

# Manually Starting MSC Nastran and Uploading Results to the SOL 200 Web App

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AN MSC NASTRAN SOL 200 TUTORIAL

# Contact me

- Nastran SOL 200 training
- Nastran SOL 200 questions
- Structural or mechanical optimization questions
- Access to the SOL 200 Web App

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# Tutorial

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# SOL 200 Web App Capabilities

The Post-processor Web App and HDF5 Explorer are free to MSC Nastran users.

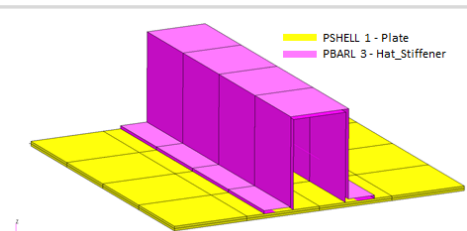
## Compatibility

- Google Chrome, Mozilla Firefox or Microsoft Edge
- Windows and Red Hat Linux
- Installable on a company laptop, workstation or server. All data remains within your company.

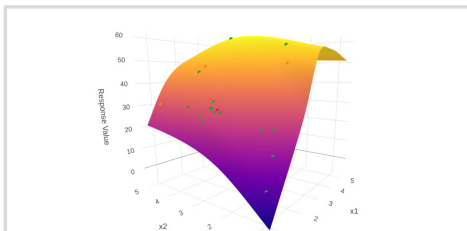
## Web Apps

## Benefits

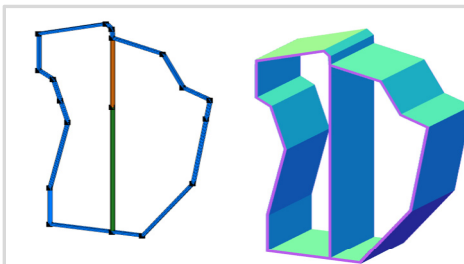
- REAL TIME error detection. 200+ error validations.
- REAL TIME creation of bulk data entries.
- Web browser accessible
- Free Post-processor web apps
- +80 tutorials



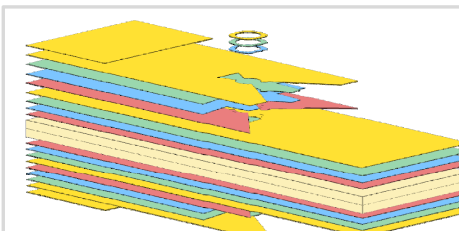
**Web Apps for MSC Nastran SOL 200**  
Pre/post for MSC Nastran SOL 200.  
Support for size, topology, topometry, topography, multi-model optimization.



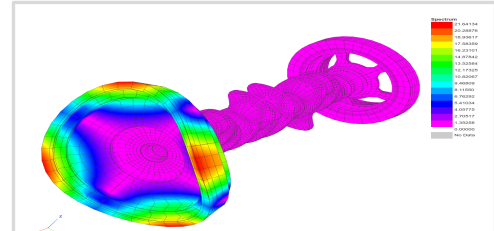
**Machine Learning Web App**  
Bayesian Optimization for nonlinear response optimization (SOL 400)



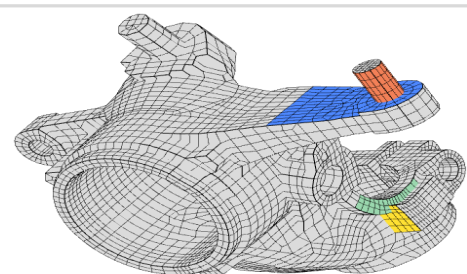
**PBMSECT Web App**  
Generate PBMSECT and PBRSECT entries graphically



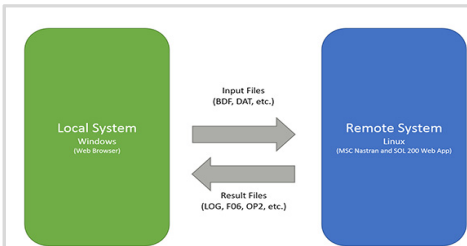
**Ply Shape Optimization Web App**  
Optimize composite ply drop-off locations, and generate new PCOMP entries



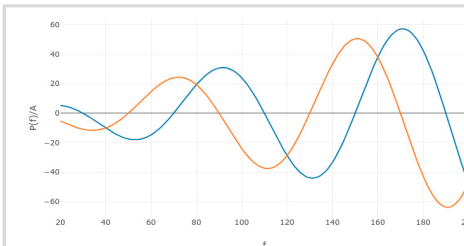
**Post-processor Web App**  
View MSC Nastran results in a web browser on Windows and Linux



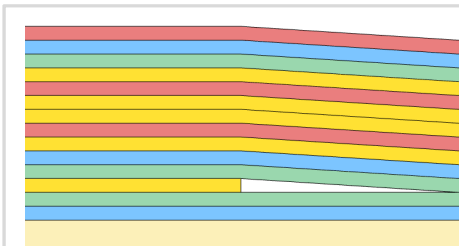
**Shape Optimization Web App**  
Use a web application to configure and perform shape optimization.



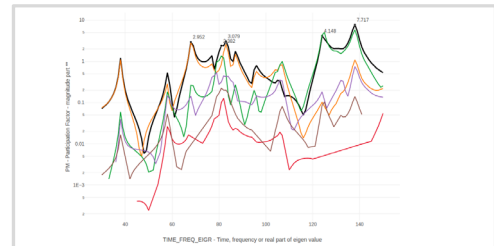
**Remote Execution Web App**  
Run MSC Nastran jobs on remote Linux or Windows systems available on the local network



**Dynamic Loads Web App**  
Generate RLOAD1, RLOAD2 and DLOAD entries graphically



**Stacking Sequence Web App**  
Optimize the stacking sequence of composite laminate plies



**HDF5 Explorer Web App**  
Create graphs (XY plots) using data from the H5 file

# Table of Contents

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- Manually Starting MSC Nastran for Local Optimization and Sensitivity Analysis
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- Manually Starting MSC Nastran for Multi Model Optimization
- Uploading Results to the SOL 200 Web App

# Manually Starting MSC Nastran for Local Optimization and Sensitivity Analysis

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1. The following procedure is only applicable if Global Optimization is selected

1. The following procedure is only applicable if Global Optimization is selected

## BDF Output - Design Model

### Optimization Type

- 1 ☒ Perform Local Optimization
- ☐ Perform Sensitivity Analysis
- ☐ Perform Global Optimization
- ☐ Perform Global Optimization Type 2
- ☐ Perform Parameter Study

### Optimization Type

1. Click on Exporter
2. Click on Download BDF Files

## 2. Click on Download BDF Files

SOL 200 Web App - Optimization

UploadVariablesObjectiveConstraintsSubcases**Exporter**Results

SettingsMatchOtherUser's GuideHome

BDF Output - Model

```
assign userfile = 'optimization_results.csv', status = unknown,  
form = formatted, unit = 52  
$ NASTRAN input file created by the Patran 2013.0.2 input file  
$ translator on February 08, 2017 at 15:12:27.  
$ Direct Text Input for Nastran System Cell Section  
$ Direct Text Input for File Management Section  
$ Direct Text Input for Executive Control  
$ Linear Static Analysis, Database  
SOL 200  
CEND  
  
$ Direct Text Input for Global Case Control Data  
TITLE = MSC.Nastran job created on 08-Feb-17 at 14:20:39  
ECHO = NONE  
DESOBJ(MIN) = 0000000  
$ DESOBJ Slot  
$ DSAPRT(FORMATTED, EXPORT, END=SENS) = ALL  
SUBCASE 1  
ANALYSIS = STATICS  
DESSUB = 40000001  
$ DRSPAN Slot  
SUBTITLE=Default  
SPC = 2  
LOAD = 2  
DISPLACEMENT(SORT1,REAL)=ALL  
SPCFORCES(SORT1,REAL)=ALL  
STRESS(SORT1,REAL,VONMISES,CENTER)=ALL  
$ Direct Text Input for this Subcase  
BEGIN BULK
```

BDF Output - Design Model

```
$*****  
$"  
$"  
$"  
$"  
$*****  
$  
$  
$-----  
$  
$  
$  
$  
DVPREL1 1000001 PCOMP 1 T1  
100001 1.0  
DVPREL1 1000002 PCOMP 1 T2  
100002 1.0  
DVPREL1 1000003 PCOMP 1 T3  
100003 1.0  
DVPREL1 1000004 PCOMP 1 T4  
100004 1.0  
DVPREL1 1000005 PCOMP 1 T5  
100005 1.0  
DVPREL1 1000006 PCOMP 1 T6  
100006 1.0  
DVPREL1 1000007 PCOMP 1 T7  
100007 1.0  
DVPREL1 1000008 PCOMP 1 T8  
100008 1.0  
DVPREL1 1000009 PCOMP 1 THETA1  
100009 1.0  
DVPREL1 1000010 PCOMP 1 THETA2  
100010 1.0  
DVPREL1 1000011 PCOMP 1 THETA3  
100011 1.0  
DVPREL1 1000012 PCOMP 1 THETA4  
100012 1.0  
DVPREL1 1000013 PCOMP 1 THETA5  
100013 1.0  
DVPREL1 1000014 PCOMP 1 THETA6  
100014 1.0  
DVPREL1 1000015 PCOMP 1 THETA7  
100015 1.0  
DVPREL1 1000016 PCOMP 1 THETA8  
100016 1.0
```

