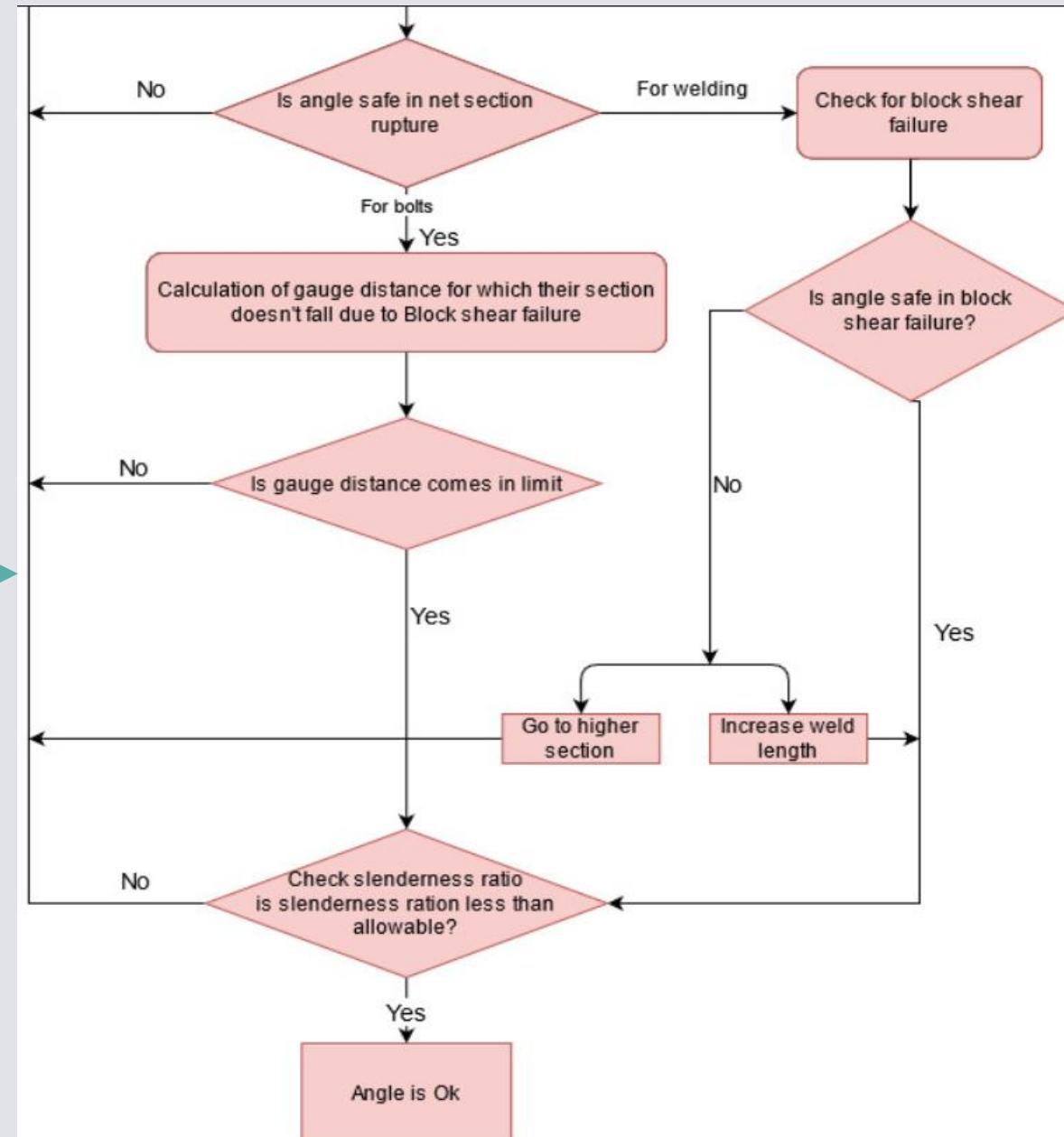
