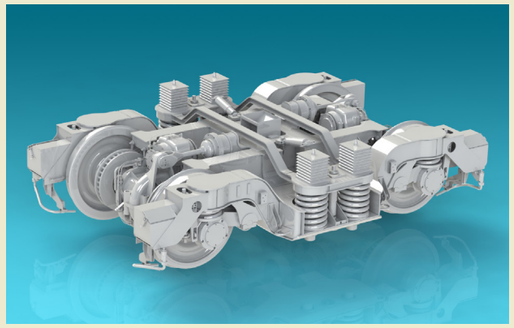




- Bogies for 1000-1600 mm gauge (up to 18t axle load)
- Bogies for passenger coaches (up to 140 km/h speed)
- Motor bogies for EMUs and for DMUs (up to 140 km/h speed)
- Bogies for special vehicles

Ganz GH150 and GH250 type bogies





- Bogies for 1000 and 1435 mm gauge (up to 18t axle load)
- Bogies for passenger coaches (up to 200 km/h speed)
- Motor bogies for EMUs and for DMUs (up to 160 km/h speed)
- Bogies for special vehicles



Manufacturing capacity

Spur and helical gears	Outside diameter (mm)	Module
External spur gear	1200	1-16
Internal spur gear	700	1-5
External helical gear	1200	1-16
External tooth grinding	1200	2-12

Bevel gears	Outside diameter (mm)	Module
Hypoid bevel gear	50-600	3,2-10
Cyclopalloid bevel gear	50-600	3,2-10
Hard cut after case	50-600	3,2-10
Face toothing	100-300	3,2-10

Worm wheel	180-630	2-8

Other parts	X (mm)	Y (mm)	Z (mm)
Shafts	Ø595		3000
Rotating parts	Ø595		1500
Cubic components	1500	1900	1300
Housings	1500	1900	1300

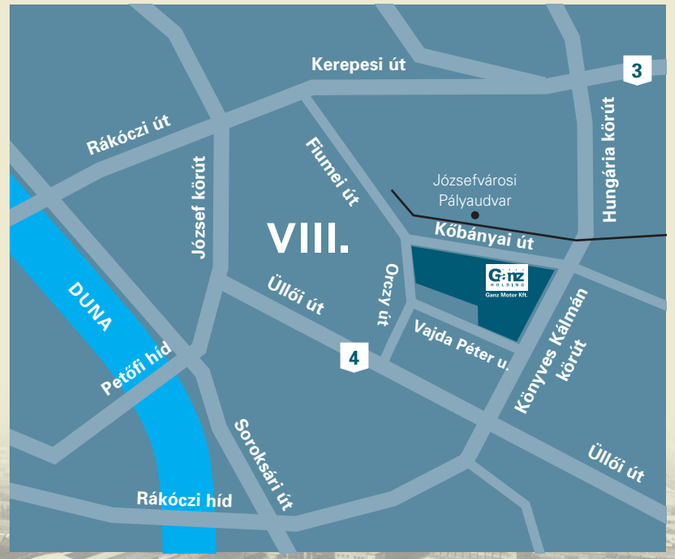
Technological processes
Heat treatment–case hardening, hardening, tempering and induction hardening.
Total metallurgical service.

Machine tools
Ganz Motor Kft. disposes of fully equiped machining and assembly shops: CNC turning machines, NC machining centres (vertical and horizontal), NC drilling machines, gear grinding machines, gear milling machines, bevel gear cutting machines, Klingelnberg cyclopalloid bevel gear machines, milling and drilling, keyway, plane, universal and internal grinding machines.



Company location





Certificates



Certificate

Standard: ISO 9001:2008

Certificate Registr. No.: 75 100 8514

TÜV Rheinland InterCert Kft. certifies:

Certificate Holder: Ganz Motor Kft.
Kőbányai út 21.
H - 1087 Budapest
Hungary

Scope: Design, development, manufacturing, modernisation, repair, site-maintenance of internal combustion engines, generating sets, transmissions, bogies. Manufacturing and repair of rolling stock.

An audit was performed. Proof has been furnished that the requirements according to ISO 9001:2008 are fulfilled.

Validity: The certificate is valid from 2009.12.31 until 2012.12.30.
First certification: 2003.

