



Best Practice	COUPLING REPLACEMENT	PUMP-05															
Application	Optimisation of Pumping Systems																
SME sector	Industrial																
SME Sub-sector	All																
Technical description	In some electric drives, there is a coupling, transmission, or gear between motor and driven component. In the case of pumps, direct coupling is usually the rule. When there is a transmission, when there is a coupling, losses and maintenance costs can be significant.																
Recommendation for optimisation	A coupling is never ideal. There are always some losses, and they can be very significant. In some cases, typically when the speed is very low and/or the torque very high, a coupling through a gear is unavoidable. If belts are necessary, to make the system more compact (limited space), flat belt must be preferred.																
Relevant technical considerations	<p>Additional criteria when choosing a coupling</p> <table> <tr> <th>Criteria</th><th>V-belt</th><th>Flat belt</th></tr> <tr> <td>Linear speed max. [m/s]</td><td>40</td><td>100</td></tr> <tr> <td>Rotating speed max. [rpm]</td><td>10000</td><td>100000</td></tr> <tr> <td>Pulley life span [h]</td><td>15000 (small) 45000 (large)</td><td>150000 (small) 150000 (large)</td></tr> <tr> <td>Operating cost</td><td>relatively high</td><td>cost-effective</td></tr> </table>		Criteria	V-belt	Flat belt	Linear speed max. [m/s]	40	100	Rotating speed max. [rpm]	10000	100000	Pulley life span [h]	15000 (small) 45000 (large)	150000 (small) 150000 (large)	Operating cost	relatively high	cost-effective
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Schemes and diagrams	<p>The difference between V-belt and flat-belt for different load cases and different size</p> <p>Efficiency comparison: V-belt vs. flat belt (source: Habasit AG)</p>																



Economics	The following table gives a qualitative indication of the costs:		
	Criteria	V-belt	Flat belt
	Investment cost	cost-effective	medium
	Operating cost	relatively high	cost-effective
Energy savings	The following table gives a qualitative indication of energy savings:		
	Criteria	V-belt	Flat belt
	Energy efficiency	Medium (when new), deteriorates over time	High over time
Economic savings	High for flat belts Medium for V-belts		
Average Payback Time	3 years		
Emissions	This measure does not involve any additional emissions.		
Environmental benefits	Reduced CO <sub>2</sub> emissions for a reduction in electricity needs.		
Main NEBs (Multiple benefits)	<input checked="" type="checkbox"/> Environmental benefits <input type="checkbox"/> Increased productivity <input type="checkbox"/> Work environment/Health/Safety <input type="checkbox"/> Increased competitiveness <input type="checkbox"/> Maintenance		
Replicability	Medium		
Related measures	<ul style="list-style-type: none"> <li>• <b>PUMP-01:</b> Reduction of running time for pumps - Switch off motors when not needed</li> <li>• <b>PUMP-02:</b> Adapt the offer to real needs</li> <li>• <b>PUMP-03:</b> Optimised control of pumps</li> <li>• <b>PUMP-04:</b> Motor replacement</li> <li>• <b>PUMP-06:</b> Pump replacement</li> </ul>		
References	Habasit AG		

This Best Practice was developed by the Impawatt Project (GA No. 785041) and adapted for the GEAR@SME Project (GA No. 894356)