Download BDF Files

Download BDF Files

2

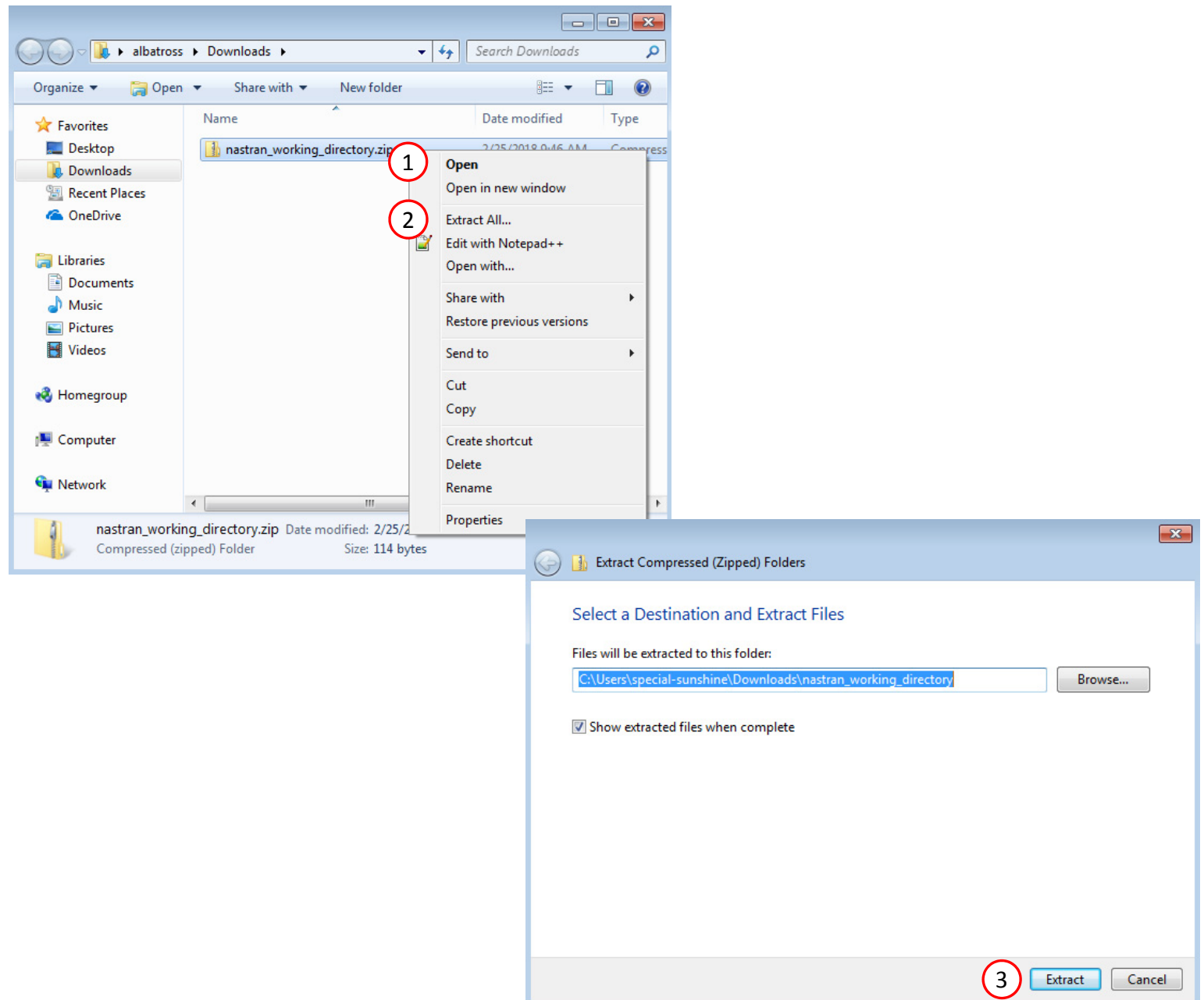
Developed by The Engineering Lab



# Perform the Optimization with Nastran SOL 200

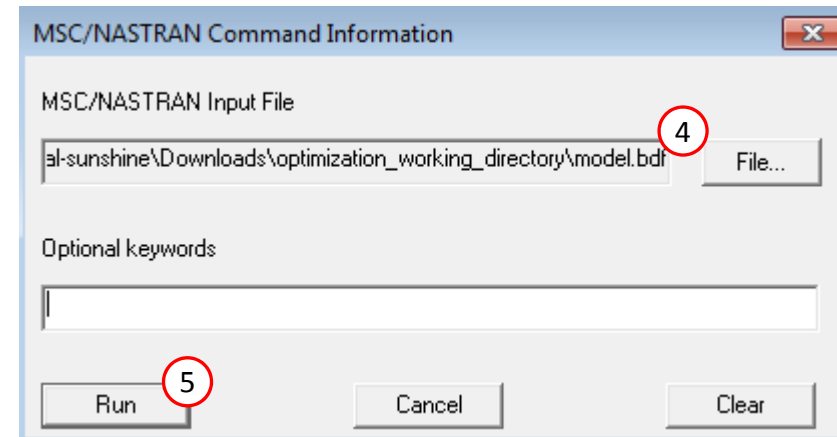
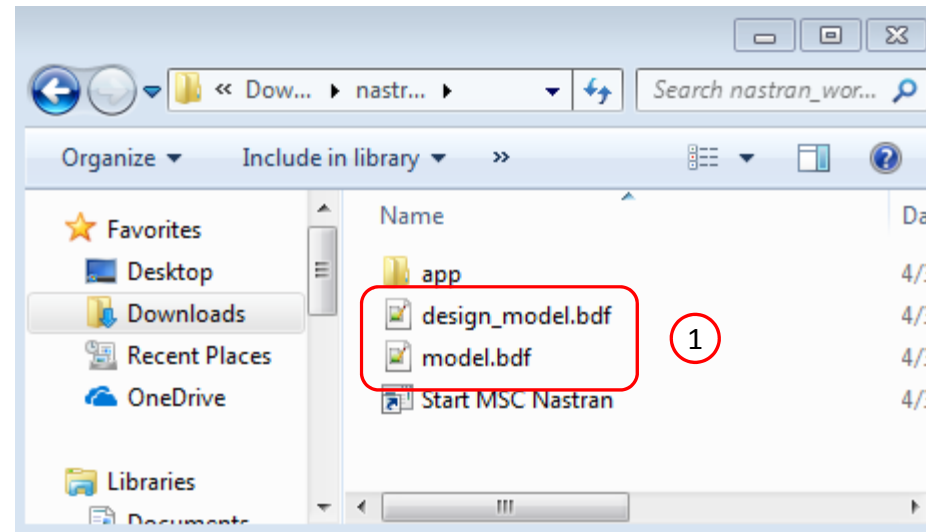
A new .zip file has been downloaded

1. Right click on the file
2. Click Extract All
3. Click Extract on the following window



# Perform the Optimization with Nastran SOL 200

1. The BDF files are available
2. Optional - The folder “app” and file “Start MSC Nastran” can be deleted
3. Start Nastran
4. Select ‘model.bdf’
5. Click Run



