Siemens Mechanical Drives, Leeds

- The Mechanical Drives business has been in the UK since 1969
- 1969 Flender established in UK in Morley, Leeds
- 1971 Flender moved to Thornbury, Bradford
- 2005 Siemens acquired Flender
- 2010 Siemens Mechanical Drives moves to Navigation Park,
- 2014 Re-structure to meet market needs – LD GM formed
Geared Motors HQ - Tübingen

Founded 1879 (Himmelwerk)
Former Flender Tübingen was renamed to Siemens Geared Motors in Nov. 2007

Employees 530
+ 52 apprentices

Certification DIN EN ISO 9001

Assembly centers worldwide available

Factory Tübingen:
Area size utilized 70,771 m²
(buildings 31,165 m²)

Production volume about 150,000 geared motors per year
Siemens Low Voltage Motors

Mechanical Drives
Industry Sector
Siemens IEC Standard Motors

**SIMOTICS®**

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Mechanical Drives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Siemens IEC Standard Motors</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Low-voltage motors** for line and converter operation

- **GP**
- **SD**
- **XP**
- **DP**
- **FD**
- **TN**
- **HT**
- **S**
- **M**
- **L**
- **T**
- **DC**
- **HV**

- **Direct Current**
- **High Voltage**

**Motors for motion control applications**

- **FD**
- **TN**

**DC motors**

**High-voltage motors**

**General Purpose**

**Severe Duty**

**Explosion protected**

**Definite Purpose**

**Flexible Duty**

**Trans-standard**

**High Torque**

**Servo**

**Main**

**Linear**

**Torque**

**Direct Current**

**High Voltage**

**SIMOTICS GP**

**SIMOTICS SD**

**1LE1 motors optimized for line operation (DOL)**

**1LE1.9 converter optimized motors (VSD)**

**SIMOTICS GP VSD 10 Line**

**SIMOTICS SD VSD10 Line**

**Power rating in kW**

- **0.55**
- **2.2**
- **15**
- **200**

*SH: Basis 4-pole*
Siemens Couplings

Mechanical Drives
Industry Sector
## Flender Standard Couplings

<table>
<thead>
<tr>
<th>Industry Sector</th>
<th>Mechanical Drives</th>
<th>Couplings for special applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall torque range</td>
<td>10 ... 10,000,000 Nm</td>
<td>Couplings for railway vehicle</td>
</tr>
<tr>
<td>Standard size range</td>
<td>48 ... 2800 mm</td>
<td>High performance couplings</td>
</tr>
<tr>
<td><strong>Hydrodynamic couplings</strong></td>
<td></td>
<td>Couplings for wind turbines</td>
</tr>
<tr>
<td>FLUDEX Fluid coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Torsionally rigid couplings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ARPEX All steel disc coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ZAPEX Gear Coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Elastomeric couplings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexible coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-EUPEX Claw coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIPEX Jaw coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RUPEX Pin &amp; bush coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Couplings for special applications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELPEX Rubber coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELPEX-B Rubber tire coupling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELPEX-S Rubber disc coupling</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Flender Standard Couplings**

- FLUDEX: Fluid coupling
- ARPEX: All steel disc coupling
- ZAPEX: Gear Coupling
- Flexible coupling
- N-EUPEX: Claw coupling
- BIPEX: Jaw coupling
- RUPEX: Pin & bush coupling
- ELPEX: Rubber coupling
- ELPEX-B: Rubber tire coupling
- ELPEX-S: Rubber disc coupling

**Overall torque range:** 10 ... 10,000,000 Nm

**Standard size range:** 48 ... 2800 mm

**Industry Sector:** Mechanical Drives

**Couplings for special applications:**
- Couplings for railway vehicle
- High performance couplings
- Couplings for wind turbines
S.I.G - Siemens Industrial Gear

Mechanical Drives
Industry Sector
FLENDER SIG offers you the complete range of horizontal design types right now: there is a choice of seven design types in numerous sizes for base or shaft mounting. The portfolio comprises single- to four-stage helical gear units and bevel-helical gear units as two-, three-, and four-stage variants.
Typical applications