Budapest, 2009.12.22.

TÜV Rheinland InterCert Kft.
H-1132 Budapest, Váci út 48/a-b
www.tuv.hu

TGA-ZM-05-08-00

TÜVRheinland®
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Zertifikat

Überprüfung als Schweißbetrieb

Zertifikat Nr.: 01 202 HU/A-12 3357

Name und Anschrift des Herstellers: GANZ MOTOR Kft.
H-1087 Budapest, Kőbányai út 21.
Ungarn

Hiermit wird bescheinigt, dass der Hersteller die zu stellenden Qualitätsanforderungen für seine schweißtechnische Fertigung nachgewiesen hat.

Prüfgrundlage: DIN EN ISO 3834-2

Prüfbericht Nr.: E 122/0630/2012

Geltungsbereich: Herstellung von Stahlkonstruktionen, siehe Anlage

Fertigungsstätte: GANZ MOTOR Kft.
H-1039 Budapest, Vajda Péter u. 12.
Ungarn

Gültig bis: 08.05.2015

Budapest, den 10.05.2012

Dipl.-Ing. (FH) Gyula PALUSKA
Zertifizierer

TÜV Rheinland-Zertifizierungsstelle für Druckgeräte der TÜV Rheinland Industrie Service GmbH
Am Grauen Stein, D-51105 Köln

Auftragnehmer:
TÜV Rheinland InterCert Kft.
H-1132 Budapest, Váci út 48/a-b
tel.: +36 (1) 4611-100, fax: +36 (1) 4611-199
E-mail: tuvintherm@tuv.com, Internet: www.tuv.hu

F-LT 20-M_3_1

(2010-10-05-06)

www.tuv.hu

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Minősítőlap

A PAKSI ATOMERŐMŰ ZRT. IGAZOLJA, HOGY
KÖVETELMÉNYEINEK A

GANZ MOTOR Korlátolt Felelősségű Társaság

MINŐSÉGIRÁNYÍTÁSI RENDSZERE

MEGFELEL.

MINŐSÍTETT TERÜLET:

ABCIS 2 biztonsági osztályba sorolt gépész technológiai rendszerek és rendszerelemek átalakításával, javításával, karbantartásával összefüggően dízel generátor és segédrendszereire vonatkozóan tervezési, gyártási, szerelési, karbantartási, javítási, üzembe helyezési és a kapcsolódó szakértői tevékenység végzése.

A MINŐSÍTÉS ÉRVÉNYESSÉGI IDEJE: 2012.10.30.

A MINŐSÍTÉS SZÁMA: KM 69/2009

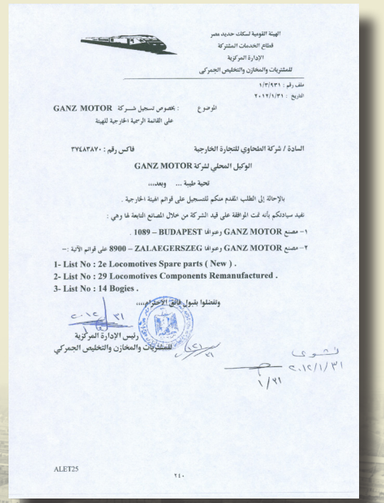
EZEN MINŐSÍTŐ LAP A MELLÉKLETTEL EGYÜTT ÉRVÉNYES.

Paks, 2009.10.30.

BAJSZ JÓZSEF
főosztályvezető

BUJTÁS GYULA
projektvezető

mvm paksi atomerőmű



GANZ MOTOR : الموضوع

GANZ MOTOR : الوكيل المحلي لشركة

1- List No : 2e Locomotives Spare parts (New) .
2- List No : 29 Locomotives Components Remanufactured .
3- List No : 14 Bogies .

ALET25

Ganz Motor Kft.

Registered seat: 1087 Budapest, Kőbányai út 21.
Office & factory: 1089 Budapest, Vajda Péter utca 12.
Postal address: 1475. Budapest, Pf. 263
Phone number: 36(1) 299-8500, 36(1) 299-8600
Telefax number: 36(1) 299-8552
e-mail: info@ganzmotor.hu
www.ganzmotor.hu