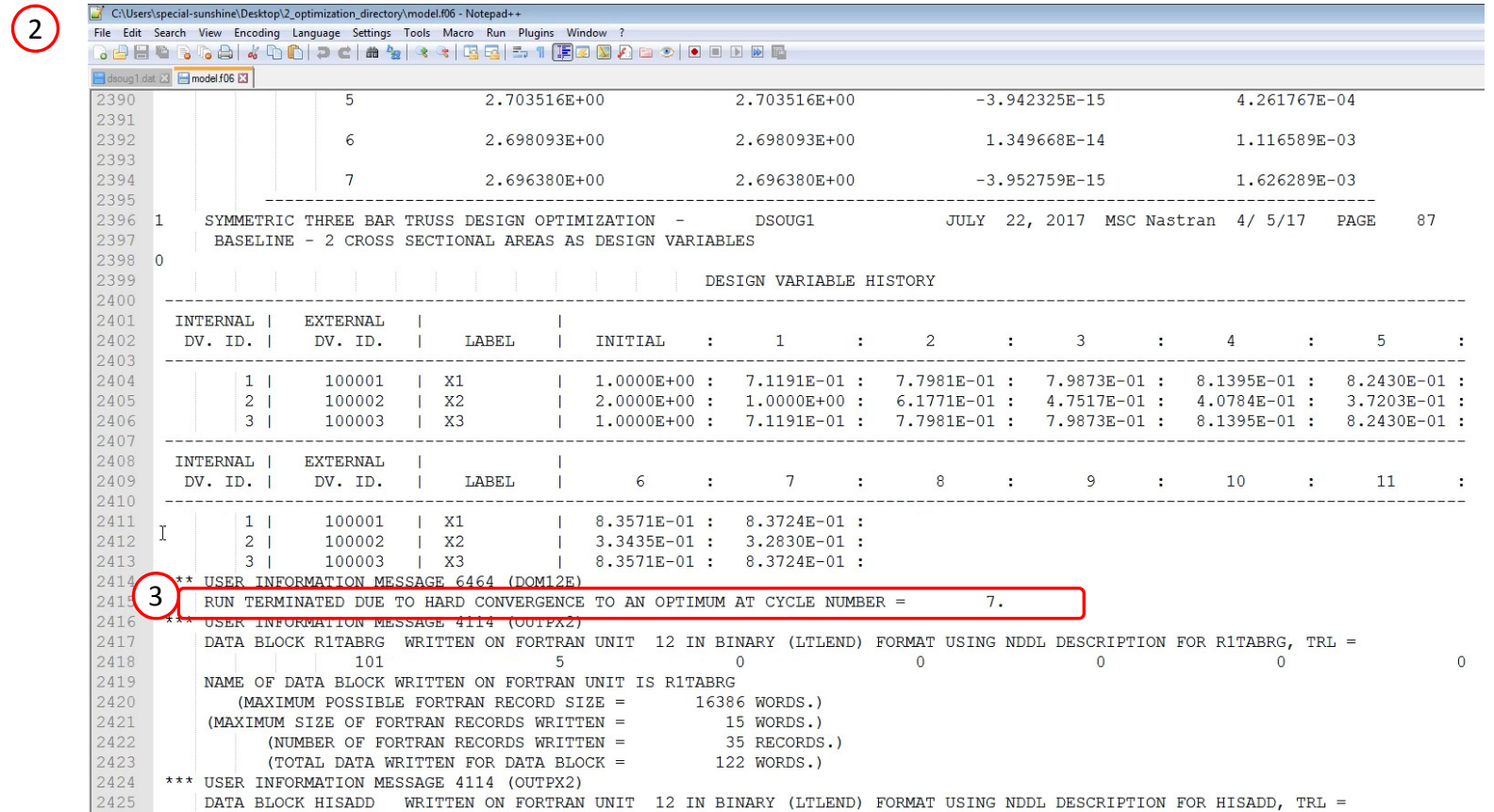
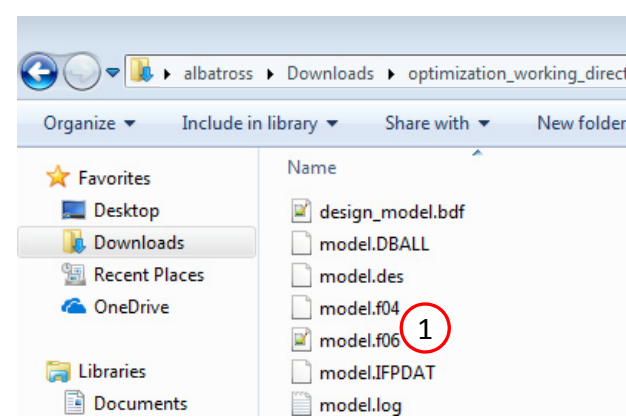
# Confirm the Optimization was Successful

1. An .f06 file has been created
2. Open the .f06 file in Notepad
3. Search the file for this message
  - RUN TERMINATED DUE TO  
HARD CONVERGENCE TO AN  
OPTIMUM

The message indicates the optimization was successful.

If performing Sensitivity Analysis, you may see this message instead:

- RUN TERMINATED DUE TO CASE CONTROL COMMAND  
DSAPRT (END=SENSITIVITY)



# Manually Starting MSC Nastran for Global Optimization

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1. The following procedure is only applicable if Global Optimization is selected

### BDF Output - Design Model

```
$
$
$      Optimization Control Settings
$-----
$
$
$
DOPTPRM  DESMAX  20      P1      1      P2      15
```

Developed by The Engineering Lab

1

- ☒
- Perform Global Optimization

1. Click on Exporter
2. Click on Download BDF Files

1. Click on Exporter

## 2. Click on Download BDF Files

SOL 200 Web App - Optimization
Upload Variables Objective Constraints Subcases **Exporter** Results
Settings Match Other User's Guide Home

---

### BDF Output - Model

```
$ NASTRAN input file created by the Patran 2013.0.2 input file
$ translator on February 08, 2017 at 15:12:27.
$ Direct Text Input for Nastran System Cell Section
$ Direct Text Input for File Management Section
$ Direct Text Input for Executive Control
$ Linear Static Analysis, Database
SOL 200
CEND

$ Direct Text Input for Global Case Control Data
TITLE = HSC_Nastran job created on 08-Feb-17 at 14:20:39
ECHO = NONE
DESOBJ(MIN) = 8000000
$ DESGLB Slot
$ DSAPRT(FORMATTED, EXPORT, ENH=SENS) = ALL
SUBCASE 1
ANALYSIS = STATICS
DESSUB = 40000001
$ DRSPAN Slot
SUBTITLE=Default
SPC = 2
LOAD = 2
DISPLACEMENT(SORT1,REAL)=ALL
SPCFORCES(SORT1,REAL)=ALL
STRESS(SORT1,REAL,VONMISES,CENTER)=ALL
$ Direct Text Input for this Subcase
BEGIN BULK
INCLUDE './design.model.bdf'
```

### BDF Output - Design Model

```
$*****
$*                                     *
$*                               Design Model                                *
$*                                                                           *
$*****
$
$                               Design Variables - Type 1
$-----
$
$
$
DVPREL1 1000001 PCOMP      1      T1
100001 1.0
DVPREL1 1000002 PCOMP      1      T2
100002 1.0
DVPREL1 1000003 PCOMP      1      T3
100003 1.0
DVPREL1 1000004 PCOMP      1      T4
100004 1.0
DVPREL1 1000005 PCOMP      1      T5
100005 1.0
DVPREL1 1000006 PCOMP      1      T6
100006 1.0
DVPREL1 1000007 PCOMP      1      T7
100007 1.0
DVPREL1 1000008 PCOMP      1      T8
100008 1.0
DVPREL1 1000009 PCOMP      1    THETA1
100009 1.0
DVPREL1 1000010 PCOMP      1    THETA2
100010 1.0
DVPREL1 1000011 PCOMP      1    THETA3
100011 1.0
DVPREL1 1000012 PCOMP      1    THETA4
100012 1.0
DVPREL1 1000013 PCOMP      1    THETA5
100013 1.0
DVPREL1 1000014 PCOMP      1    THETA6
100014 1.0
DVPREL1 1000015 PCOMP      1    THETA7
100015 1.0
DVPREL1 1000016 PCOMP      1    THETA8
100016 1.0
```

