

# SKF



**Wind Turbine Reliability  
Workshop  
Yaw & Pitch System  
Lubrication  
October 3-4, 2006**

## Wind Energy Stations On-Shore



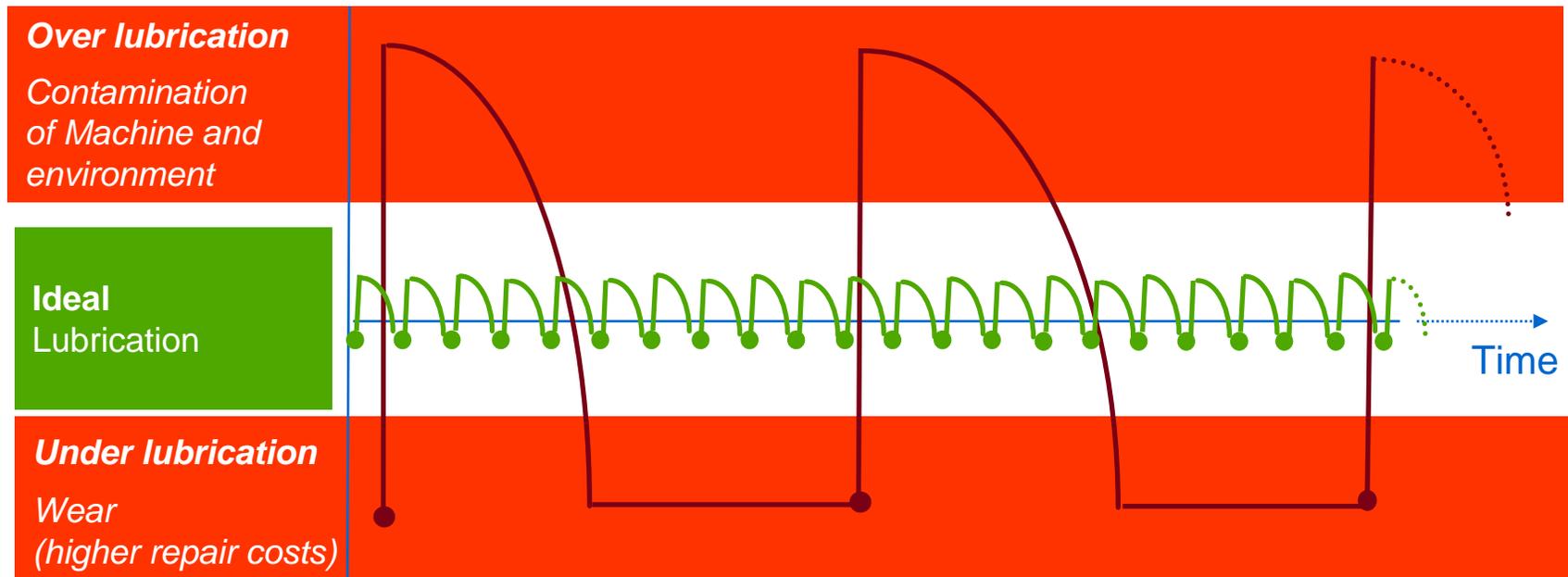
# WINDLUB



## Wind Park Off-Shore



# Automatic vs. Manual Lubrication



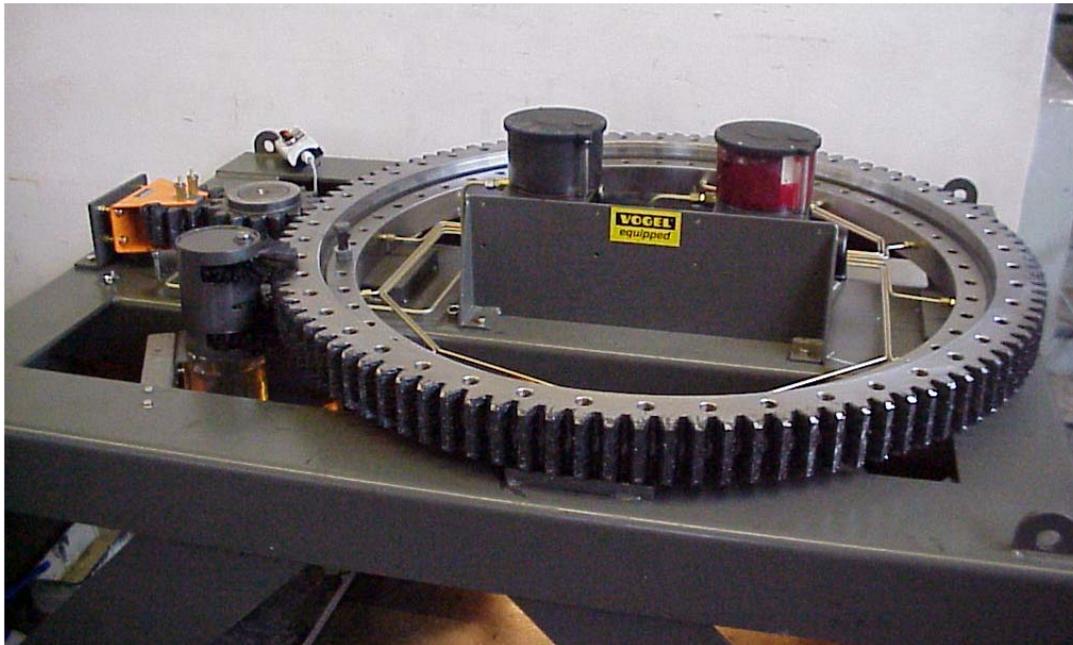
● Manual Lubrication      ● Automatic Lubrication System



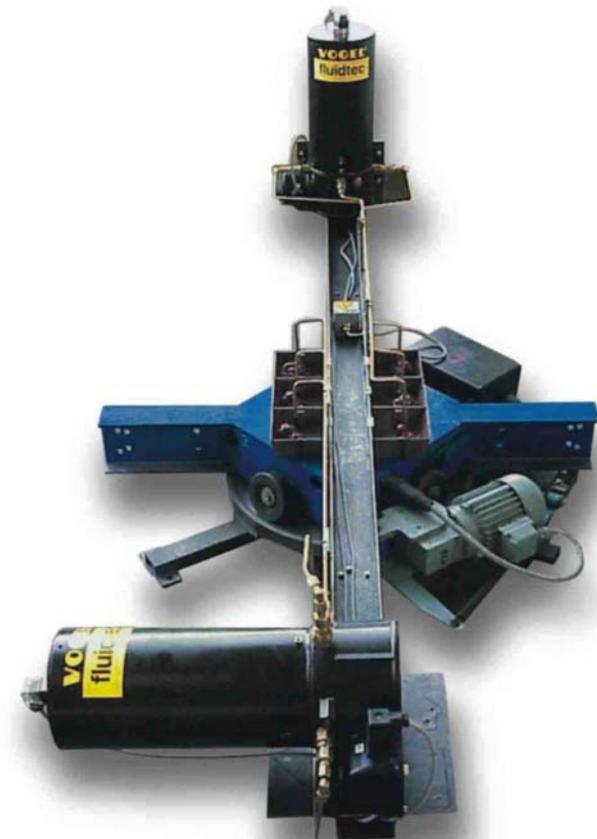
# WINDLUB



## Vogel Research & Development



Azimuth drive simulation stand



Pump rotation stand

