
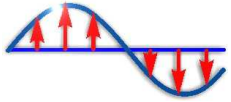


A mechanical diagram of a beam with a distributed load, supports, and stick figures. The beam is supported by a pin support on the left and a roller support on the right. A distributed load is applied downwards along the entire length of the beam. Above the beam, a group of six blue stick figures are standing and holding hands. Below the beam, a single blue stick figure is sitting on the ground, with a green starburst and green arrows pointing towards it.

Getting started in Pictures Siarhei Arlou

2
Mechanics of Materials
ToolBox for Maple™
Copyright© 2006-2008 S.Arlou

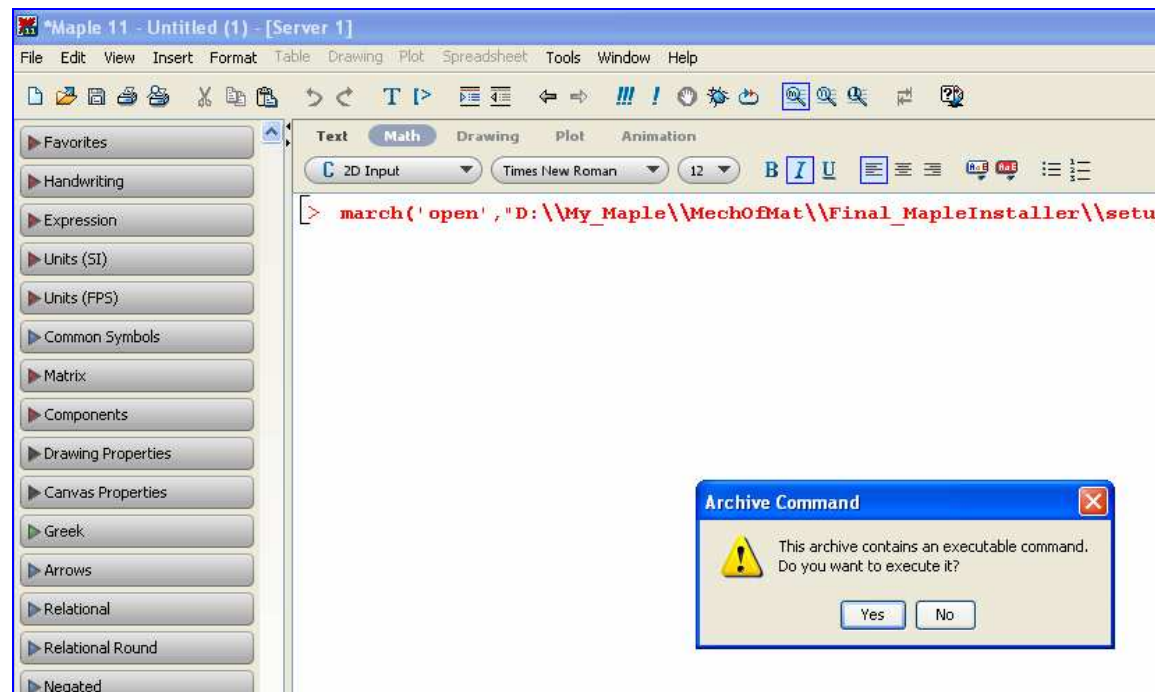
www.mechofmat.com

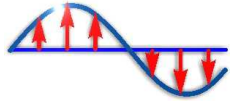


Mechanics of Materials™ Toolbox for Maple™

Installation Steps

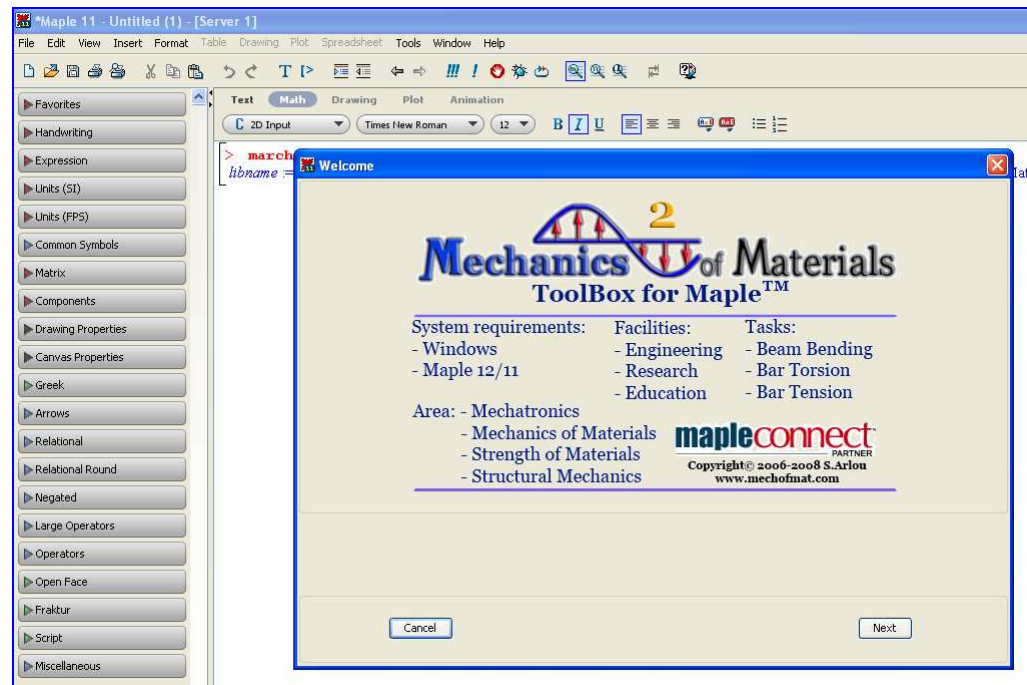
1. System Requirements:
 - Windows;
 - Maple 11 or Maple 12.
2. Please open downloaded Maple archive file **setup.mla** in Maple Standard interface (or double click this file simply).
3. You will invite to run this archive like this



