

MAINTENANCE STORIES
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"Fatti di Manutenzione"
Gardaland
Hotel Resort
& Giugno 2005



La Rosa dei Costi

Ing. Paolo Lotti
"Fatti di manutenzione" Gardaland 2005



GKN PLC

Automotive

- **Fondata nel 1759 come Guest, Keen and Nettlefolds**

- **Oltre 6.000 miliardi € di fatturato**

- **Operativi in oltre 24 Paesi**

Trasmissioni per automobili

Metallurgia

Utensili e macchine
meccaniche

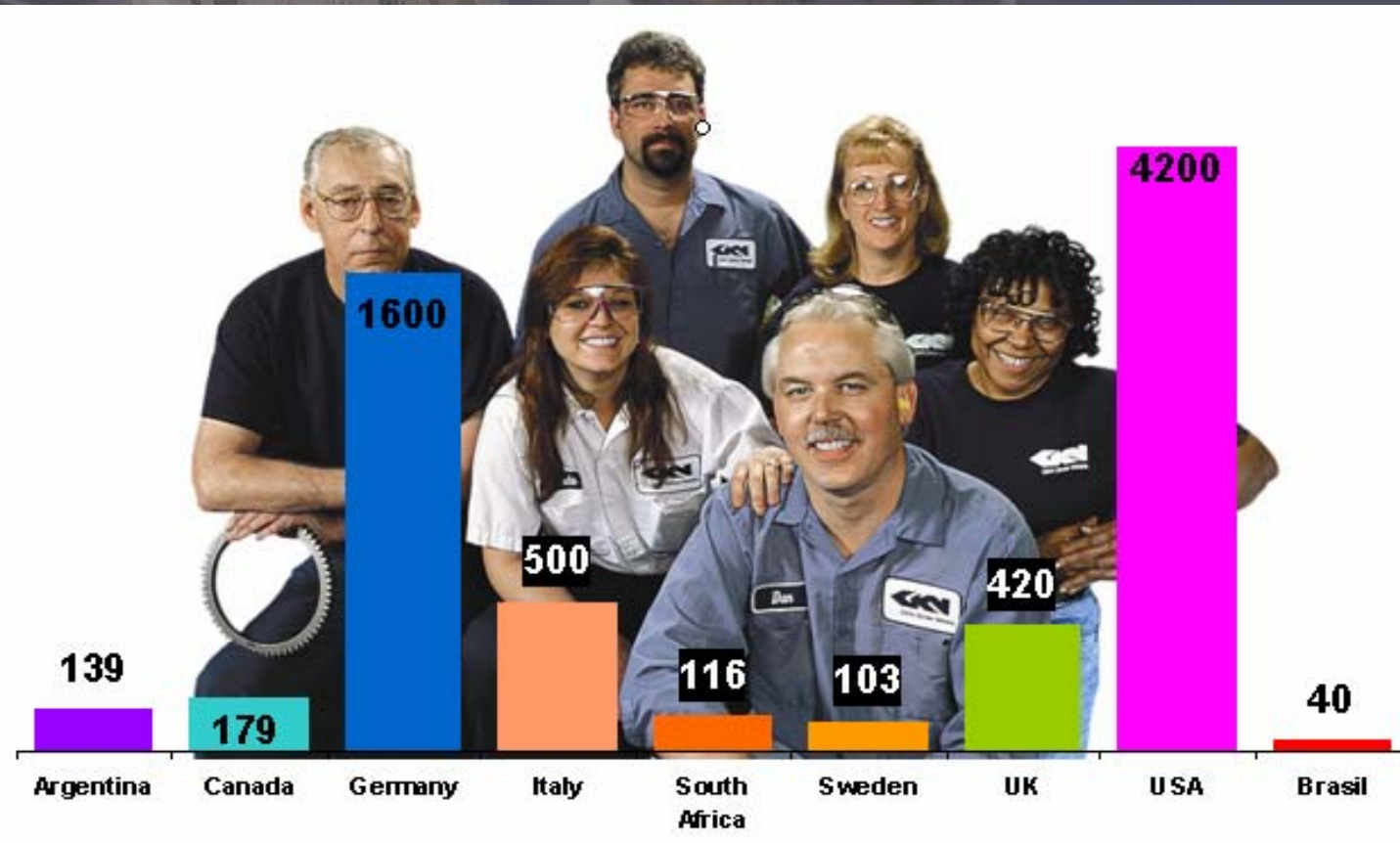
Aerospace

Strutture per elicotteri

Componenti elicotteri

- **Impiegando una forza lavoro di circa 40.000 persone**

GKN Sinter Metals



GKN Sinter Metals nel mondo



GKN Sinter Metals ***Stabilimento di Cernusco sul Naviglio***

- ***19 milioni € di fatturato***
- ***130 dipendenti***
- ***Particolari sagomati***