# Lubrication Systems Windlub® For Bearings And Gears



# Lubrication Systems Windlub® Pumps



6kg Standard



2kg Standard

4kg



new! 20kg



For rotating operation



## Quick Change Reservoir for Easy Servicing

### System benefits:

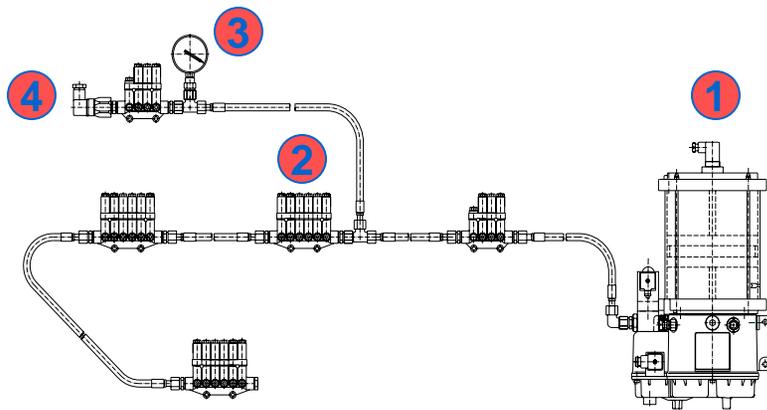
- Quick and easy filling of the reservoir, even outside the wind energy station
- Quick and easy change of the reservoir at the pump
- reusable quick change reservoir
- upgrade of all KFG grease pump with the quick change system



