GPC Retrofit

Grinding Process Control for Roll Grinding Machines

GPC 2 by KLEINKNECHT
## Roll Grinder Retrofit

**modular Retrofit in individual Phases**

<table>
<thead>
<tr>
<th>Phase</th>
<th>CNC / PLC</th>
<th>Switchgear incl. digital Servodrive Technology</th>
<th>AC/DC-Motors</th>
<th>Measuring Equipment</th>
<th>Mechanical Revamp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Phase 2</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Phase 3</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Phase 4</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Phase 5</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Phase n</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
Control System Configuration

OPERATION & MONITORING

HOST INTERFACE TO „ROLLSHOP MANAGEMENT“

OPERATOR PANEL 1

OPERATOR PANEL 2 (OPTION)

PRINTER

CONTROL SYSTEM

CNC

INTERFACE

- Ethernet
- Serial
- Parallel

PROFIBUS INTERFACE

COUNTER INTERFACE

DIGITAL AC AXLE DRIVE

PLC

SERIAL INTERFACE

PROFIBUS INTERFACE

DIGITAL I/O’s

ANALOG I/O’s

DIGITAL MAIN-SPINDLE-MODULE

DIGITAL MAIN DRIVE AC / DC DRIVE

MACHINE

DRIVES

EXTERNAL SYSTEMS (OPTION)

- ROUGHNESS MEASUREMENT
- HARDNESS MEASUREMENT
- CRACK CHECK DEVICE
- DATA PROCESSING

MACHINE-MEASUREMENT SYSTEMS

ANALOG SIGNALS

- DISC LOAD
- POTENTIOMETER

CONTROL & FIELD DEVICE

- LIMIT SWITCHES
- PRESSURE SWITCHES
- TEMPERATURE SWITCHES
- VALVES

(Ver. 15.04.2010)
GPC - System Advantages

- Industrial-PC with INTEL Processor

- Communication between the modular off-the-shelf Hardware via standard data transfer: Industrial Ethernet and Profibus-DP

- Latest Software Version for New- and Retrofit Machines

- Low Cost Components, extendable

- Operator-PC based on QNX or Windows

- High mechanical Strength, Operating Temperature +5°C to +45°C

- User-friendly Operation and Monitoring

- Tele-Service

- Worldwide Spare Part Service

- international approvals: EMV, EN, IEC, CE, FCC, UL and CSA
<table>
<thead>
<tr>
<th><strong>SIEMENS Rack PC 847 B</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Type</strong></th>
<th>SIEMENS 19&quot;-Industrial PC 4 height units, IP 41 (Front)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
<td>INTEL Celeron 1,86 GHz</td>
</tr>
<tr>
<td><strong>Main Memory</strong></td>
<td>512MB DDR SDRAM 5G shock resistant</td>
</tr>
<tr>
<td><strong>Disc Drives</strong></td>
<td>hard disk SATA 80 GB CF-memory card DVD-ROM MO-drive 640</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>COM1(TTY), COM2, LPT1, VGA, PROFIBUS-DP (12Mbit/s)</td>
</tr>
<tr>
<td><strong>CNC - Kernel</strong></td>
<td>Real Time GP-Applications CNC as Technology Master</td>
</tr>
<tr>
<td><strong>Safety approvals</strong></td>
<td>EN 60950 UL 60950 und cUL 60950 WEEE / RoHS</td>
</tr>
<tr>
<td><strong>Ambient temp.</strong></td>
<td>5 bis 50°C full Power</td>
</tr>
</tbody>
</table>
GPC - System Components

CNC SIMATIC PC 847
SIEMENS Panel PC 677 B

- **Main Board**: SIEMENS Mobile All-in-one-Board
- **Processor**: INTEL Celeron 1.5GHz
- **Main Memory**: 512MB SDRAM (extendable up to 2MB)
- **Disc Drives**: HDD SATA: > 40GB
  - DVD-ROM
  - 1,44MB FDD option
- **Graphic (AGP)**: Onboard Graphic
- **Interfaces**: 2 Ethernet onboard
  - USB and V24
  - Profibus DP
- **Power Supply**: 85 - 264V AC
- **Operating System**: QNX or Windows
- **Display**: 15" TFT (optional Touch Screen)
- **Safety approvals**: UL for USA and Canada
  - EN 61000-6/4
  - DIN ISO 9001
  - EMV and EGB
GPC - System Components

Panel PC 677

Industrial Ethernet

CNC SIMATIC PC 847
GPC - System Components

S7/S5-CPU

- compact and modular design
- low cost modules
- standard interface to GPC-System
- PLC as profibus-coordinator

PLC: SIMATIC S7/S5-CPU with Profibus-DP Interface
GPC - System Components

Panel PC 677

Industrial Ethernet

CNC SIMATIC Rack PC 847

Profibus-DP

S7/S5-CPU
Grinding wheel, headstock and axis-drives

Digital Drive Interface
- digital drive technology 1FT6/1FT7 and Simoreg
- Profibus-DP interface to GPC-System
- axle positioning via motor encoder
  alternatively (dependant on customer requirements):

Analog Drive Interface
- analog drive technology 1FT5 and Simovert
- cable link to GPC-System
- axle positioning via existence measurement systems
GPC - System Components

Panel PC 677

CNC SIMATIC Rack PC 847

Industrial Ethernet

Profibus-DP

S7/S5-CPU

Digital/Analog Drive Interface

Profibus-DP
GPC - System Components

Panel PC 677
Industrial Ethernet
CNC SIMATIC Rack PC 847
Profibus-DP

S7/S5-CPU
Digital/Analog Drive Interface
Profibus-DP

PC - Counter Interface
Heidenhain IK220
GPC - System Components

- Panel PC 677
- S7/S5-CPU
- CNC SIMATIC Rack PC 847
- PC - Counter Interface Heidenhain IK220
- Digital/Analog Drive Interface

Connections:
- Industrial Ethernet
- Profibus-DP
The History of Kleinknecht Roll Grinding Experience:

1946 – 1984 = approx. 800 Grinding Control Systems (incl. retrofits)

1984 – to date = over 250 CNC based Grinding Control Systems, i.e.

<table>
<thead>
<tr>
<th>CNC based Machines</th>
<th>No. of Systems</th>
<th>End-Customer</th>
<th>CNC-Type</th>
<th>Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll Grinding Machine</td>
<td>(78 systems)</td>
<td>worldwide</td>
<td>GPC 1</td>
<td>1994 – 1999</td>
</tr>
<tr>
<td>Roll Grinding Machine</td>
<td>(95 systems)</td>
<td>worldwide</td>
<td>GPC 2</td>
<td>1999 – to date</td>
</tr>
</tbody>
</table>

In Total = 256 Roll Grinding Control Systems based on CNC (to date)

46 of which have been retrofits with GPC2