Progettazione



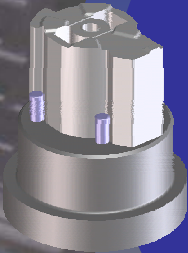
Miscelazione polveri



Sinterizzazione



Realizzazione attrezzo



Il ciclo produttivo di Sinterizzazione

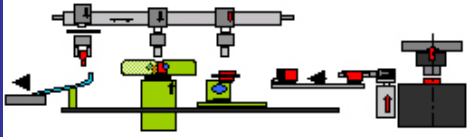


Manipolazione

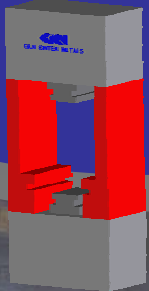
Ass. adattatore



Lavorazioni al verde



Formatura (Pressa)



Technologies and Applications

Sintered Structural Parts

Engine

- Pulleys
- Sprockets
- Cam/Bearing Caps
- Oil Pump Rotors

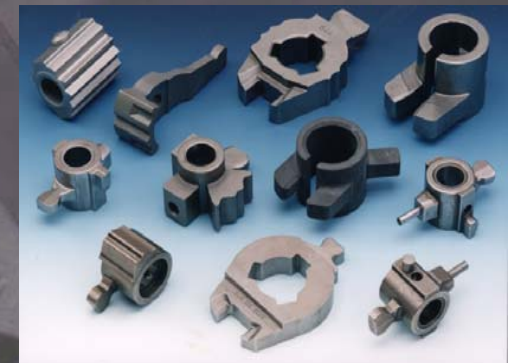


Technologies and Applications

Sintered Structural Parts

Manual Transmission

- Synchronizer Rings
- Synchronizer Hubs
- Sleeves
- Shift Fingers



Technologies and Applications

Sintered Structural Parts

Automatic Transmission

- *Carriers*
- *Clutch Races*
- *Turbine/
Shaft Hubs*
- *Thrust/
Pressure Plates*



Technologies and Applications

Sintered Structural Parts

Various Automotive

- *Mirror Bosses*
- *Shock Absorber Components*
- *Pump Components*
- *Power Steering Parts*



Technologies and Applications

Bearing Technology

Maintenance-free machine elements to suit most appropriate frictional/bearing requirements in any industrial applications





Engine

- Alternator pulleys, bearings
- Bearing caps
- Balance shaft mechanisms
- Bedplate inserts
- Belt and chain tensioner cams
- Bushings and Bearings
- Cam caps aluminum
- Camshaft adjuster
- Camshaft brackets
- Camshaft lobes
- Camshaft sensor rings
- Cam- and crankshaft chain sprockets
- Cam- and crankshaft gears
- Cam-and crankshaft pulleys
- Clutch races
- Cooling system Inserts
- Connecting rods
- Cylinder liners
- Distributor pole pieces and gears
- Engine management components
- Engine balance shaft
- Engine mounting inserts
- Exhaust manifold flanges
- Fuel injection pulley and sprocket
- Fuel pump components

- Gears
- Generator of pump
- Ignition gears
- Oil pump gears and rotors
- Pole pieces
- Pivots
- Piston cooling nozzle
- Restrictors
- Rocker arms, inserts, brackets
- Sensors rings for position control
- Spacers various
- Starter motor pinion gear
- Turbocharger thrust bearings
- Throttle cam
- Valve lifter guides
- Valve seats and rings
- Water pump impellers and inserts
- Water pump pulleys
- Water pump flanges

Miscellaneous

- Airbag mechanism parts and filter
- Air conditioner components (pulleys, hubs, bearings, rns, compressor cylinder and rotor)
- Bearings, various applications
- Cruise control inserts
- Door and sunroof hinges
- Electric motor cores, armatures, commutators (SMC)
- Emission control plate
- Fasteners
- Gears for locking, roof and door mechanisms

- Levers various
- Lock plates
- Rear view mirror mounts
- Twisting seat mechanism parts
- Speedometer gears and sensors
- Seat adjustment gears and levers
- Seat belt mechanism parts
- Side view mirror mechanisms
- Sunroof mechanisms
- Windscreen wiper drives
- Window winder mechanisms

Transmission

- Bushings
- Clutch hubs
- Clutch adjusting rings
- Clutch pressure plates
- Clutch releases and spring seats
- Clutch races (outer and inner)
- Converter turbine hub
- Detent levers
- Drive hubs
- Driveshaft balancers
- Gear levers and arms
- Gear plates
- Guide sleeves
- Lock-up components
- Lugs
- Oil pump gears
- Oil pump rotors and stators
- Oil pump gears
- Parking gears
- Planetary carrier, disc and assemblies
- Retainers
- Shift fork and levers
- Spacer various
- Stator plates
- Struts
- Synchronizer cones
- Synchronizer hubs
- Synchronizer rings (annealed and powder forged)
- Synchronizer sleeves
- Synchronizer sliding blocks
- Torque converter stator and thrust bearings
- Transmission shaft hubs
- Transfer case components
- Washers