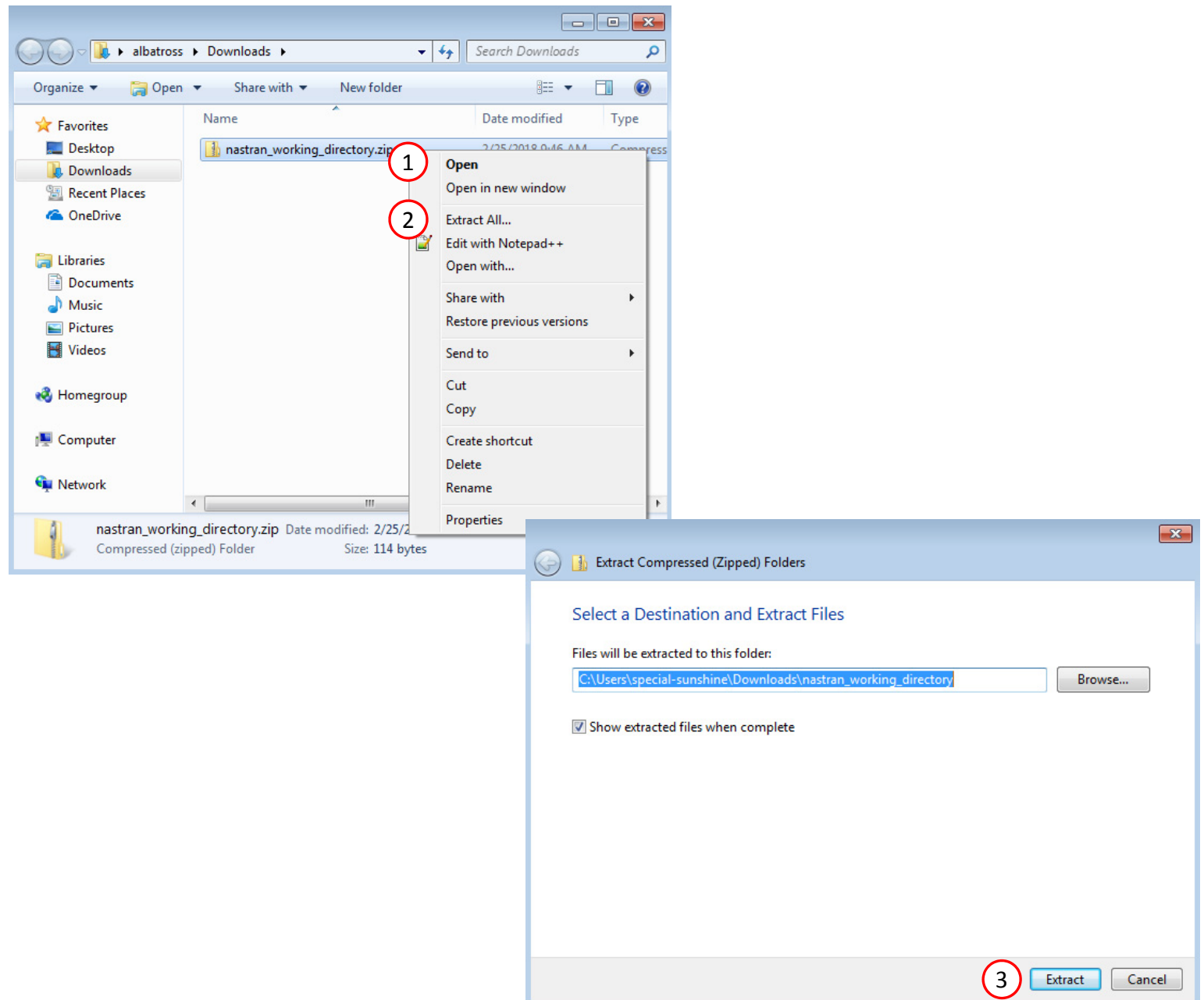
Download BDF Files

2

# Perform the Optimization with Nastran SOL 200

A new .zip file has been downloaded

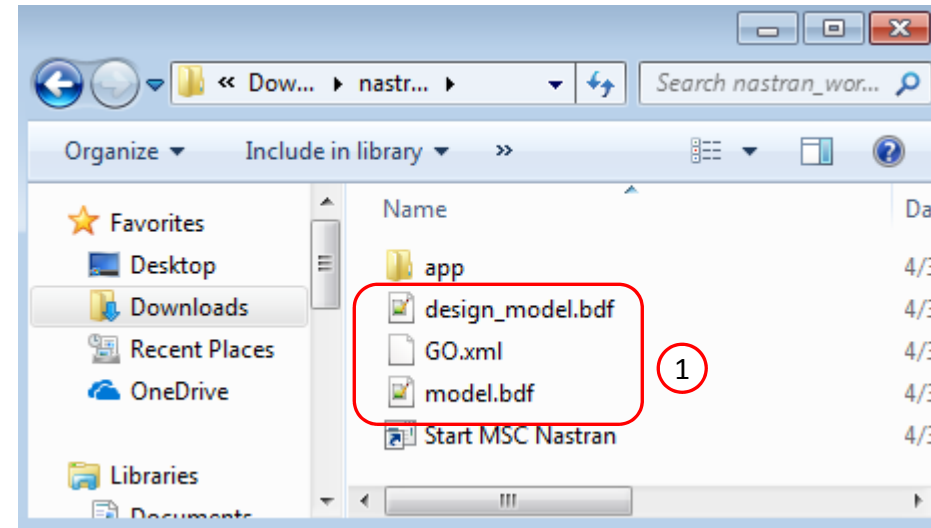
1. Right click on the file
2. Click Extract All
3. Click Extract on the following window



# Files

1. Ensure that the following files have been downloaded
  - model.bdf
  - design\_model.bdf
  - GO.xml
2. Optional - The folder “app” and file Start MSC Nastran” can be deleted

NOTE: If you are using INCLUDE files, ensure the additional .bdf/.dat files are also present.



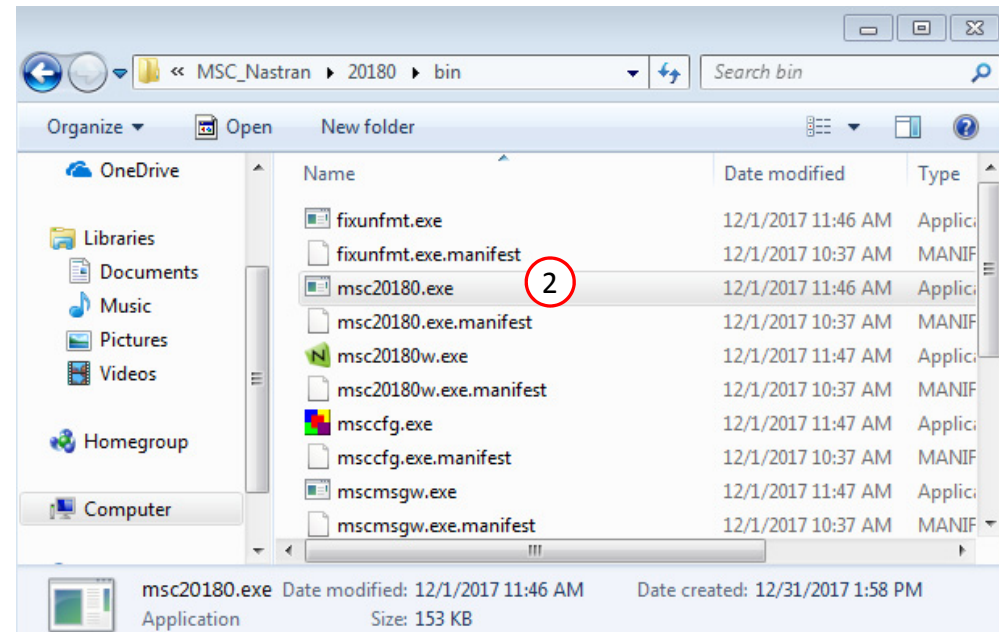
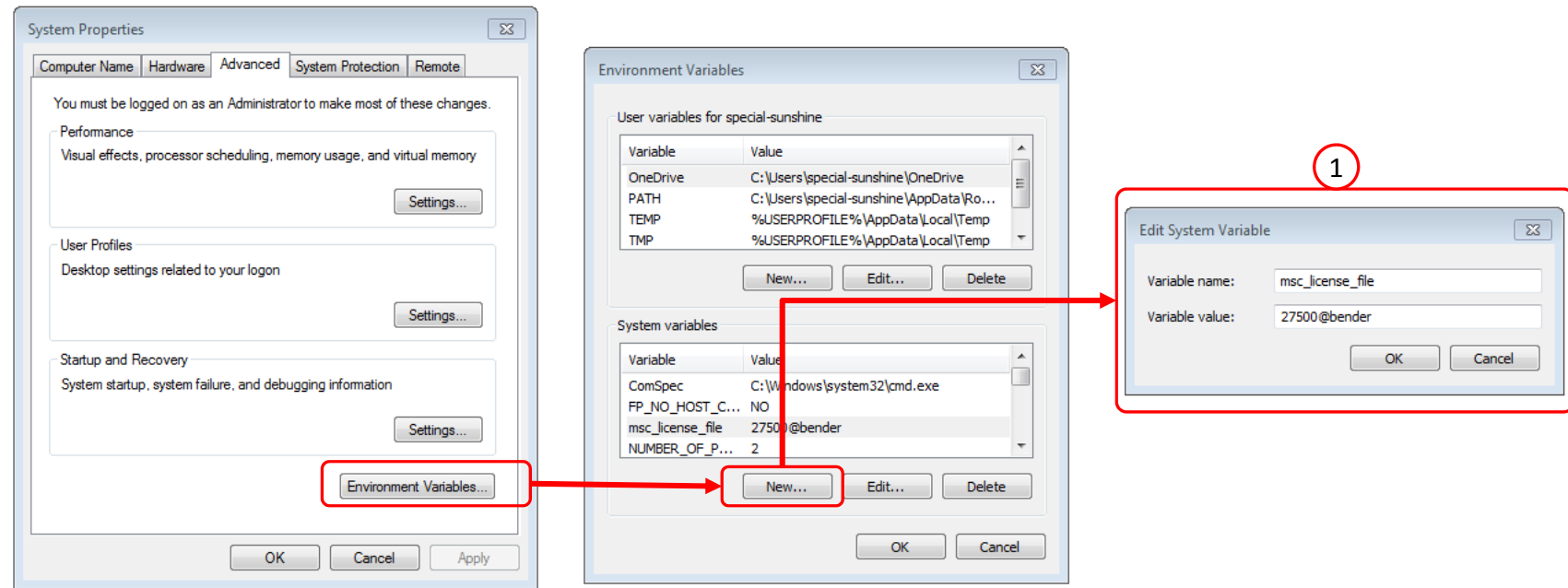