- Conveyor drives
- Hoisting gear drives for cranes
- Water screw drives
- Bucket elevator drives
- Paper machine drives
- Fan drives
- Pump drives
- Compressor drives
SIP - Siemens Industrial Planetary

Mechanical Drives
Industry Sector
S.I.P

**FLENDER SIP**
- 10,000 to 80,000 Nm,
- Solid Shaft
- Hollow shaft with a shrink disk
- Hollow shaft multi-spline profile.
- Flanged shaft,
- Taconite seals
Examples of typical applications

- Apron feeders
- Shredders
- Mixers
- Filtration technology
- Reactors
- Traveling gears
- Water treatment
SIMOGEAR Geared motors
## New Geared Motor Range SIMOGEAR

### Torque class T2N

<table>
<thead>
<tr>
<th>Nm</th>
<th>25</th>
<th>50</th>
<th>100</th>
<th>200</th>
<th>300</th>
<th>500</th>
<th>750</th>
<th>1000</th>
<th>2000</th>
<th>3000</th>
<th>5000</th>
<th>8000</th>
<th>10000</th>
<th>13000</th>
<th>20000</th>
<th>35000</th>
<th>50000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>postponed until further notice</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

### Helical gearbox

2-/3-stage

- D/Z19: 90 Nm
- D/Z29: 140 Nm
- D/Z39: 200 Nm
- D/Z49: 320 Nm
- D/Z59: 450 Nm
- D/Z69: 600 Nm
- D/Z79: 840 Nm
- D/Z89: 1680 Nm
- D/Z109: 3100 Nm
- D/Z129: 5000 Nm
- D/Z149: 8000 Nm
- D/Z169: 13000 Nm
- D/Z189: 19000 Nm

### Parallel shaft gearbox

2-/3-stage

- F29: 150 Nm
- F39: 290 Nm
- F49: 480 Nm
- F69: 600 Nm
- F79: 1000 Nm
- F89: 1850 Nm
- F109: 3100 Nm
- F129: 4500 Nm
- F149: 8100 Nm
- F169: 13000 Nm
- F189: 18500 Nm

### Bevel helical gearbox

2-stage

- B19: 50 Nm
- B29: 110 Nm
- B39: 250 Nm
- B49: 450 Nm

3-stage

- K39: 220 Nm
- K49: 420 Nm
- K69: 600 Nm
- K79: 820 Nm
- K89: 1600 Nm
- K109: 2900 Nm
- K129: 4700 Nm
- K149: 8000 Nm
- K169: 13500 Nm
- K189: 19500 Nm

### Helical worm gearbox

2-stage

- C29: 100 Nm
- C39: 225 Nm
- C49: 400 Nm
- C69: 700 Nm
- C89: 1600 Nm

1-stage

- S09
- S19
- S29

### Prioritization on Drive Train topics

- Phase 1: HMI 2014
- Phase 2a: SPS 2014
- Phase 2b: HMI 2015
- Phase 2c: SPS 2015
## Siemens Geared Motors – Portfolio Overview