# Single-Line Lubrication Systems Windlub<sup>®</sup>, For Bearings



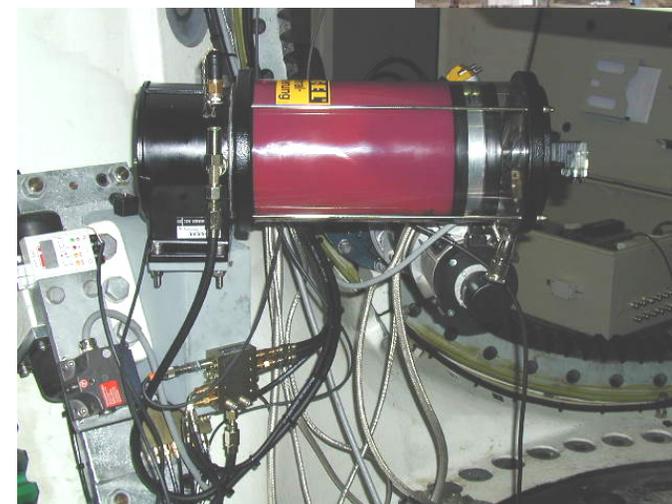
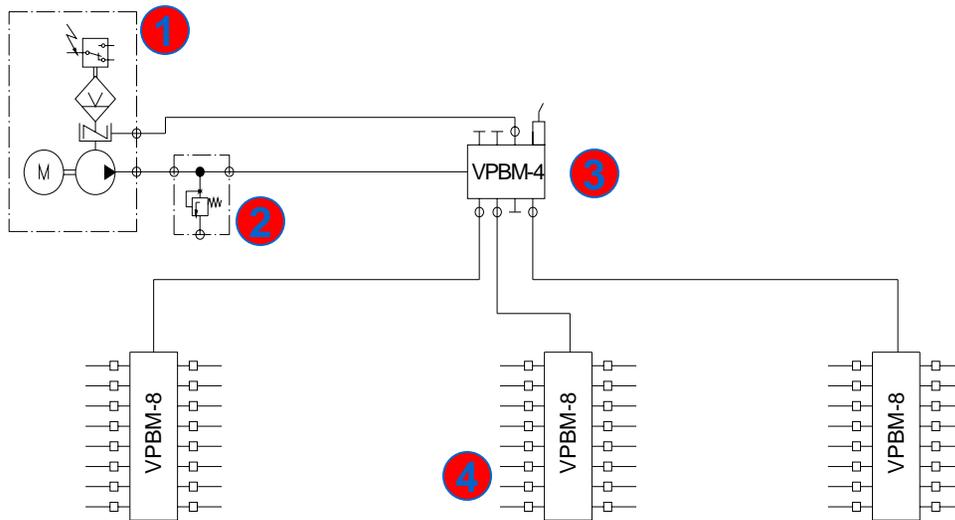
- 1 KFG-pump for rotating operation with integrated relief valve
- 2 Distributor
- 3 Pressure gauge
- 4 Pressure switch