# Before Starting

The following must be configured or known

1. Ensure the MSC\_LICENSE\_FILE environment variable has been set and restart the machine for the changes to go into effect
  - In this example, the location of the license is 27500@bender. The license location will vary.
2. Track the location of the msc20180.exe file. Note this file is for MSC Nastran version 2018.0. Your version may be different. The file will be named differently depending on the version of MSC Nastran. Below is the location for this example:

C:\MSC.Software\MSC\_Nastran\20180\bin\msc20180.exe



# Open the Command Prompt

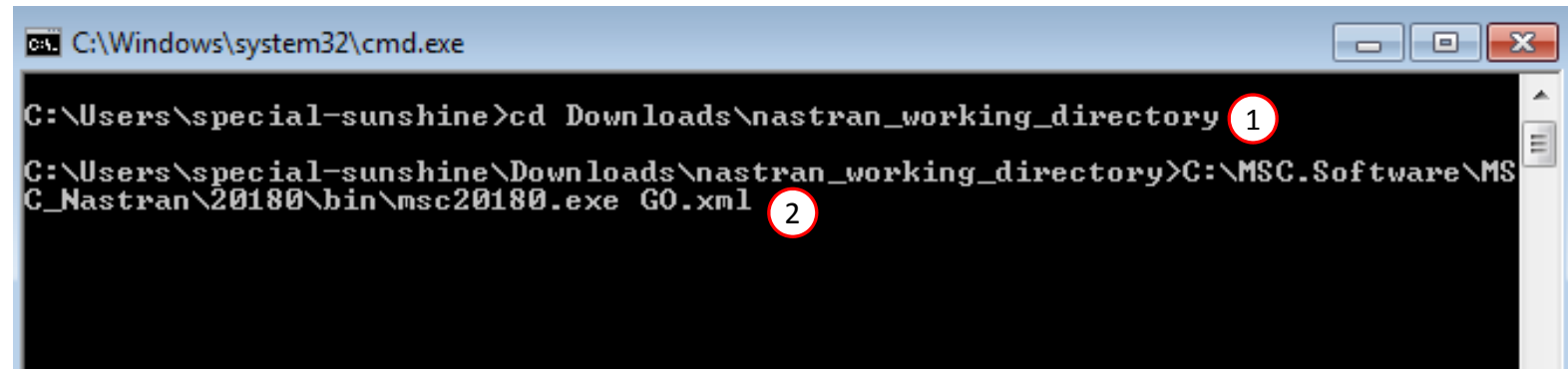
1. Navigate to the location of the GO.xml file:

```
cd
Downloads\nastran_working_
directory
```

2. Supply this command and hit enter to start the Global Optimization:

```
C:\MSC.Software\MSC_Nastran\20180\bin\msc20180.exe
MultiOpt GO.xml
```

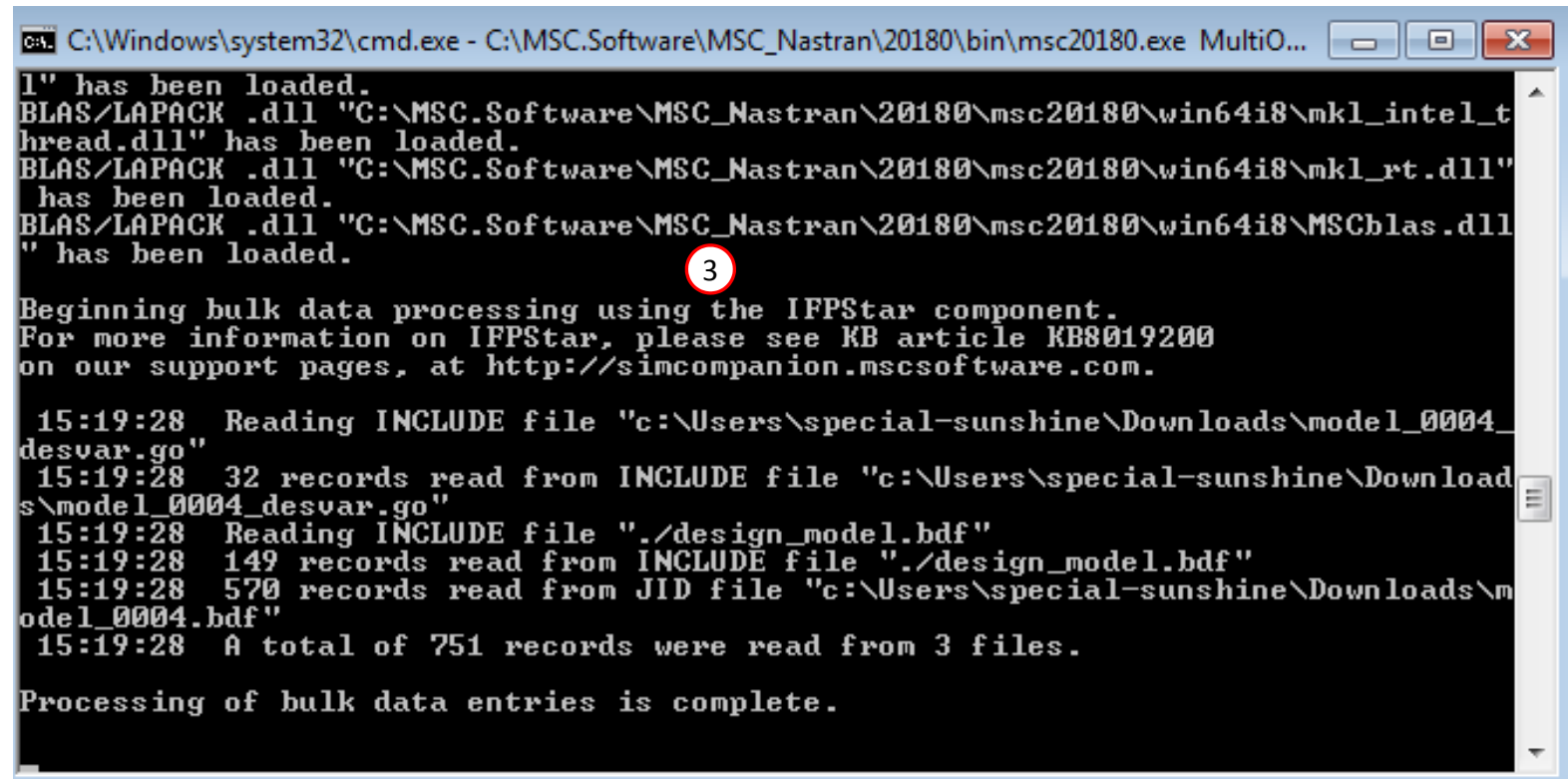
3. MSC Nastran has been started and will perform the Global Optimization.



```
C:\Windows\system32\cmd.exe

C:\Users\special-sunshine>cd Downloads\nastran_working_directory 1

C:\Users\special-sunshine\Downloads\nastran_working_directory>C:\MSC.Software\MSC_Nastran\20180\bin\msc20180.exe GO.xml 2
```



```
C:\Windows\system32\cmd.exe - C:\MSC.Software\MSC_Nastran\20180\bin\msc20180.exe MultiO...

1" has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\mk1_intel_t
hread.dll" has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\mk1_rt.dll"
has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\MSCblas.dll
" has been loaded. 3

Beginning bulk data processing using the IFPStar component.
For more information on IFPStar, please see KB article KB8019200
on our support pages, at http://simcompanion.mscsoftware.com.

15:19:28 Reading INCLUDE file "c:\Users\special-sunshine\Downloads\model_0004_
desvar.go"
15:19:28 32 records read from INCLUDE file "c:\Users\special-sunshine\Download
s\model_0004_desvar.go"
15:19:28 Reading INCLUDE file ".\design_model.bdf"
15:19:28 149 records read from INCLUDE file ".\design_model.bdf"
15:19:28 570 records read from JID file "c:\Users\special-sunshine\Downloads\m
odel_0004.bdf"
15:19:28 A total of 751 records were read from 3 files.

Processing of bulk data entries is complete.
```

# Manually Starting MSC Nastran for Multi Model Optimization

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# Export New BDF Files

1. Refer to the Multi Model web app
2. Scroll to the section titled Download Files
3. Click Download BDF Files

## SOL 200 Web App - Multi Model Optimization 1

### Preview of Merged Objective

```
DRESP2 5000000 R0 570000
DTABLE c1 c2 c3
DRESP1 8000000 8000000 8000000
DEQATN 570000
g(c1, c2, c3, r1, r2, r3) = c1 * r1 + c2 * r2 + c3 * r3
DTABLE c1 1.0 c2 0.0 c3 0.0

$ urlused: http://192.168.56.1:8080/optimization/
```