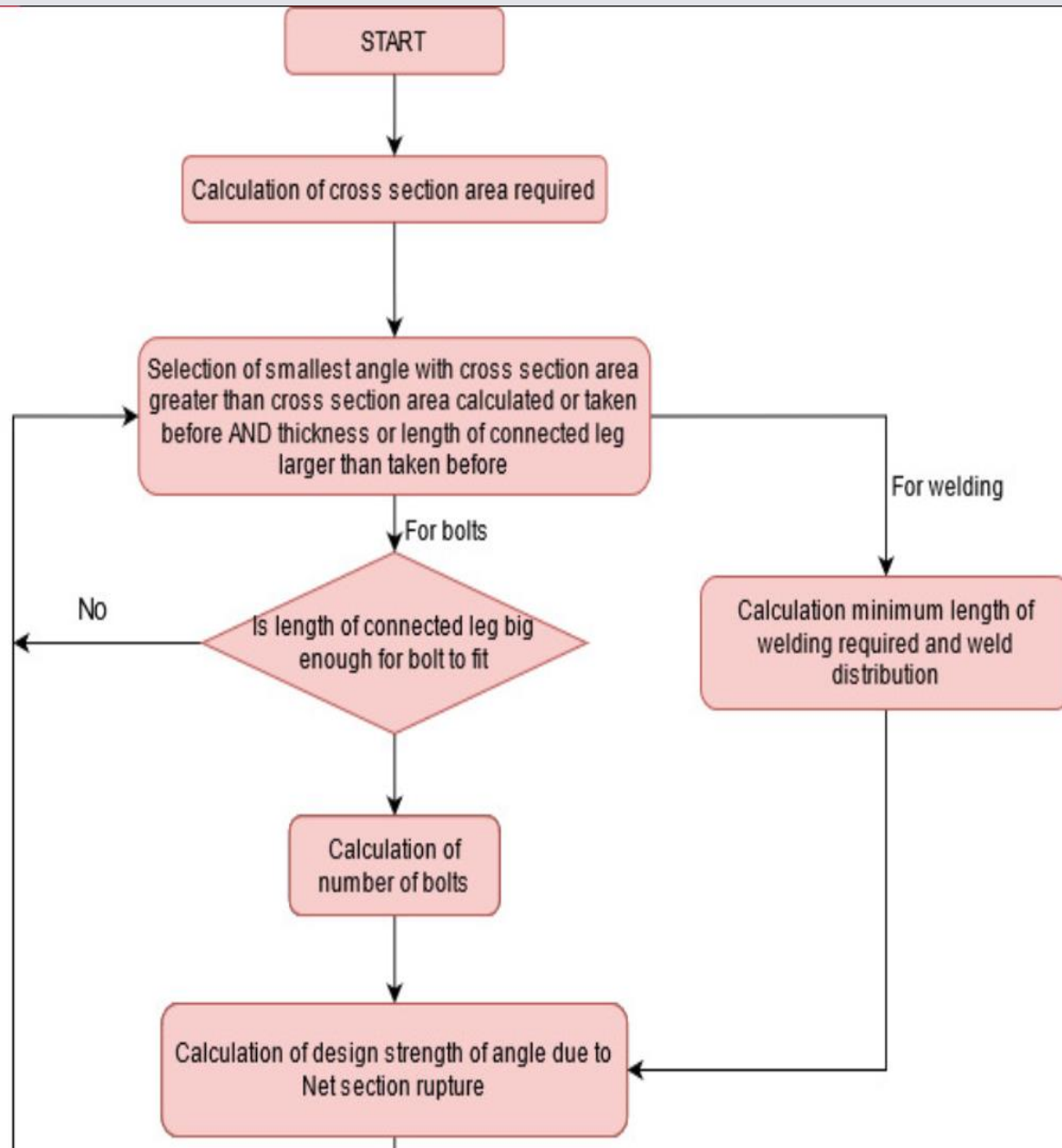