Steering, Brake System, Suspension

- Power steering pump components (rotors, cams, spacers, seats, bearings, hubs vanes, rings, end plate)
- Column components (coupling gears, collar, lock inserts,)
- Steering (steering levers, bushings, rack guides, bearings, yokes)
- Brake ABS sensor ring
- Brake disk pad support
- Brake valve spacers and plates
- Brake pistons, nuts, gear drums, adjusters
- Shock absorber components (piston, rod guides, valve base, endplates)



GKN Sinter Metals

GKN Sinter Metals



Gli indici di manutenzione (UNI 10388)

Indici generali

Spesa di manutenzione/Fatturato
Spesa di manutenzione/Costo a nuovo degli impianti
Spesa di manutenzione/Costo di trasformazione
Spesa di manutenzione/Volume di produzione

Indice sulle politiche

Spesa di manutenzione ripartita per politiche (guasto, prev., pred.) globale e a livello impianto/macchina.
Tempo di manutenzione ripartita per politiche (guasto, prev., pred.), globale e a livello impianto/macchina.

Efficacia, efficienza , struttura

Tempo medio di risposta tra la richiesta di intervento e l'esecuzione.
Frazionamento dei tempi: tempo logistico, tempo di diagnosi, tempo di intervento, tempo di test.
Analisi ABC di magazzino
Etc.

Dati Tecnici di affidabilità sul componente

MTBM sul componente
MTBF sul componente
Frequenza di guasto sul componente
Criticità degli effetti di guasto

Grafico ad indici combinati

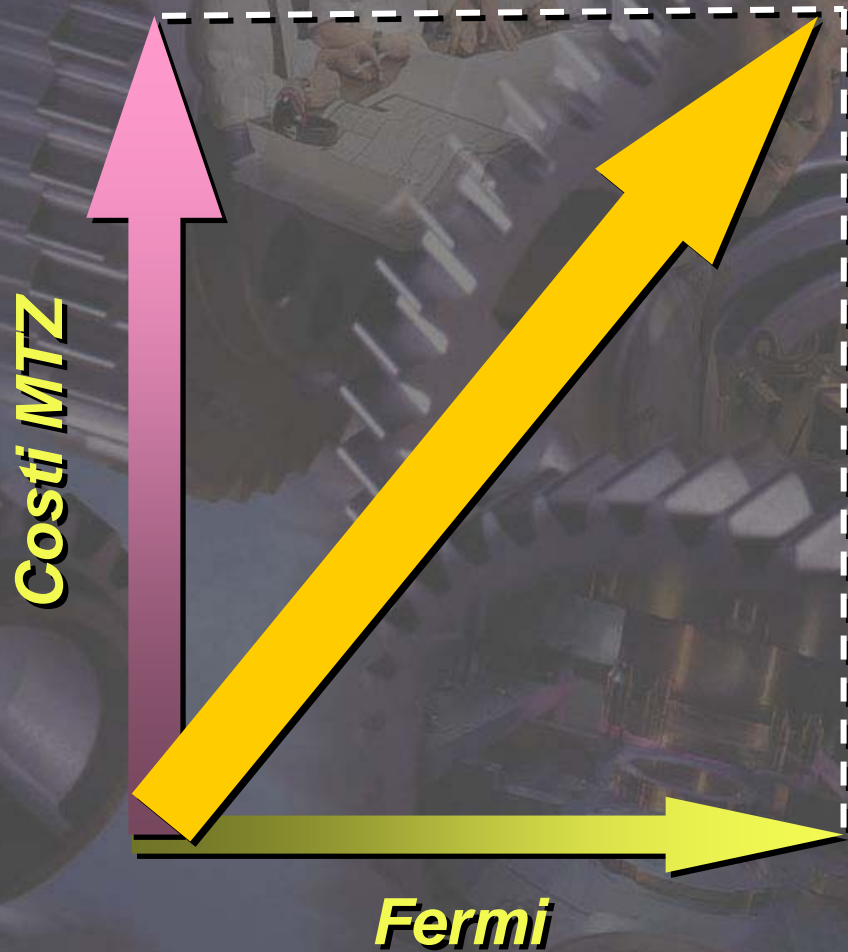
- *Fornisce informazioni utili per orientarsi nelle scelte delle politiche manutentive*
- *“Visualizza” la “rotta” della manutenzione*

Rosa dei costi

I Costi di MTZ



Grafico ad indici combinati



Rosa dei costi

La "Rosa dei Costi"