<table>
<thead>
<tr>
<th>Gear Unit Size</th>
<th>Inline Geared Motor</th>
<th>Flange Mounted Geared Motor</th>
<th>Helical Bevel 2-stage</th>
<th>Helical Bevel 3-stage</th>
<th>Worm Geared Motor 2-stage</th>
<th>Worm Geared Motor 1-stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of contraction sizes</td>
<td>E39…E149 (1-stage) Z19…Z189 (2-stage) D19…D189 (3-stage)</td>
<td>FZ29…FZ229 (2-stage) FD29…FD229 (3-stage)</td>
<td>B19…B49 (2-stage)</td>
<td>K39…K229 (3-stage)</td>
<td>C29…C89 (2-stage)</td>
<td>S09…S29 (1 – stage)</td>
</tr>
<tr>
<td>Torque range [Nm]</td>
<td>90…20.000</td>
<td>150…50.000</td>
<td>50…450</td>
<td>220…50.000</td>
<td>100…1600</td>
<td>18…80</td>
</tr>
<tr>
<td>Ratio Range</td>
<td>1.1…10 (1-stage)</td>
<td>3.57...60.21 (2-stage)</td>
<td>3.47...59.28 (2-stage)</td>
<td>5.17...244 (3-stage)</td>
<td>10..290 (2-stage)</td>
<td>5…100 (1-stage)</td>
</tr>
<tr>
<td>max. Motor Power [kW]</td>
<td>200</td>
<td>200</td>
<td>7.5</td>
<td>200</td>
<td>15</td>
<td>0.75</td>
</tr>
</tbody>
</table>

---

**Mechanical Drives**

Alex Broadley

Industry Sector
## 2-stage Bevel Helical Geared Motors (B series)

- Aluminum Housing
- Less weight
- Corrosion resistant
- Higher efficiency
- Less noise
- Cost effective

Expansion of torque range enables 95% coverage of applications.

<table>
<thead>
<tr>
<th></th>
<th>B29</th>
<th>B39</th>
<th>B49</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Torque $T_2$ [Nm]</td>
<td>73 – 110</td>
<td>200 – 250</td>
<td>290 - 450</td>
</tr>
<tr>
<td>Ø Hollow Shaft</td>
<td><strong>20/25 mm</strong></td>
<td><strong>30/35/40 mm</strong></td>
<td><strong>35/40 mm</strong></td>
</tr>
<tr>
<td>Shrink Disc / Feather Key</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Motor adapters – K4 – Shortadapter

### Technical features

| Adapter sizes | 8 sizes with IEC 63, 71, 80, 90, 100, 112, 132 and 160 |
| Purpose        | Universal and easy-to-mount standard solution for mounting IEC standard motors (flange IEC B5) |
| Characteristics| Short, less expensive |

### Technical features

Coupled With other features such as the Eco Fast connector and Simoloc system availability, reduced downtime and site standardisation are the key advantages.

![Diagram](image1.png)

- Harting Plug Connector
- Simoloc Fast Shaft Mount

---

**Mechanical Drives**

Alex Broadley

Industry Sector
Interchangeable Mechanical Interface

The Mechanical interface is a direct fit to SEW

<table>
<thead>
<tr>
<th>Design</th>
<th>SIMOGEAR FDZ109</th>
<th>MOTOX FDZ108</th>
<th>SEW F87</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaft mounting</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Flange</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Feet</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Centering</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Material GG25</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Shaft distance</td>
<td>252.5</td>
<td>280</td>
<td>246.7</td>
</tr>
</tbody>
</table>

Two-stage unit

<table>
<thead>
<tr>
<th>Nominal torque</th>
<th>3100</th>
<th>3400</th>
<th>3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio i min</td>
<td>4.77</td>
<td>5.68</td>
<td>4.12</td>
</tr>
<tr>
<td>Ratio i max</td>
<td>70.74</td>
<td>64.21</td>
<td>33.92</td>
</tr>
</tbody>
</table>

Three-stage unit

<table>
<thead>
<tr>
<th>Nominal torque</th>
<th>3100</th>
<th>3400</th>
<th>3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio i min</td>
<td>55.31</td>
<td>48.24</td>
<td>29.20</td>
</tr>
<tr>
<td>Ratio i max</td>
<td>410.0</td>
<td>424.5</td>
<td>270.7</td>
</tr>
</tbody>
</table>