### Settings for Merged Model

Option	Status	Configure
Minimize or Maximize Combined Objective		MIN
Memory (mem)	✓	200MB
Number of Processors (smp)	✓	1
Option for Scratch (scr)		yes

```
<?xml version="1.0" ?>
<rc OptType="MMO" debug="no" >

  <Job name="m_stress" coef="1.0" mem="200MB" smp="1" scr="yes" blocking="0"/>
  <Job name="m_modes" coef="0.0" mem="200MB" smp="1" scr="yes" blocking="0"/>
  <Job name="m_storsp" coef="0.0" mem="200MB" smp="1" scr="yes" blocking="0"/>

  <Merge mem="200MB" smp="1" scr="yes" />

</rc>
```

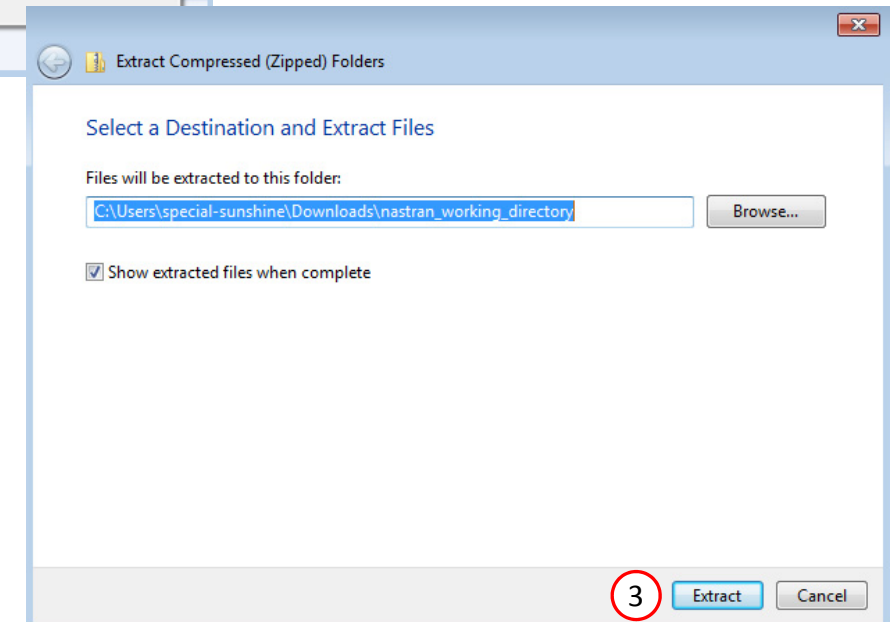
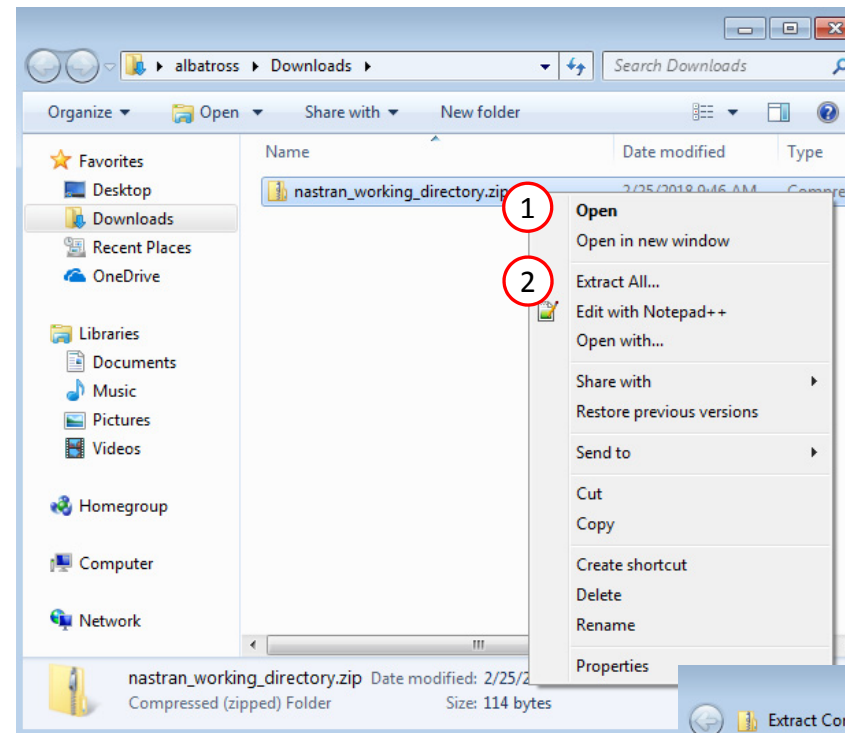
## 2 Download Files

Download BDF Files

3

# Perform the Optimization with Nastran SOL 200

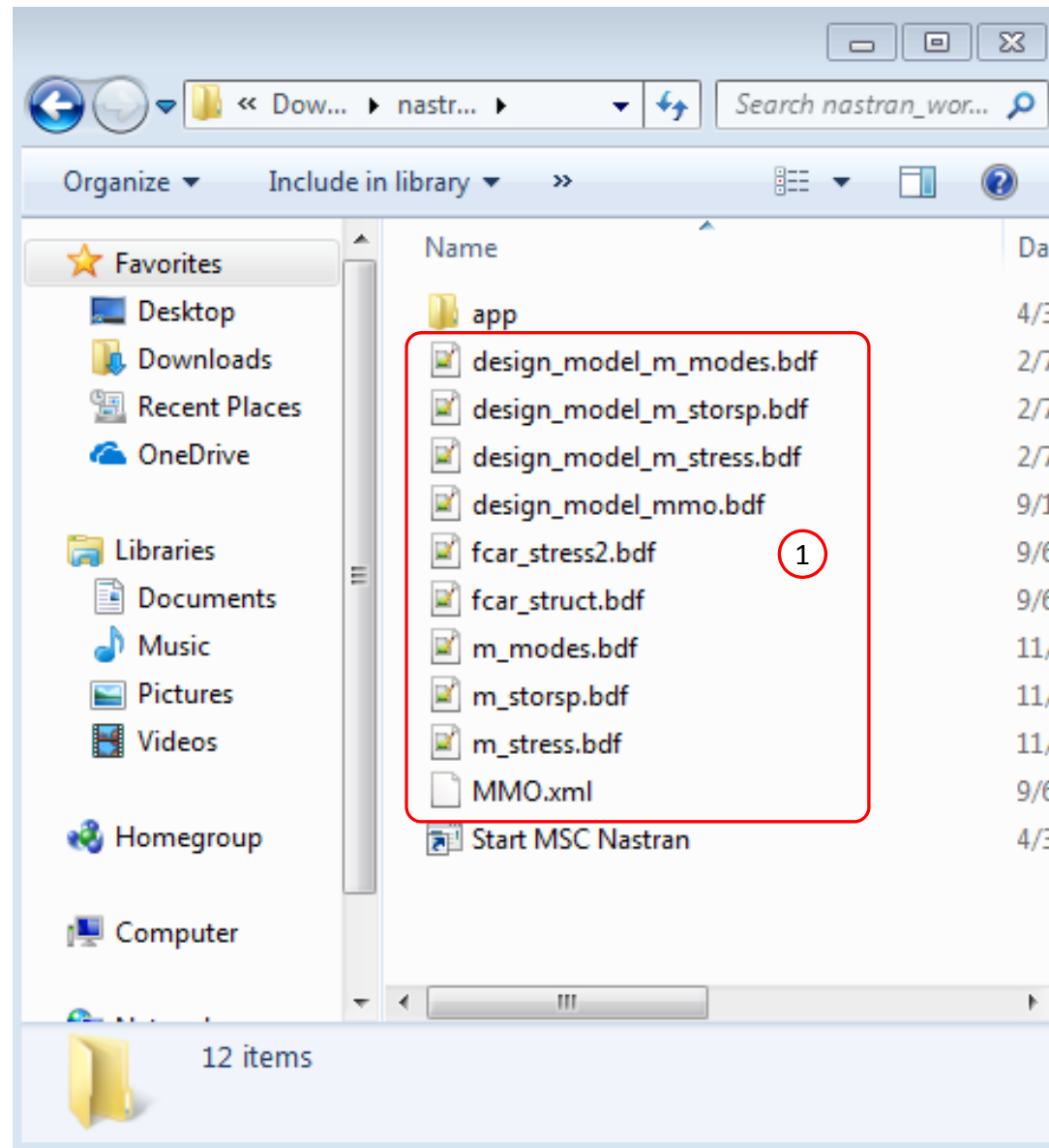
1. A new .zip file has been downloaded
2. Right click on the file
3. Click Extract All
4. Click Extract on the following window (Not shown)



# Files

1. The necessary BDF files and MMO.xml file are available.
2. Optional - The folder “app” and file Start MSC Nastran” can be deleted

NOTE: If you are using INCLUDE files, ensure the additional .bdf/.dat files are also present.

