Study on the Axial force and Assembly Torque value of Bolted Joint

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1. Introduction

When jointing high tension bolt, in order the nut rotary timely operates force we as the torque(Torque moment). The size of the torque is proportionate in axial force of bolt and diameter of bolt. This time the relationship with proportional torque coefficient in afterwords is expressed.

$$T = k \cdot d \cdot N/1000 \qquad (1)$$

Where,

T : Jointed torque (Nm)
(Nut rotate moment)
k : Torque coefficient
(Friction coefficient)
d : Bolt diameter (mm)
N : Bolt axial force (kN)

When jointing a bolt with torque formula, design target axial force value according to (1) it calculates a torque value. This time there is not a possibility of knowing the friction coefficient (Torque coefficient k) which is accurate.
This coefficient to decide experimentally and influence bolt diameter, bolt material, tightening speed etc.
According to type of lubricant which but, is used mostly it changes.
It differs the lubricant of Wolsung #4 unit steam generator manway stud bolt jointing at the time of bolt from the present paper axial force it is a result which researches the result which it examines.

2. Methods and Results

The tester which is used in axial force test Japan NTC Co., highest pressure 68.6 Mpa, maximum output power 2942 kN, is with the product and until M 80 bolt the test is possible.

The test method in steam generator manway stud bolt differed the lubricant and it measured axial force and elongation. The lubricant which is used N-5000, N-7000 and P-37, is AG-PD. And it examined BOLT where it does not apply the lubricant. The result with Table 1 is same.

Table 1 Bolt axial force test result

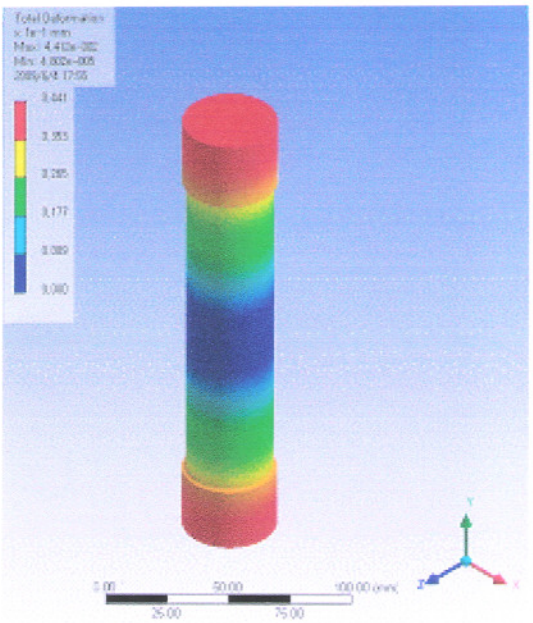
Lube	Step	Axial force (kN)	Elongation (mm)
No Lube	1	181	0.42
	2	182	0.40
	3	176	0.42
	AVG	**179.67**	**0.41**
N-5000	1	185	0.45
	2	184	0.39
	3	185	0.43
	AVG	**184.67**	**0.43**
N-7000	1	216	0.45
	2	196	0.48
	3	200	0.48
	AVG	**204**	**0.47**
P-37	1	214	0.46
	2	189	0.46
	3	205	0.43
	AVG	**202.67**	**0.45**
AG-PD	1	200	0.45
	2	211	0.52
	3	207	0.49
	AVG	**206**	**0.49**

3. Conclusions

According to lubricant type of bolt the torque coefficient is not a possibility of knowing accurately. But the AG-PD coating lubricant average axial force and elongation like Table 1 was most. It differs the lubricant with the torque of 1632 (Nm) it is a result which it joints, in the lubricant AG-PD is different it

compares and is smallest most the coefficient of friction it is a test result where.

In order to verify a result used ANSYS Workbench and executed analysis. The modeling did with 3D and the axial force did with 206 kN. The next picture 1 is the result.



Picture 1 3D Analysis of 9Bolt

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