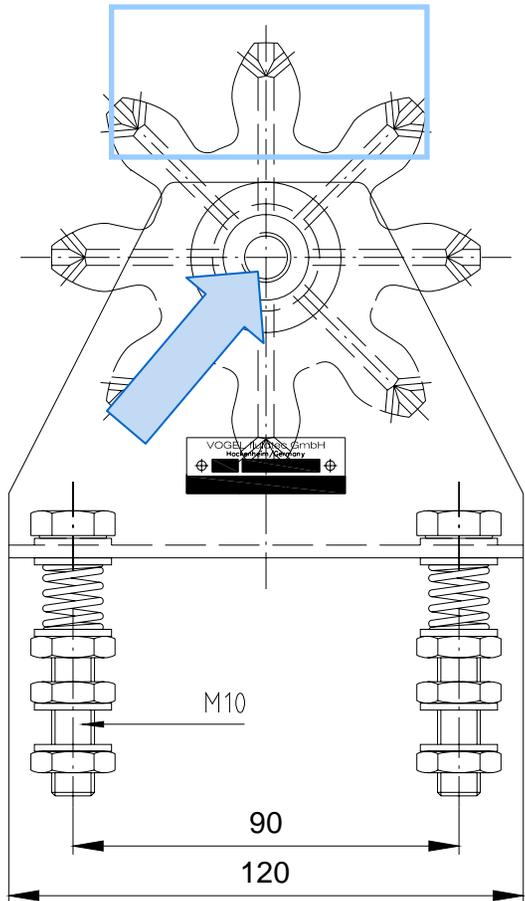
# Progressive Lubrication Systems Windlub<sup>®</sup>, For Bearings



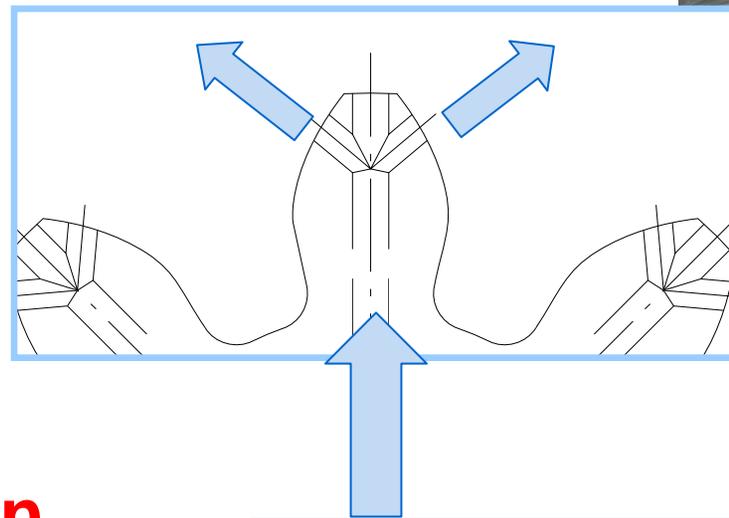
- ① KFG-pump for rotating operation
- ② Safety valve
- ③ Main-distributor (controlled),
- ④ Sub-distributor (bladebearing)



# Single-Line Lubrication Systems Windlub<sup>®</sup>, For Gears



Grease flow from inlet  
direct to contact area of  
pinion effects pointexact  
dosing on working surface