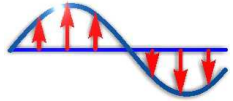


Mechanics of Materials™ Toolbox for Maple™

4. Click Yes. The Welcome window appears.

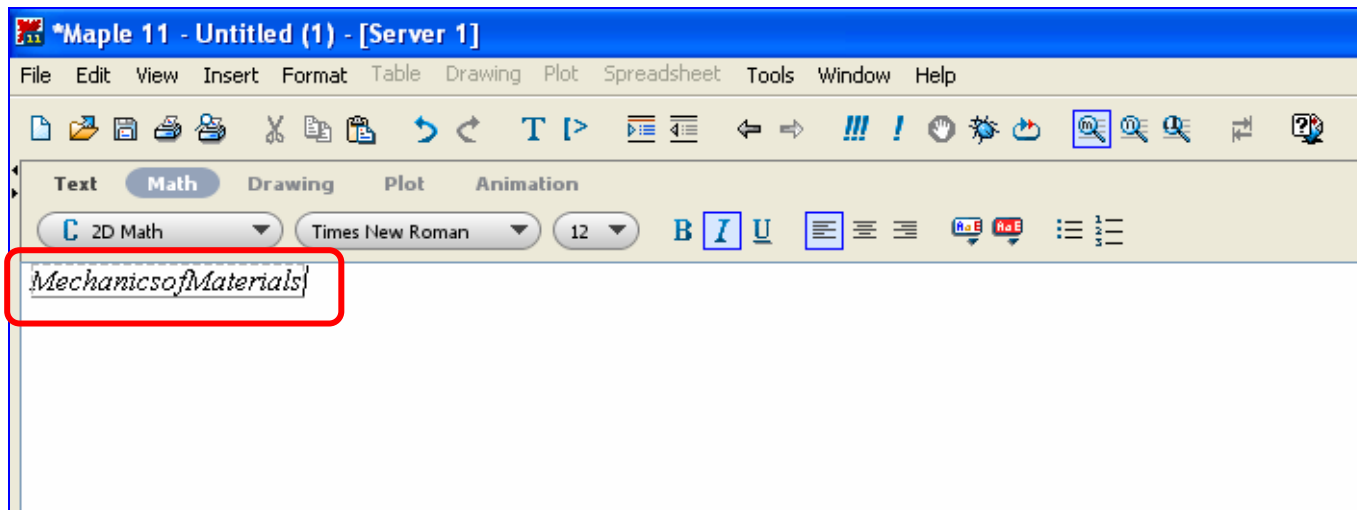


5. Click Next and please follow simple offers.
6. If you agree with License Agreement, click next.
7. For correct Mechanics of Materials™ Toolbox work it requires to reboot Maple session. Installation operations are finished.



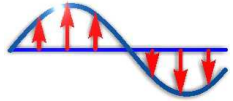
Mechanics of Materials™ Toolbox for Maple™

Easy Start



The Mechanics of Materials toolbox was developed for the Maple standard interface. To begin working with a Mechanics of Materials, use the examples located in toolbox library **Help**. You may also use the predefined **Templates** (more information will follow).

Press the **F2 button** in the **MechanicsofMaterials** line to open the **Help** section.



Mechanics of Materials™ Toolbox for Maple™

Maple 11 Help - [MechanicsOfMaterials]

File Edit View History Help

Search For: ☒ Topic ☐ Text

MechanicsOfMaterials Search

Resources: All

Table of Contents Search Results

- MechanicsOfMaterials
- MechanicsOfMaterials,BarTension
- MechanicsOfMaterials,BarTorsion
- MechanicsOfMaterials,BeamBending
- MechanicsOfMaterials,Options
- MechanicsOfMaterials,sample01
- MechanicsOfMaterials,sample02
- MechanicsOfMaterials,sample03
- MechanicsOfMaterials,Templates,FullBending
- MechanicsOfMaterials,Templates,FullBendingBoundary
- MechanicsOfMaterials,Templates,FullBendingShearing
- MechanicsOfMaterials,Templates,FullBendingWinkler
- MechanicsOfMaterials,Templates,FullStretching
- MechanicsOfMaterials,Templates,FullStretchingBoundary
- MechanicsOfMaterials,Templates,FullTorsion
- MechanicsOfMaterials,Templates,FullTorsionBoundary

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Developed for Maple Standard Interface Help system

Main Toolbox Help Page

▼ **Short Toolbox Links**

- [BeamBending Package Examples](#)
- [BarTension Package Examples](#)
- [BarTorsion Package Examples](#)
- [Toolbox Options](#)
- [FullBending Template](#)
- [FullBendingBoundary Template](#)
- [FullBendingShearing Template](#)
- [FullBendingWinkler Template](#)
- [FullStretching Template](#)
- [FullStretchingBoundary Template](#)
- [FullTorsion Template](#)
- [FullTorsionBoundary Template](#)
- [MM Free Library Sample 01](#)
- [MM Free Library Sample 02](#)
- [MM Free Library Sample 03](#)
- [MM Free Library](#)

▼ **Licence Agreement**

- **Siarhei Arlou© 2006-2008 License Agreement**

► **Information for version 1 users**

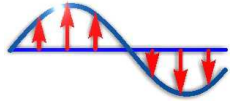
► **I am so busy or ... so lazy**

▼ **1. With lightning speed or couple of samples**

▼ **Beam Bending Tasks Solutions**

- The following group of commands lets to solve the problem of the beam bending.

The **Help** page for the Mechanics of Materials toolbox is shown.



