**Bearing Selection:**

A diagram of a mechanical engineering project

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Figure 1 Shaft Layout

**For the** **bearing at B on the left shaft:**

1. Performance and operating condition:

Table 1 Performance and operating condition for the bearing at B on the left shaft

|  |  |
| --- | --- |
| Radical Force () | 426.82 [N] |
| Axial Force () | 7.487 [N] |
| Speed | 15 [rpm] |
| Operating Condition | 50 [degree] |
| Required rating life\* | 20000 [h] |

\* Let’s say the machine operate 40 h for one week and operate 48 weeks per year. If we want it to work for 10 years, then the total life is .

1. Bearing type and arrangement:

* Locating bearing is used since the bearing B need to carry the weight of the shaft, the gear and the cutter.
* Deep groove ball bearings are selected because they have the capability to carry both axial and radical force.

1. Bearing Size:

The inner radius of the shaft is 12 mm, thereby the inner radius of the bearing should align with it. Then, choose the 6201 deep groove ball bearing from SKF company.

1. Technical Specification:

A screenshot of a computer

Description automatically generated

Figure 2 Technical specification of 6201 deep groove ball bearing from SKF company

A screenshot of a computer

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Figure 3 Calculation data of 6201 deep groove ball bearing from SKF company

1. Basic rating life:

From the data sheet for 6201 deep groove ball bearing, the calculation factor:

From Table 10, P257, SKF handbook, e = 0.34, and:

According to Page 254 in SKF handbook,

which satisfies our requirement.

1. Lubrication:

Input Values:

From SKF handbook, Table 1, Page 113,

The limit is 100000, which is greater than 210.

Grease selection criteria:

* Temperature: 50 -> M
* Speed: -> L
* Load: C/P = 16.93 -> L

From the SKF bearing grease selection chart, page 124, LGWM2 grease is selected since the bearing operates at low speed.

From SKF handbook, Diagram 2 Page 112, the relubrication intervals at operating temperatures of 70 °C is:

This satisfies the requirement.

**For the bearing at B on the right shaft:**

1. Performance and operating condition:

Table 2 Performance and operating condition for the bearing at B on the right shaft

|  |  |
| --- | --- |
| Radical Force () | 426.82 [N] |
| Axial Force | 0 [N] |
| Speed | 15 [rpm] |
| Operating Condition | 50 [degree] |
| Required rating life\* | 20000 [h] |

1. Bearing type and arrangement:

* Non-locating bearing is used since the bearing A only carry the radical load.
* Needle bearing is used.

1. Bearing Size:

The inner radius of the shaft is 12 mm, thereby the inner radius of the bearing should align with it. Then, choose the HK 1210 E needle roller bearing from SKF company.

1. Technical Specification:

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Figure 4 Technical specification of HK 1210 E needle roller bearing from SKF company.

A screenshot of a computer

Description automatically generated

Figure 5 Calculation data of HK 1210 E needle roller bearing from SKF company.

1. Basic rating life:

which satisfies our requirement.

1. Lubrication:

Input Values:

From SKF handbook, Table 1, Page 113,

The limit is 100000, which is greater than 210.

Grease selection criteria:

* Temperature: 50 -> M
* Speed: -> L
* Load: C/P = 11.65 -> M

From the SKF bearing grease selection chart, page 124, LGEV2 grease is selected since the bearing operates at low speed.

From SKF handbook, Diagram 2 Page 112, the relubrication intervals at operating temperatures of 70 °C is:

Since the operating temperature in this project is , based on SKF handbook, table 2, we need to adjust the interval by double it, therefore,

This satisfies the requirement.

**For the bearing at A on the left shaft:**

1. Performance and operating condition:

Table 3 Performance and operating condition for the bearing at A on the left shaft

|  |  |
| --- | --- |
| Radical Force () | 425.35 [N] |
| Axial Force | 0 [N] |
| Speed | 15 [rpm] |
| Operating Condition | 50 [degree] |
| Required rating life\* | 20000 [h] |

\* Let’s say the machine operate 40 h for one week and operate 48 weeks per year. If we want it to work for 10 years, then the total life is .

Since the performance and operating condition is similar with the Bearing B of the right shaft with a lower radical force, we can use the same bearing here. Therefore, we choose HK 1210 E needle roller bearing from SKF company for this shaft.