WORKFLOW OF THE CODE



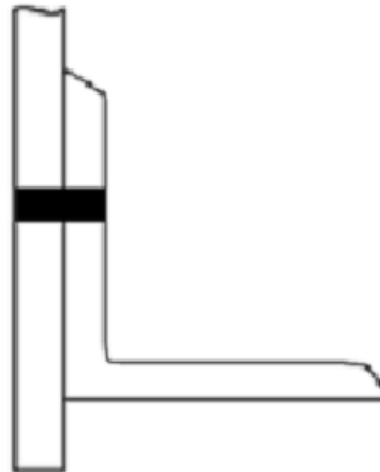
Test Case- Screen 1

Design Of Tension Member



Select Type

- ☒ Single Angle Section with bolted connections
- ☐ Single Angle Section with welded connections
- ☐ Double Angle placed same side of gusset plate with bolted connection
- ☐ Double Angle placed opposite side of gusset plate with welded connection



GET INPUT VALUES

SELECTING A TENSION MEMBER
OUT OF THE OPTIONS GIVEN IN
THE SCREEN NUMBER 1

Test Case- Screen 2

Single Angle Section with bolted connections

Inputs

Factored Load in KN

Length of tension member in mm

Allowable Slenderness Ratio

Properties of Steel

☒ Fe410 Steel

Ultimate Tensile Stress in Mpa

Yield Stress in MPa

Partial Safety Factors

☒ Take according to IS800 table 5 (cl. 5.4.1)

Governed by ultimate strength (γ_{m1})

Governed by yielding (γ_{m0})

Type of Design

☒ Design for economical section

☐ Check for a particular section

Properties Of Bolts

☒ Grade 4.6 ☐ Grade 8.8

Ultimate tensile strength in MPa

Diameter of bolt in mm

Pitch and End Distance

☒ Take min. value according to IS800

Pitch in mm

End Distance in mm

Partial Safety Factor

☒ Take according to IS800 table 5 (cl. 5.4.1)

Custom safety factor (γ_{mf})

Type Of Section

☒ Equal ☐ Unequal

Choose ISA Section

INPUT ALL THE GIVEN VALUES
FOR THE TENSION MEMBER. THE
PROGRAM PROMPTS THE USER
TO COMPLETELY FILL THE INPUT
BOXES

OPEN THE OUTPUT FILE

OPEN

Test Case- Output

Single Angle Section with bolted connections

The choosen section is **65X65X8**, is OK and the **OPTIMUM ONE** under the given load configuration

Output File

```
An = 800.0 mm^2
Tdn = alpha x An x fu/ym1
Tdn = 209.92 kN

->Block Shear Failure:
Avg = 1840.0 mm^2
Avn = 1048.0 mm^2
Atg = 288.0 mm^2
Atn = 200.0 mm^2
Tdb1 = 0.9xAvnxFu/(root(3)xym1) + AtgxFy/ym0= 244.069 kN
Tdb2 = AvgxFy/(Math.sqrt(3)xym0) + 0.9xAtnxFu/ym1 = 300.477 kN
Tdb = Min(Tdb1,Tdb2) = 244.069 kN

->Check for Slenderness Ratio:
lambda = Length of Tension Member/Rvv = 3000.0/24.7 = 121.457
As we can see, ( 121.457 < 350.0 ), so OK
Hence, the choosen section, 65X65X8 is OK and the OPTIMUM ONE under the given load configuration
```

GET THE RESULT OUTPUT FILE.
GIVES OUT THE DIMENSION FOR
THE OPTIMUM SECTION TO USE.

65X65X8 IS THE OPTIMUM ONE
IN THIS CASE.

 **REDESIGN**



REDESIGN OR CLOSE THE
SECTION AS NEEDED

Test Case- Calculations

$$A_n = 800.0 \text{ mm}^2$$

$$T_{dn} = \alpha \times A_n \times f_u / y_{m1}$$

$$T_{dn} = 209.92 \text{ kN}$$

->Block Shear Failure:

$$A_{vg} = 1840.0 \text{ mm}^2$$

$$A_{vn} = 1048.0 \text{ mm}^2$$

$$A_{tg} = 288.0 \text{ mm}^2$$

$$A_{tn} = 200.0 \text{ mm}^2$$

$$T_{db1} = 0.9 \times A_{vn} \times f_u / (\sqrt{3} \times y_{m1}) + A_{tg} \times f_y / y_{m0} = 244.069 \text{ kN}$$

$$T_{db2} = A_{vg} \times f_y / (\sqrt{3} \times y_{m0}) + 0.9 \times A_{tn} \times f_u / y_{m1} = 300.477 \text{ kN}$$

$$T_{db} = \min(T_{db1}, T_{db2}) = 244.069 \text{ kN}$$

->Check for Slenderness Ratio:

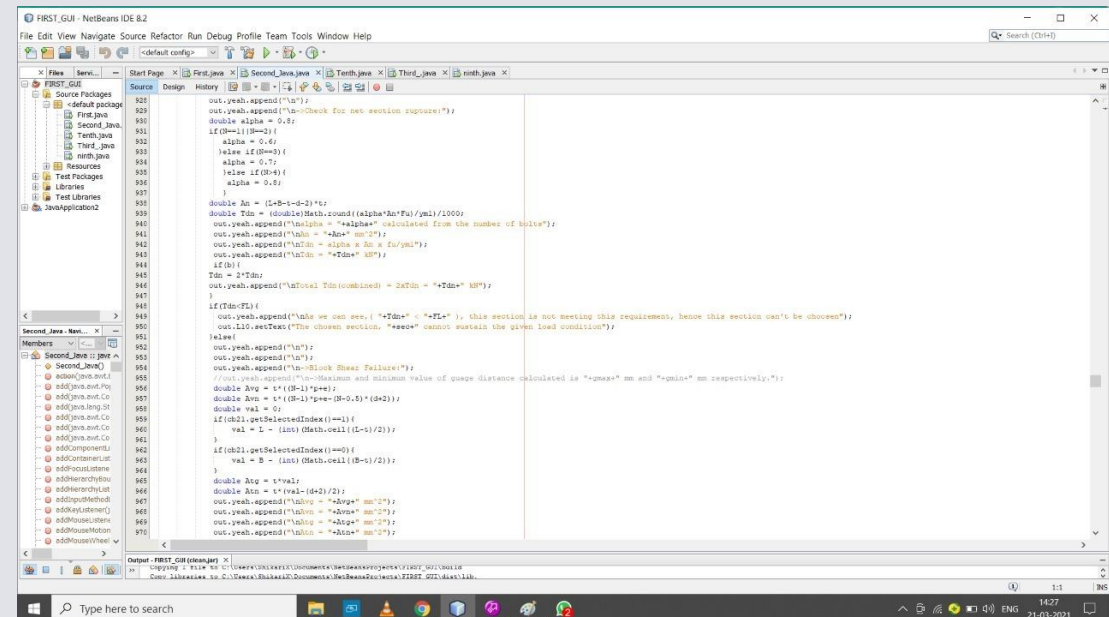
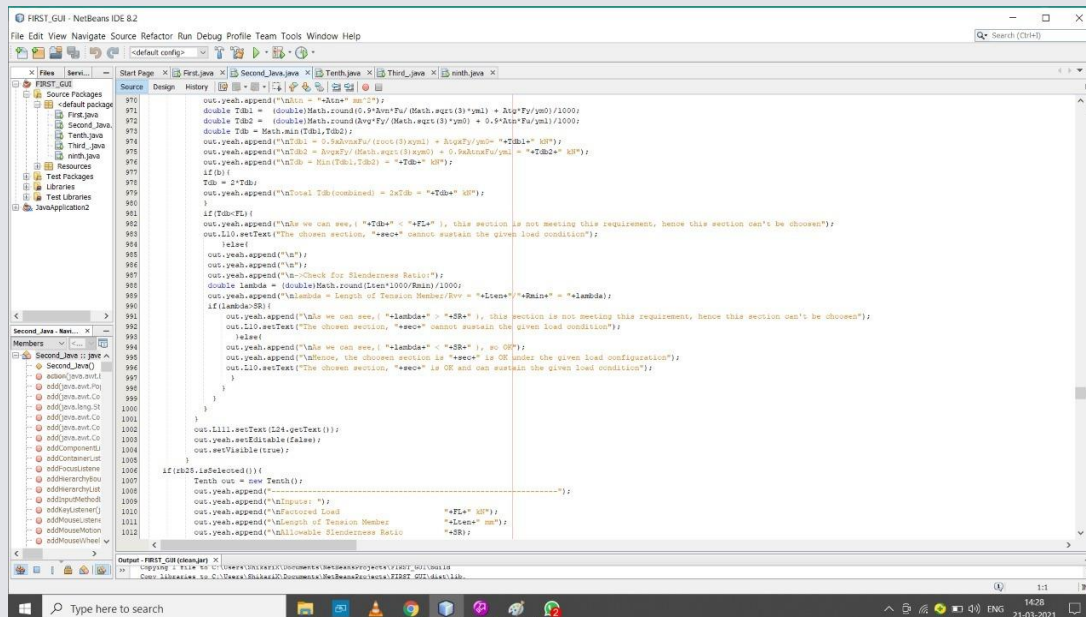
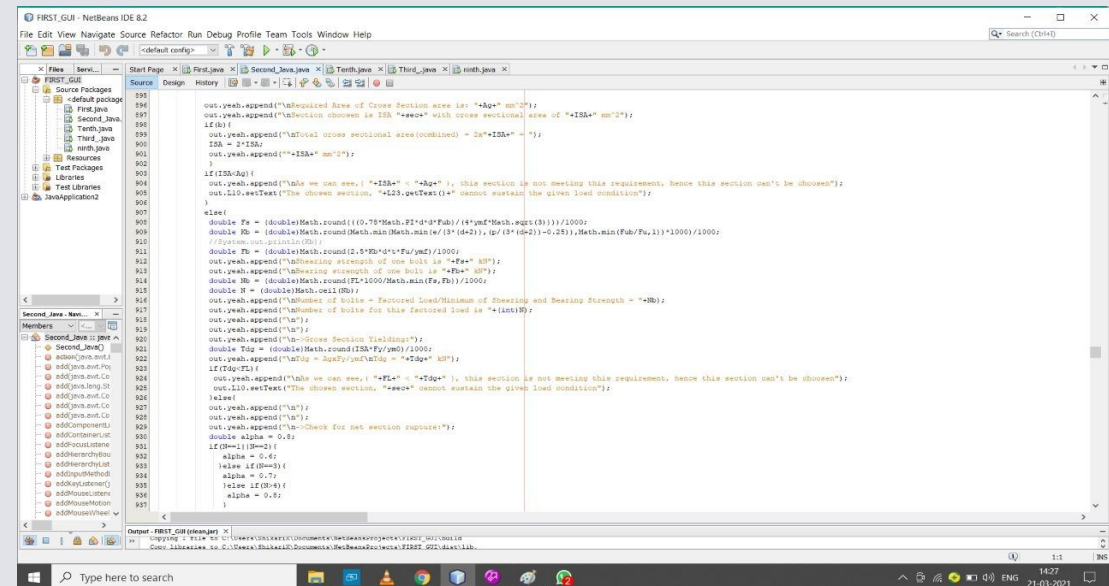
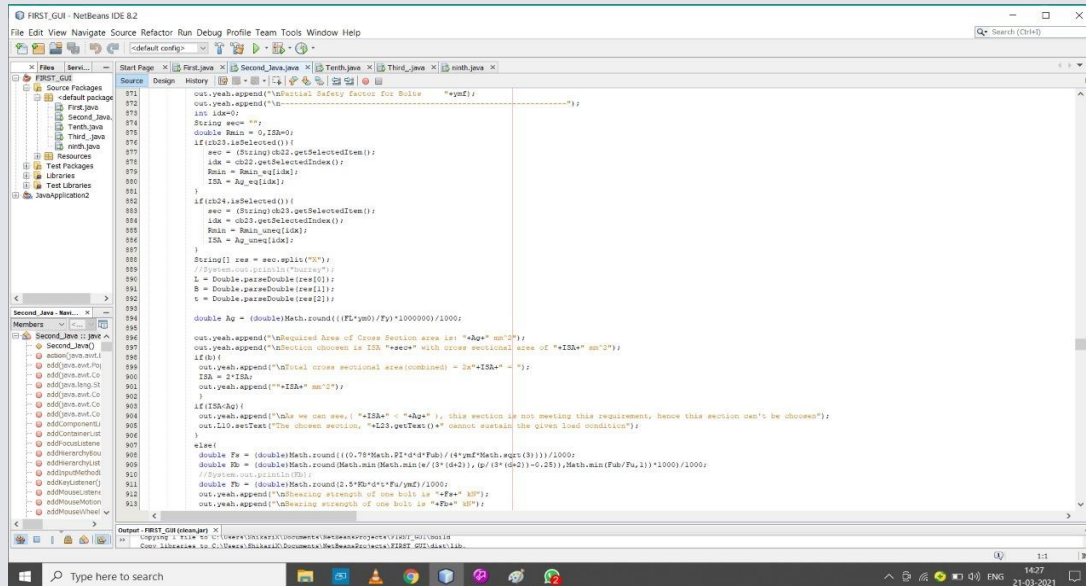
$$\lambda = \text{Length of Tension Member} / R_{vv} = 3000.0 / 24.7 = 121.457$$

As we can see, ($121.457 < 350.0$), so OK

Hence, the choosen section, 65X65X8 is OK and the OPTIMUM ONE under the given load configuration

SNIPPET OF CALCULATION AS SHOWN IN THE OUTPUT FILE

Code Snippet- Written in JAVA



THANK YOU