Mechanics of Materials™ Toolbox for Maple™

Developed for Maple Standard Interface Help system

Main Toolbox Help Page

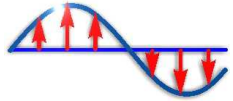
▼ **Short Toolbox Links**

- [BeamBending Package Examples](#)
- [BarTension Package Examples](#)
- [BarTorsion Package Examples](#)
- [Toolbox Options](#)
- [FullBending Template](#)
- [FullBendingBoundary Template](#)
- [FullBendingShearing Template](#)
- [FullBendingWinkler Template](#)
- [FullStretching Template](#)
- [FullStretchingBoundary Template](#)
- [FullTorsion Template](#)
- [FullTorsionBoundary Template](#)
- [MM Free Library Sample 01](#)
- [MM Free Library Sample 02](#)
- [MM Free Library Sample 03](#)
- [MM Free Library](#)

▼ **Licence Agreement**

An easy way to start is by using the Templates or (and) MM Free Library™ samples.

It is possible to view the selection by one click in Maple help page.



Mechanics of Materials™ Toolbox for Maple™

Maple 11 Help - [MechanicsofMaterials, Templates, FullBending]

File Edit View History Help

Search For: ☐ Topic ☐ Text

MechanicsofMaterials Search

Resources: All

Table of Contents Search Results

- MechanicsofMaterials
- MechanicsofMaterials, BarTension
- MechanicsofMaterials, BarTorsion
- MechanicsofMaterials, BeamBending
- MechanicsofMaterials, Options
- MechanicsofMaterials, sample01
- MechanicsofMaterials, sample02
- MechanicsofMaterials, sample03
- MechanicsofMaterials, Templates, FullBending**
- MechanicsofMaterials, Templates, FullBendingBoundary
- MechanicsofMaterials, Templates, FullBendingShearing
- MechanicsofMaterials, Templates, FullBendingWinkler
- MechanicsofMaterials, Templates, FullStretching
- MechanicsofMaterials, Templates, FullStretchingBoundary
- MechanicsofMaterials, Templates, FullTorsion
- MechanicsofMaterials, Templates, FullTorsionBoundary

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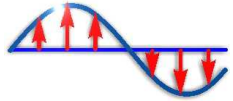
Bending Deformations
Template for FullBending Function - Four Segments

If you changed the code blocks or deleted some components fortuitously you may always restore it from help files by points:

1. Open Maple HELP browser by topic *MechanicsofMaterials*. Find the Templates.
2. Find a basic menu at top of window. Follow to View group.
3. Follow to item *Open Page As Worksheet*.

Input Data. Node Points		Input Data. Loading Segments	
Force, N in Node Point 1 <input type="text" value="- 10 · 10<sup>3</sup>"/>	Fixing Types <input type="checkbox"/> Movable Support <input checked="" type="checkbox"/> Rigid Constrained <input type="checkbox"/> None <input type="checkbox"/> Joint	Length, m of Segment 1 <input type="text" value="5"/>	Distributed Load, N/m <input type="text" value="25 · sin(2 · z) · 10<sup>3</sup>"/>
Moment, Nm in Node Point 1 <input type="text" value="4 · 10<sup>3</sup>"/>		Young Modulus, Pa on Segment 1 <input type="text" value="2 · 10<sup>11</sup>"/>	Moment of Inertia, m⁴ <input type="text" value="190 · 10<sup>(-8)</sup>"/>
Force, N in Node Point 2 <input type="text" value="- 10 · 10<sup>3</sup>"/>	Fixing Types <input type="checkbox"/> Movable Support <input checked="" type="checkbox"/> Rigid Constrained <input type="checkbox"/> None <input type="checkbox"/> Joint	Length, m of Segment 2 <input type="text" value="4"/>	

For example, the calling of **MechanicsofMaterials** > **Templates** > **FullBending** displays the following results.



Mechanics of Materials™ Toolbox for Maple™

Another example, calling **MechanicsofMaterials** > **sample01** displays the following results.