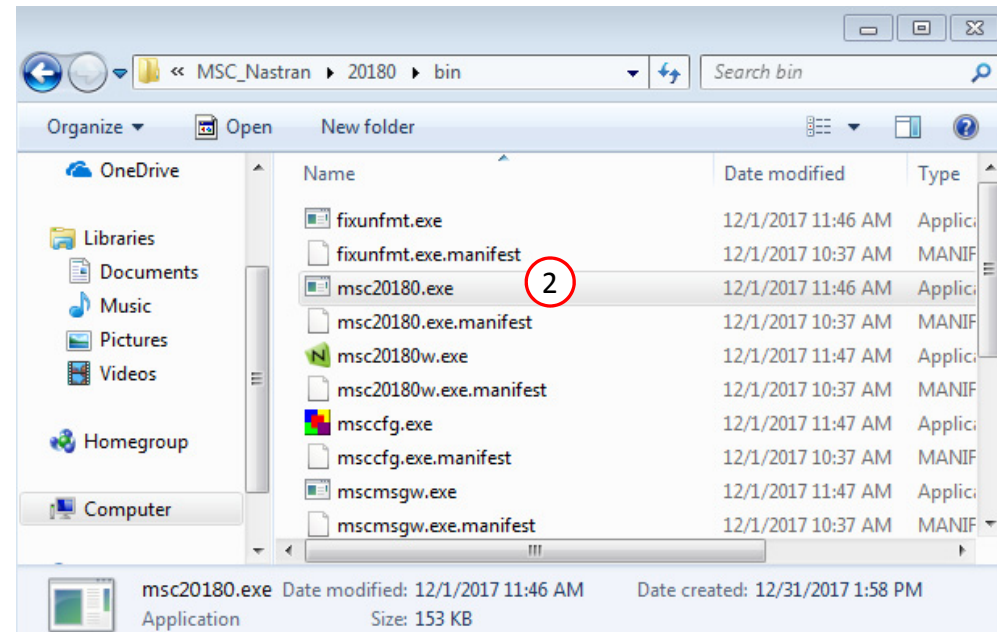
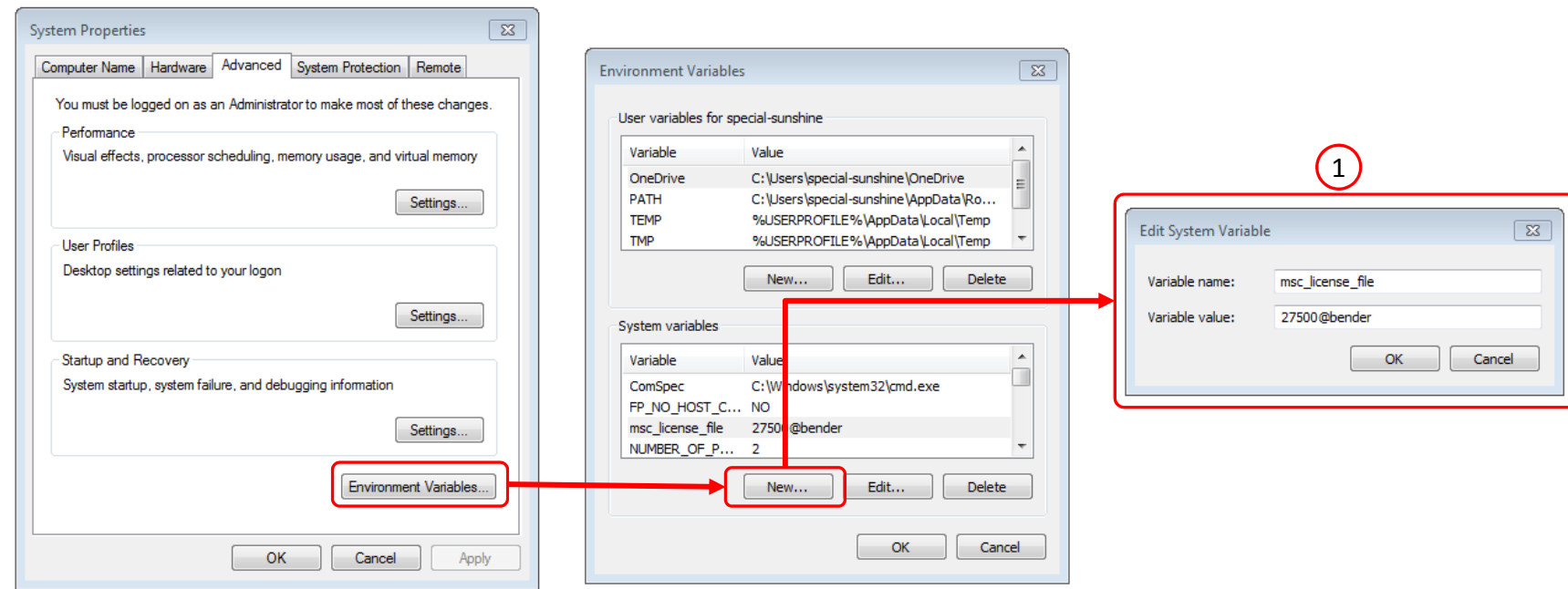


# Before Starting

The following must be configured or known

1. Ensure the MSC\_LICENSE\_FILE environment variable has been set and restart the machine for the changes to go into effect
  - In this example, the location of the license is 27500@bender. The license location will vary.
2. Track the location of the msc20180.exe file. Note this file is for MSC Nastran version 2018.0. Your version may be different. The file will be named differently depending on the version of MSC Nastran. Below is the location for this example:

C:\MSC.Software\MSC\_Nastran\20180\bin\msc20180.exe





# Open the Command Prompt

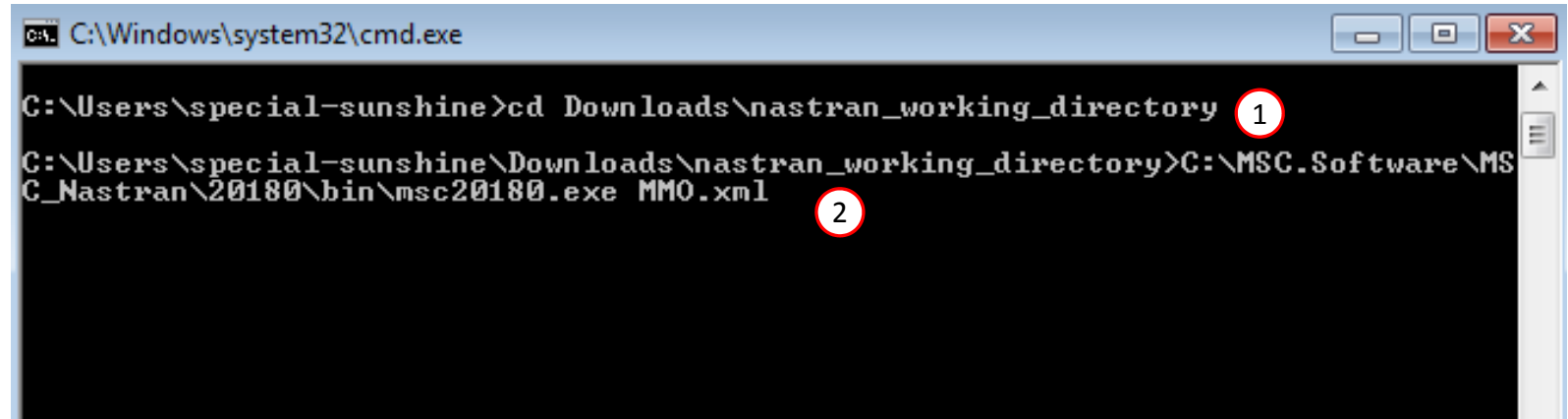
1. Navigate to the location of the MMO.xml file:

```
cd
Downloads\nastran_working_dir
ectory
```

2. Supply this command and hit enter to start the Multi Model Optimization:

```
C:\MSC.Software\MSC_Nastran\2
0180\bin\msc20180.exe
MultiOpt MMO.xml
```

