2 Find out if the required item is standard stock.
In consideration of delivery time and price, select from the standard R Series (rolled ball screws). Select from Flanged single nuts.

Second selection :	Rolled ball screw, standard in stock
Screw shaft diameter :	15、16、20、25、32 36、40、45、50(mm)
Lead :	10(mm)
Stroke :	1500(mm)

3 Checking basic safety
(1) Checking allowable axial load
① Calculation of allowable axial load (see Fig. Ⅱ-15•7.)
Acceleration at accelerating/decelerating time is:

$$\alpha_1=\frac{V}{60t_1}=\frac{10\times10^3}{60\times0.2}=833(mm/s^2)=0.833(m/s^2)$$

①、⑥ ……$F_1=mg-m\alpha=2690(N)$
②、⑤ ……$F_2=mg=2940(N)$
③、④ ……$F_1=mg+m\alpha=3190(N)$

(2) Bucking load
Use values below.
P = 3190(N), L = 1600 (mm)
Bearing supporting condition is common Fixed -- Simple support.
From Formula (Ⅱ-2) on Page B505:

$$d_r\geqq\left[\frac{P\cdot L^2}{m}\times10^{-4}\right]^{1/4}=\left[\frac{3190\times1600^2}{10.0}\times10^{-4}\right]^{1/4}$$
$$=16.8(mm)$$

(2) Checking permissible rotational speed
① Critical speed
Use values below.
n = 1000 min^{-1}, L = 1600 mm.
From Formula (Ⅱ-7) on Page B509:

$$d_r\geqq\frac{n\cdot L^2}{f}\times10^{-7}=\frac{1000\times1600^2}{15.1}\times10^{-7}$$
$$=17(mm)$$

② d・n value
From Table Ⅱ-3.1 on Page B512:

$$d\leqq\frac{50000}{n}=\frac{50000}{1000}$$
$$=50(mm)$$

* Please consult NSK if d・n >50000 is required.

(3) Decision of screw length

$$L_s=\underbrace{\text{Stroke}+\text{nut length}+\text{margin}+\text{shaft end length}}_{\text{Screw section length}}$$
$$=1500+100+100+200=1900\leqq2000(mm)$$

Normally, Ls/d (screw length/shaft diameter) ≦70 is recommended.

$$d\geqq\frac{L_s}{70}=\frac{1900}{70}=27.1$$

Third selection:	Rolled ball screw, standard in stock
Shaft diameter:	32、36、40、45、50 (mm)
Lead:	10 (mm)
Stroke:	1500 (mm)

(4) Checking life (dynamic load rating)
Determine required load carrying capacity from load conditions.

Table Ⅱ-15•8

Operating condition	Axial load (N)	Rotational speed (mean)(min^{-1})	Use time (s)
① ⑥	F_1=2690	N_1=500	t_a=1.4
② ⑤	F_2=2940	N_2=1000	t_b=13.0
③ ④	F_3=3190	N_3=500	t_c=1.4

Calculate mean load F_m and mean rotational speed N_m from Formulas (Ⅱ-11) and (Ⅱ-12) on Page B515:
Required load carrying capacity is:

$$F_m=\left[\frac{F_1^3\cdot N_1\cdot t_a+F_2^3\cdot N_2\cdot t_b+F_3^3\cdot N_3\cdot t_c}{N_1\cdot t_a+N_2\cdot t_b+N_3\cdot t_c}\right]^{1/3}$$
$$=2940(N)$$

$$N_m=\frac{N_1\cdot t_a+N_2\cdot t_b+N_3\cdot t_c}{t}$$
$$=288(min^{-1})$$

From Formulas (Ⅱ-8) and (Ⅱ-9) on Page B515:

$$C_a\geqq(60N_m\cdot L_t)^{1/3}\cdot F_m\cdot f_w\times10^{-2}(N)$$
$$=(60\times288\times24000)^{1/3}\times2940\times1.2\times10^{-2}$$
$$=26300(N)$$

Checking static load rating

$$C_{0a}=F\max\times f_s=3190\times2$$
$$=6380(N)$$

In consideration of expense:

Fourth selection :	
Rolled ball screw, standard in stock	
Shaft diameter :	32(mm)
Lead :	10(mm)
Stroke :	
Turns of balls and circuit number :	2.5x2
Screw length :	2000(mm)
Basic dynamic load rating :	35700(N)

4 Selection of nut
Select a "standard nut with a flange and a seal (Brush-seals contained inside)" based on the necessity as well as on the environmental conditions.

Selected ball screw:Nut assembly RNFTL3210A5S
Screw shaft RS3210A20

B-Ⅱ-16 Reference

"NSK Motion & Control (technical journal)" was compiled to introduce NSK products and its technologies. You will find data summaries which are imperative in selecting ball screws in this catalogue. If you need detailed technical data, other than described in this catalogue, please refer to "NSK Motion & Control" technical journal.
For inquiries and orders, please contact NSK branch offices, sales offices, and representatives assigned at various locations.

Table Ⅱ-16•1 NSK Motion & Control (technical journal) : Issues relating to ball screws (1980-)

No.	Issued Date	Title
No.4	Jun. 1998	Recent Technical Trends in Ball Screws
No.8	May. 2000	Ball Screw with Rotating Nut and Vibration Damper
No.9	Oct. 2000	WFA Standard-Stock Ball Screws
No.10	Apr. 2001	High Performance Seals for Ball Screws
No.11	Oct. 2001	Development of NSK S1 Series Ball Screws and Linear Guides
No.11	Oct. 2001	Low Inertia Series of Nut Rotatable Ball Screws
No.13	Oct. 2002	Development of HTF Series Ball Screws for High Load Drive Application
No.13	Oct. 2002	High Lead Precision Rolled Ball Screws
No.14	May. 2003	High Speed and Low Noise Ball Screws HMC-B02 Series
No.15	Dec. 2003	Clean Support Units for Ball Screws
No.16	Aug. 2004	Development of High Speed and Low Noise Ball Screws
No.18	Aug. 2005	S3 Ball Screws: Super Low Noise Ball Screws for Automation Equipment