Maple 11 Help - [MechanicsofMaterials.sample01]

File Edit View History Help

Search For: ☐ Topic ☐ Text

MechanicsofMaterials

Resources: All

Table of Contents Search Results

- MechanicsofMaterials
- MechanicsofMaterials,BarTension
- MechanicsofMaterials,BarTorsion
- MechanicsofMaterials,BeamBending
- MechanicsofMaterials,Options
- MechanicsofMaterials.sample01**
- MechanicsofMaterials.sample02
- MechanicsofMaterials.sample03
- MechanicsofMaterials,Templates,FullBending
- MechanicsofMaterials,Templates,FullBendingBoundary
- MechanicsofMaterials,Templates,FullBendingShearing
- MechanicsofMaterials,Templates,FullBendingWinkler
- MechanicsofMaterials,Templates,FullStretching
- MechanicsofMaterials,Templates,FullStretchingBoundary
- MechanicsofMaterials,Templates,FullTorsion
- MechanicsofMaterials,Templates,FullTorsionBoundary

2

Mechanics of Materials

MM Free Library™

July 2008

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Maplesoft is a division of Waterloo Maple Inc.

Sample 01

It requires:

- To receive analytical expressions of shearing forces, bending moments, angles of a bending and deflections for a beam resulted in figure;
- To find the strain energy which have been saved up by each cargo segment and of all beam as a whole;
- To construct epures of shearing forces, bending moments, angles of a bending and deflections;
- To determine extremum value of the bending moment.

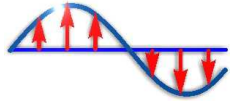
$q = 1 \cdot 10^3 \text{ N/m},$
 $a = 1 \text{ m},$
 $J_x = 600 \cdot 10^{-8} \text{ cm}^4,$
 $E = 2 \cdot 10^{11} \text{ Pa}.$

Solution

The initial stage of calculations connected to package initialization and input of the basic data is resulted in table 1.1.

Table 1.1

Maple Code	Comment



Mechanics of Materials™ Toolbox for Maple™

There is simple way to display a help page article as a Maple worksheet. Navigate to **View** then click **Open Page As Worksheet**.

Maple 11 Help - [MechanicsofMaterials.sample01]

File Edit View History Help

Search For: Search

Resources: Back Forward

Table of Contents

- Mechanics of Materials
- Mechanics of Materials, Options
- Mechanics of Materials, sample01
- Mechanics of Materials, sample02
- Mechanics of Materials, sample03
- Mechanics of Materials, Templates, FullBending
- Mechanics of Materials, Templates, FullBendingBoundary
- Mechanics of Materials, Templates, FullBendingShearing
- Mechanics of Materials, Templates, FullBendingWinkler
- Mechanics of Materials, Templates, FullStretching
- Mechanics of Materials, Templates, FullStretchingBoundary
- Mechanics of Materials, Templates, FullTorsion
- Mechanics of Materials, Templates, FullTorsionBoundary

Open Page As Worksheet

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Maple and MapleConnect are trademarks of Waterloo Maple Inc.
Maplesoft is a division of Waterloo Maple Inc.

Sample 01

It requires:

- To receive analytical expressions of shearing forces, bending moments, angles of a bending and deflections for a beam resulted in figure;
- To find the strain energy which have been saved up by each cargo segment and of all beam as a whole;
- To construct epures of shearing forces, bending moments, angles of a bending and deflections;
- To determine extremum value of the bending moment.

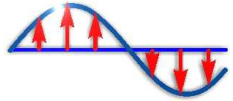
$q = 1 \cdot 10^3 \text{ N/m}$,
 $a = 1 \text{ m}$,
 $J_x = 600 \cdot 10^{-8} \text{ cm}^4$,
 $E = 2 \cdot 10^{11} \text{ Pa}$.

Solution

The initial stage of calculations connected to package initialization and input of the basic data is resulted in **table 1.1**.

