Tightening Torques of threaded connections

The purpose of the bolt and nut is to clamp two or more sections together. Tightening the nut stretches the bolt to produce a clamping or preload force. The preload force exists to keep the connection secure no matter what external force is exerted on the connection, i.e. it has to be large enough to resist the external forces. In a threaded connection there is a direct relationship between the coefficient of friction, the tightening torque and the preload force. The coefficient of friction itself is dependent on several factors:

1. Thread type
2. Material of the threaded connection
3. The coating on the bolt
4. Lubrication between the thread and surface

In addition, it is necessary to differentiate between the friction of the thread and the friction of the head or nut contact.

BPW specifies the prescribed tightening torque and lubrication (coefficient of friction) on all its threaded connections and adhering to this will ensure the correct preload force on the bolt. Note: the coefficient of friction of the bolt is changed by greasing the bolted connection.

What happens to the preload force of the bolt when the incorrect tightening torque or lubrication is used:

Incorrect tightening torque is used:

1. **The tightening torque is higher than the prescribed tightening torque:** This produces a higher preload force in the threaded connection. If this force is greater than the maximum permitted force then there will be plastic deformation (extension of the bolt, deformation of the thread).
2. **The tightening torque is less then the prescribed tightening torque:** This produces a lower preload force which is less than the external forces and the connection will loosen.

Given that the correct tightening torque is used but the incorrect greasing method is used:

1. **Adding grease when you should not:** The coefficient of friction is lower than the prescribed and higher preload force is generated. If this force is greater than the maximum permitted force then there will be plastic deformation (extension of the bolt, deformation of the thread).
2. **Adding no grease, when you should:** The coefficient of friction is higher and the preload force generated is lower in the threaded connection. In this case there is a risk that the clamping force is no longer sufficient and the connection will loosen.

In conclusion, it should be remembered that major fluctuations in the coefficient of friction and tightening torques represent a safety risk and potential source of damage that should not be underestimated. When servicing BPW running gear it is of the utmost importance that the correct tightening torques and lubrication is adhered to in order to ensure a safe and reliable connection. The prescribed tightening torques can be downloaded from the BPW website at www.bpw.co.za.