Dimensions

<table>
<thead>
<tr>
<th>Feet bores</th>
<th>310 x 165</th>
<th>310 x 165</th>
<th>310 x 165</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange diameter</td>
<td>350</td>
<td>350</td>
<td>350</td>
</tr>
<tr>
<td>Housing flange</td>
<td>C245</td>
<td>C245</td>
<td>C215</td>
</tr>
<tr>
<td>Solid shaft metric</td>
<td>V60</td>
<td>V60/V80</td>
<td>V60</td>
</tr>
<tr>
<td>Hollow shaft metric</td>
<td>H60</td>
<td>H60/H70</td>
<td>H60</td>
</tr>
<tr>
<td>Hollow shaft shrink</td>
<td>HS65</td>
<td>HS65/H70</td>
<td>HS65</td>
</tr>
<tr>
<td>Hollow shaft splined</td>
<td>N65</td>
<td>N70</td>
<td>N65</td>
</tr>
<tr>
<td>Housing heigh</td>
<td>568</td>
<td>573</td>
<td>531</td>
</tr>
<tr>
<td>Distance to D</td>
<td>346</td>
<td>346</td>
<td>346</td>
</tr>
</tbody>
</table>
SIMOGEAR Geared motors
G110M
Overview Power Module

- **2 Frame Sizes**
  Frame Size A = 0.37kW; 0.55kW; 0.75kW; 1.1kW; 1.5kW
  Frame Size B = 2.2kW; 3.0kW; 4.0kW

- **Mains**
  (3AC 380 \(-10\% \ldots 500 \,-10\%\))

- **High Overload Capability**
  (200% for 3s or 150% for 57s at a 300s cycle)

- **“Easy to use“**
  integrated potentiometer (max. speed)
  USB interface (Commissioning via Starter/Start Drive)
  optical interface (Connection of IOP)

- **Easy Diagnosis**
  (local LEDs for „ready“, „bus fault“, „system fault“)

- **Cooling**
  (by motor fan / Derating at reduced motor speeds)
### SINAMICS G110M vs SEW MOVIMOT D

#### Compact (integrated communication-same height)
- **Safety integrated** (STO) without additional costs or additional external components
- **I/O**'s by M12 connectors without additional costs
- **PROFINET** and Profibus DP at identical price level
- **Basic PLC functionality** without additional costs (logical function blocks, BiCo technology, etc.)
- **USB interface** on top of inverter (for commissioning tool Starter/Start Drive)
- **Fast exchange** of defective Power Modules (drive data stored within control unit)

#### Big (communication by external modules)
- **SafeTorqOff** at extra costs (approx. 50 EUR list price) + additional external, fail safe 24VDC supply (e.g. Pnoz) required
- **I/O**'s by M12 connectors at extra costs (approx. 70 EUR list price)
- **PROFINET** more expensive than Profibus DP
- **No intelligence** of basic unit (programmable „IPOS“ at extra costs – approx. 100 EUR list price)
- **Additional Hardware** (e.g. USB 11A) needed for interconnection of Engineering PC/PG and inverter
- **Replacement** of defective power modules time intensive (drive data stored within power module, DIP switches need to be adjusted according to defective power module)
There’s more to it

Siemens INTEGRATED DRIVE SYSTEMS
What is I.D.S

### Horizontal
Functional, mechanical and energy-efficient integration of the drive train – motor, gear unit, coupling, and converter – along the power flow

You can boost the availability of your application or plant to up to 99%.

*E.g., Compressor application*

### Vertical
Integration of the drive train and controller up to MES IT, along the information flow, engineering based on Totally Integrated Automation (TIA)

With TIA Portal you can cut your engineering time by up to 30%.

### Lifecycle
Supplementing the drive system with service and software that support the entire lifecycle, especially design and operation

With Integrated Drive Technologies you can reduce your maintenance costs by up to 15%.
With **SIMOGEAR** we are continuing with the TIA pyramid in conveyor technology

**Most comprehensive portfolio**
from the geared motor through motor starter and converter, identification systems and switchgear up to the automation

**Standard, tailored and modular**
components, systems and services

- Lower assembly and commissioning costs
- Increased flexibility and system availability

**Mechanical Drives**

Alex Broadley

Industry Sector
Thank you for your attention!

Alex Broadley
Product Manager Geared Motors

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E-Mail: alex.broadley@siemens.com