Table 1.1

Maple Code	Comment



Mechanics of Materials™ Toolbox for Maple™

With the article presented as a worksheet, it is now possible to can browse, calculate and change the document.

Maple 11 - MechanicsofMaterials_sample01 - [Server 2]

File Edit View Insert Format Table Drawing Plot Spreadsheet Tools Window Help

Text Math Drawing Plot Animation

Text Times New Roman 18 B I U

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 Maple and MapleConnect are trademarks of Waterloo Maple Inc.
 Maplesoft is a division of Waterloo Maple Inc.

Sample 01

It requires:

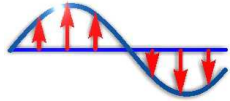
- To receive analytical expressions of shearing forces, bending moments, angles of a bending and deflections for a beam resulted in figure;
- To find the strain energy which have been saved up by each cargo segment and of all beam as a whole;
- To construct epures of shearing forces, bending moments, angles of a bending and deflections;
- To determine extremum value of the bending moment.

	$q = 1 \cdot 10^3 \text{ N/m},$ $a = 1 \text{ m},$ $J_x = 600 \cdot 10^{-8} \text{ cm}^4,$ $E = 2 \cdot 10^{11} \text{ Pa}.$
--	---

Solution

The initial stage of calculations connected to package initialization and input of the basic data is resulted in **table 1.1.**

Ready Memory: 0.43M Time: 0.06s Text Mode



Mechanics of Materials™ Toolbox for Maple™

It is also possible to use a Template (Ex: Beam bending task) as an interactive Maple document.

Maple 11 - MechanicsofMaterials, Templates, FullBending - [Server 3]

File Edit View Insert Format Table Drawing Plot Spreadsheet Tools Window Help

Text Math Drawing Plot Animation

Times New Roman 14 B I U

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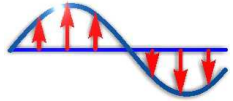
Bending Deformations
Template for FullBending Function - Four Segments

If you changed the code blocks or deleted some components fortuitously you may always restore it from help files by points:

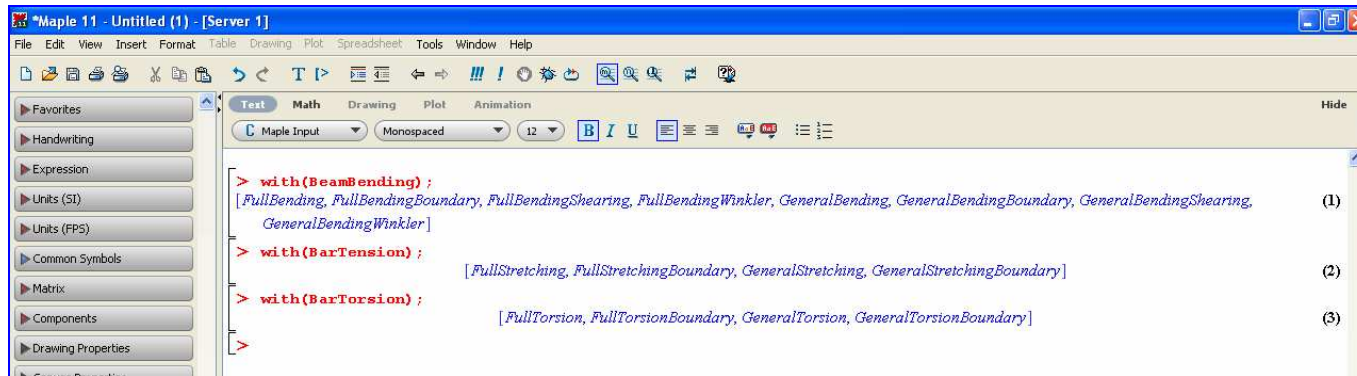
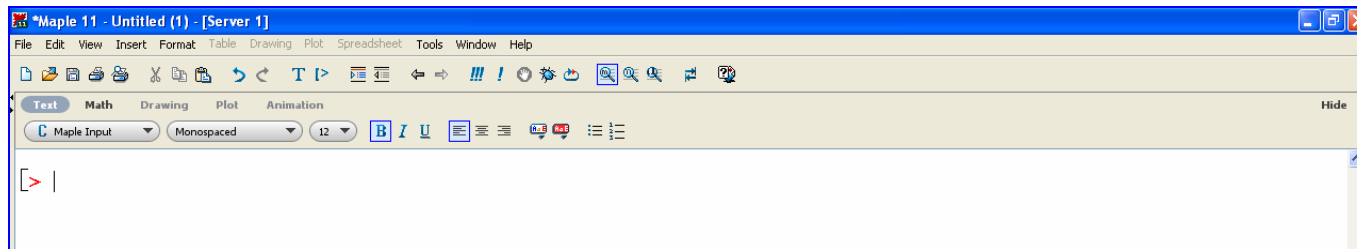
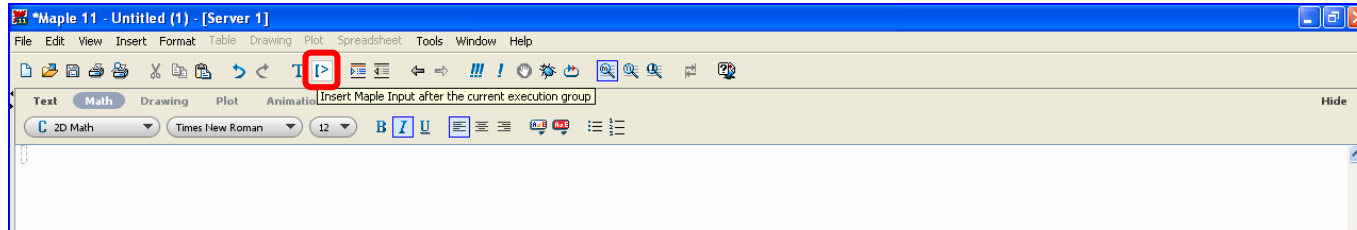
1. Open Maple HELP browser by topic *MechanicsofMaterials*. Find the Templates.
2. Find a basic menu at top of window. Follow to *View* group.
3. Follow to item *Open Page As Worksheet*.

Input Data. Node Points		Input Data. Loading Segments	
Force, N in Node Point 1 $-10 \cdot 10^3$		Length, m of Segment 1 5	 Distributed Load, N/m $25 \cdot \sin(2 \cdot z) \cdot 10^3$ Young Modulus, Pa on Segment 1 $2 \cdot 10^{11}$ Moment of Inertia, m^4 $190 \cdot 10^(-8)$
Moment, Nm in Node Point 1 $4 \cdot 10^3$		 <input type="checkbox"/> Movable Support <input checked="" type="checkbox"/> Rigid Constrained <input type="checkbox"/> None <input type="checkbox"/> Joint	

Ready Memory: 0.43M Time: 0.25s Text Mode



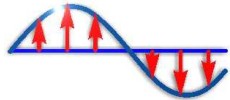
Mechanics of Materials™ Toolbox for Maple™