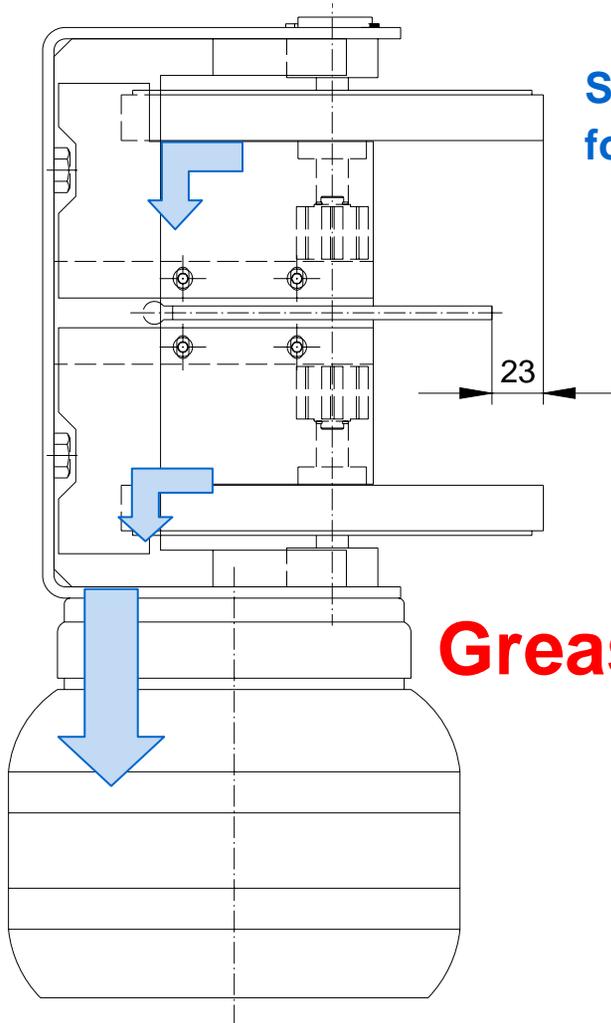


## Lubricating Pinion

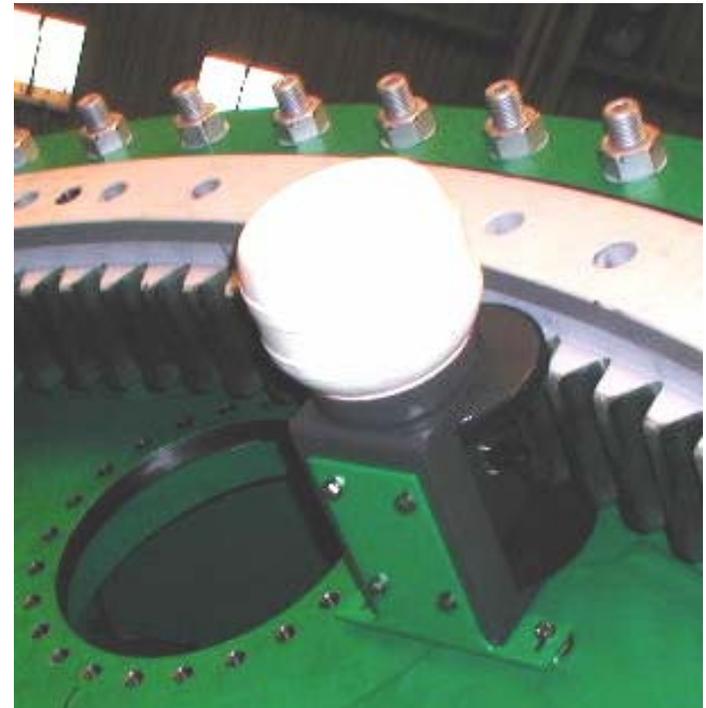
# Single-Line Lubrication Systems Windlub<sup>®</sup>, For Gears



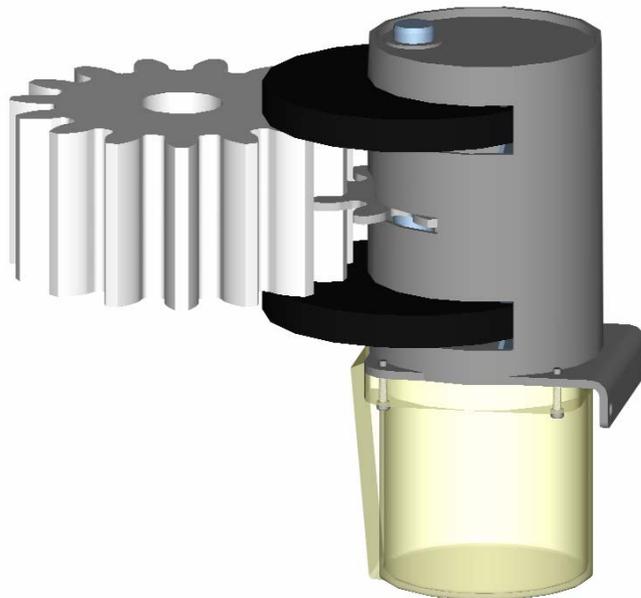
System thinking solution means: Used grease removal for a green energy with reduced production costs.



**Grease Collector**



## Design of Lubricant Collector



### System advantages:

- automatic removal of used lubricant
- no contamination by grease fall out
- quick and easy change of the grease reservoir

### Benefits:

- environmentally friendly because of reduced use of lubricant
- less servicing
- cost reduction

# Advantages And Added Values For The Customer



1. Reduced Service time and costs at site
2. Safe: Protect the asset
3. Direct lubrication in contact area
4. Reduced Lubricant consumption
5. Controlled bearing/lubrication system
6. “Greener” energy production
7. Reduced overall costs: Increased Reliability
8. Higher system availability/efficiency
9. Lubrication at parts in movement