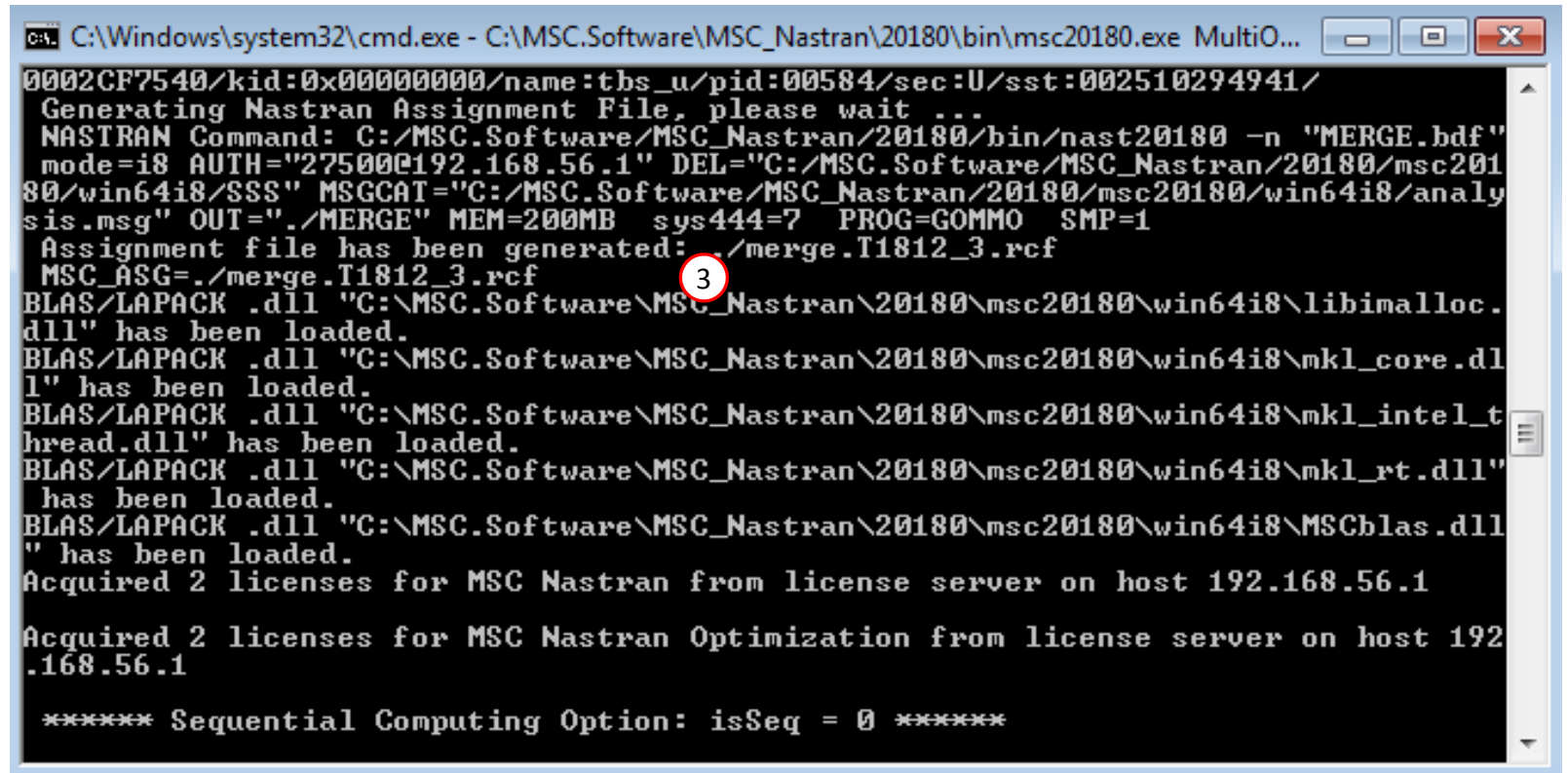
3. MSC Nastran has been started and will perform the Multi Model Optimization.



```
C:\Windows\system32\cmd.exe

C:\Users\special-sunshine>cd Downloads\nastran_working_directory 1

C:\Users\special-sunshine\Downloads\nastran_working_directory>C:\MSC.Software\MSC_Nastran\20180\bin\msc20180.exe MMO.xml 2
```



```
C:\Windows\system32\cmd.exe - C:\MSC.Software\MSC_Nastran\20180\bin\msc20180.exe MultiOpt MMO.xml

0002CF7540/kid:0x00000000/name:tbs_u/pid:00584/sec:U/sst:002510294941/
Generating Nastran Assignment File, please wait ...
NASTRAN Command: C:/MSC.Software/MSC_Nastran/20180/bin/nast20180 -n "MERGE.bdf"
mode=i8 AUTH="27500e192.168.56.1" DEL="C:/MSC.Software/MSC_Nastran/20180/msc201
80/win64i8/SSS" MSGCAT="C:/MSC.Software/MSC_Nastran/20180/msc20180/win64i8/analy
sis.msg" OUT="./MERGE" MEM=200MB sys444=7 PROG=GOMMO SMP=1
Assignment file has been generated: ./merge.T1812_3.rcf 3
MSC_ASG=./merge.T1812_3.rcf
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\libimalloc.
dll" has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\mkl_core.dl
l" has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\mkl_intel_t
hread.dll" has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\mkl_rt.dll"
has been loaded.
BLAS/LAPACK .dll "C:\MSC.Software\MSC_Nastran\20180\msc20180\win64i8\MSChlas.dll
" has been loaded.
Acquired 2 licenses for MSC Nastran from license server on host 192.168.56.1

Acquired 2 licenses for MSC Nastran Optimization from license server on host 192
.168.56.1

***** Sequential Computing Option: isSeq = 0 *****
```



# Manually Uploading Results

---

# Navigate to Results

## Optimization Type

1. Refer to the Optimization web app
2. Click Settings
3. Recall that the Optimization Type can be set in the Settings section

The Results section has a separate page for each Optimization Type

4. Click Results
5. If performing Local Optimization, click on the Local Optimization (.f06) link. If performing Sensitivity Analysis, click on the Sensitivities (.csv) link. Remember, each Optimization Type has its own Results page.

1

## Optimization Settings

Parameter	Description	Configure
APRCOD	Approximation method to be used	<input type="checkbox"/> 2 - Mixed Method
CONV1	Relative criterion to detect convergence	<input type="checkbox"/> Enter a positive real number
CONV2	Absolute criterion to detect convergence	<input type="checkbox"/> Enter a positive real number
DELX	Fractional change allowed in each design variable during any optimization cycle	<input type="checkbox"/> Enter a positive real number
DESMAX	Maximum number of design cycles to be performed	<input checked="" type="checkbox"/> 20
DISBEG	Design cycle number for discrete variable processing initiation	<input type="checkbox"/> Enter a positive integer
GMAX	Maximum constraint violation allowed at the converged optimum	<input type="checkbox"/> Enter a positive real number
P1	Print items, e.g. objective, design variables, at every n-th design cycle to the .f06 file	<input checked="" type="checkbox"/> 1
P2	Items to be printed to the .f06 file	<input checked="" type="checkbox"/> 15 - Print objective, design variab
TCHECK	Topology Checkerboarding	<input type="checkbox"/> -1 - Automatic selection (Default)
TDMIN	Minimum diameter of members in topology optimization	<input type="checkbox"/> Enter a positive real number
TREGION	Trust Region	<input type="checkbox"/> 1 - Trust Region On

5 10 20 30 40 50

## Optimization Type

3

- ☒ Perform Local Optimization
- ☐ Perform Sensitivity Analysis
- ☐ Perform Global Optimization
- ☐ Perform Global Optimization Type 2
- ☐ Perform Parameter Study

4

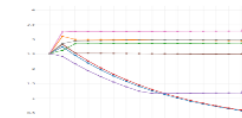
## Select a Results App



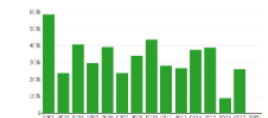
Global Optimization (multiplt.log)



Global Optimization Type 2 (.f06)



Local Optimization (.f06)



Parameter Study (.f06)

5

# Upload the Results File

1. A new page is opened
2. Note that the compatible file type is indicated as the .f06 file extension
3. Click Select Files and select a file with the indicated file extension
4. Click Upload Files

SOL 200 Web App - Local Optimization Results 1

Upload 2 .f06 Files

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3 1. Select files model.f06

4 2. Upload files

Uploading

# Review Results

The results are displayed.

This is the Local Optimization Results page. Special considerations must be made.

1. Ensure the messages shown have green checkmarks. This is indication of success. Any red icons indicate challenges.
2. The final value of objective, normalized constraints (not shown) and design variables can be reviewed.

The following steps are optional

3. Click +Option
4. Select the file design\_model.bdf
5. Click Import. Doing this will add additional descriptions for each variable. This will only work if lines containing \$LCOMM are present.

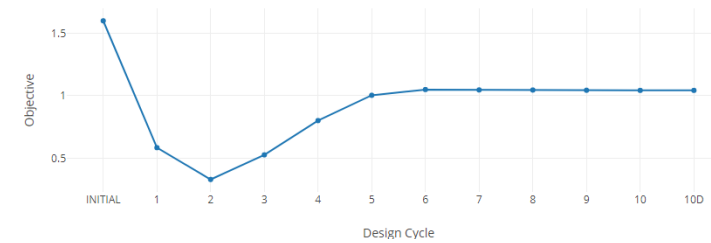
## Final Message in .f06

1

RUN TERMINATED DUE TO HARD CONVERGENCE TO AN OPTIMUM AT CYCLE NUMBER = 10.  
AND HARD FEASIBLE DISCRETE DESIGN OBTAINED

## Objective

2



## Design Variables

3

+ Options

4

Select files

design\_model.bdf

Import

5