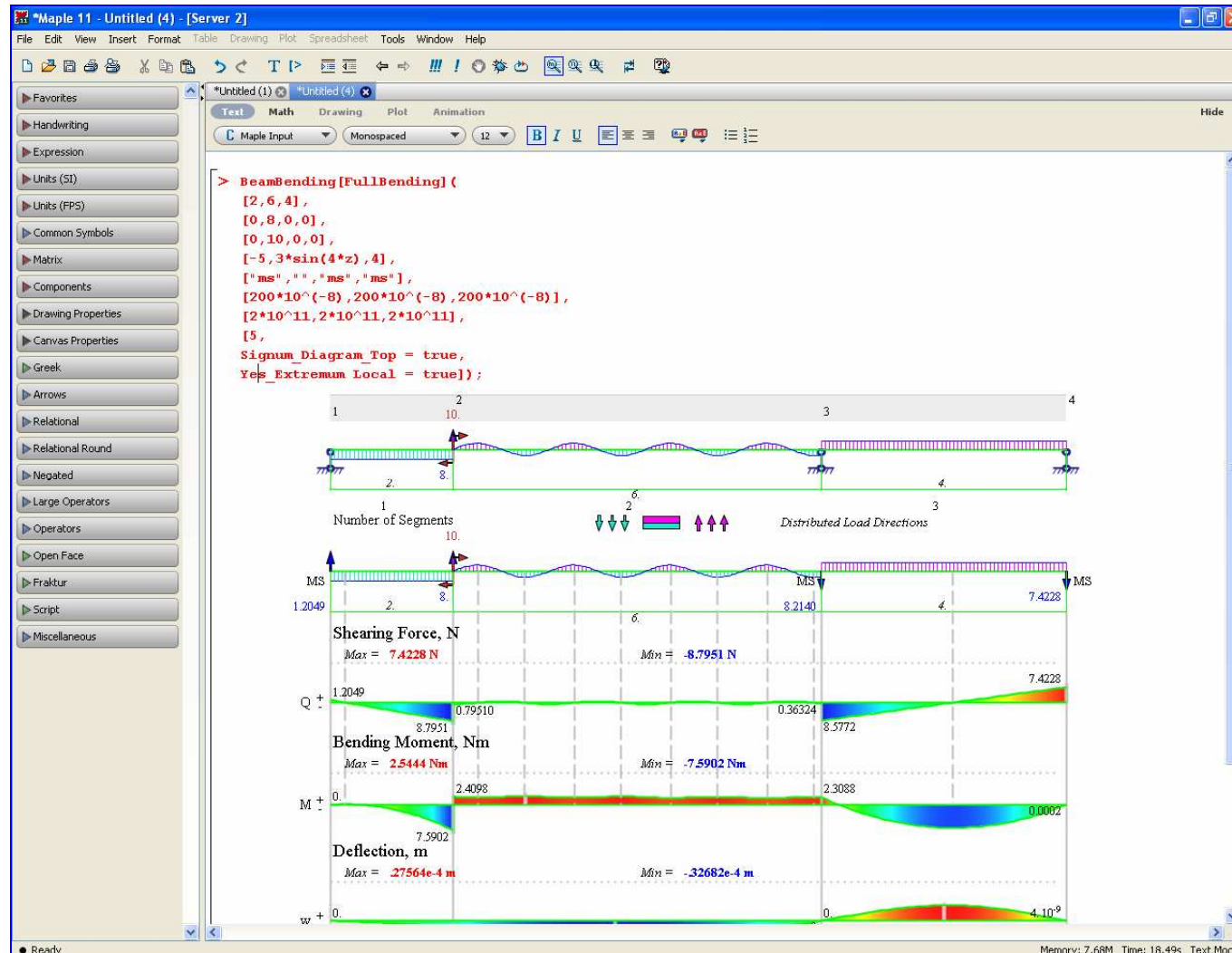
The Maple programming environment provides powerful opportunities for modeling your own tasks. To use this mode, press the button labeled “Insert Maple Input after the current execution group”. Then press **Ctrl+M** to enter Maple Input Mode.

All sixteen functions are available by using references to the toolbox packages.

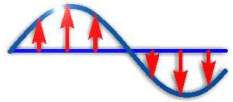
You may also use short form commands to access some functions by using the following format
PackageName
[FunctionofPackage]
(InputData);. For detailed information about package application, please see the topic **with** via Maple help.



Mechanics of Materials™ Toolbox for Maple™



It is also possible to copy code blocks from the Mechanics of Materials help page and paste them into a Maple worksheet.



Mechanics of Materials™ Toolbox for Maple™

Drawing Mode may also be used to enhance and isolate some of the graphical outputs.

