Vibration Mitigation Solutions for Power Generation with Sylomer® and Sylodyn®

For more than 40 years Getzner offers solutions for vibration isolation for power, iron & steel, mineral processing and cement industry.
Getzner Werkstoffe provides elastic solutions for the following industrial equipment

- Turbines:
  - gas turbines, turbines for combined cycle power plants, hydro power turbines
- Mills and crushers:
  - PCI mills, ball mills, vertical roller mills (VRM), hammer mills, ring granulators
- Fans and blowers
- Boiler feed pumps
- Compressors
- Chillers & AHUs

Services provided by Getzner Werkstoffe

- Development of customer-specific vibration isolation solutions:
  - development of complete isolation systems
  - selection of appropriate Sylomer®/Sylodyn® material
  - design of superstructures (concrete foundation decks) in cooperation with external engineering consultants
- Supply of materials
- Installation supervision

Production and engineering are both located in Bürs/Austria.

Example of elastic bearing of boiler feed pump foundation

<table>
<thead>
<tr>
<th>Mass inertia moment</th>
<th>Natural frequencies</th>
<th>Isolation values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction</td>
<td>Inertia of mass</td>
<td>Direction</td>
</tr>
<tr>
<td>lxx</td>
<td>4349478 kgm²</td>
<td>tz</td>
</tr>
<tr>
<td>lyy</td>
<td>1639716 kgm²</td>
<td>fzz</td>
</tr>
<tr>
<td>lzz</td>
<td>4970879 kgm²</td>
<td>fxx</td>
</tr>
<tr>
<td>fxc</td>
<td>20.6 Hz</td>
<td></td>
</tr>
<tr>
<td>fyx</td>
<td>15.5 Hz</td>
<td></td>
</tr>
<tr>
<td>fyv</td>
<td>23.4 Hz</td>
<td></td>
</tr>
</tbody>
</table>

Inertia of mass, of all optional forces and masses, referring to the origin.

Given natural frequencies occur when using above mentioned bearing materials. tz describes the natural frequency in vertical direction, fxx the rotary natural frequency around the vertical axis and fyy, fyy the sweep frequencies around an upper (fxx, fyy) and lower (fyy, fxx) centre of rotation. In this calculation the influence of the subgrade was not taken into consideration.

Given insulation values are only valid for a one-mass-spring system. This means that the machine and foundation are assumed as stiff masses.
Sylomer® and Sylodyn® solutions - High efficiency in vibration isolation combined with low implementation costs

**Easy and fast installation**
- No special equipment or staff training required
- Damping properties already included in Sylomer®/Sylodyn® - therefore no need for additional dampers like visco dampers
- Concrete can be directly poured on Sylomer®/Sylodyn® isolation layer

**Adaption to various constructions methods**
- Isolation layer can be provided in 3 configurations depending on the construction method
  - Full surface bearing
  - Strip bearing
  - Point bearing
- System can be designed for in-situ concrete construction and for construction with pre-fabricated elements

**No requirements for special foundation design**
- No maintenance for the elastic layer needed
- Simple and cost-effective slab design
- Significant cost reductions especially for deep seated foundations

**Deep-seated foundation**
- with full surface bearing

**Elevated foundation**
- with point bearing
- with strip bearing
Vibration mitigation solutions by Getzner are made out of microcellular polyurethanes. Both Sylomer® and Sylodyn® materials are designed to achieve maximum isolation values at moderate implementation costs.

**Sylomer®** - Excellent elasticity and durability

*Material characteristics*
- Mixed cell construction
- Static range of use 0.011 N/mm² to 1.2 N/mm²
- Load peaks to 6.0 N/mm²
- Insignificant amplitude dependence
- Proven long-term performance
- Fatigue strength
- Optimized range of products (10 standard types) to cover the needs of calculations for systems
- Customer-specific adjustments are possible

**Sylodyn®** - Outstanding dynamic load bearing capacity

*Material characteristics*
- Closed cell construction
- Permanent static load for standard product types from 0.075 N/mm² to 1.5 N/mm², special types to 2.5 N/mm² (N80 - 1030, for specific projects)
- Load peaks to 8 N/mm²
- Insignificant amplitude dependence
- Minimal tendency to creep
- Stiffening factor from $\kappa (C_{\text{dyn}}/C_{\text{stat}})$ 1.15-1.40
- Proven long-term performance
- Fatigue strength
- Optimized range of products (5 standard types) to cover the needs of calculations for systems
- Customer-specific adjustments are possible

References
- Kahoku Shimpo, Sendai, Japan, rotary printing press
- Ccpp Deir Ali, Syria, gas- and steam turbine foundations
- Ccpp Melach, Austria, boiler feed pump foundation
- Hydro power plant, Kempten, Germany, turbine set
- Ccpp Ciclo del Norte, Mexico, gas-turbine foundation
- Ccpp Karstrø, Norway, gas-turbine foundation
- Essar Power, Salaya and Mahan TPP, India, boiler feed pump and seal air fan foundations

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