

# Solid Model Creation

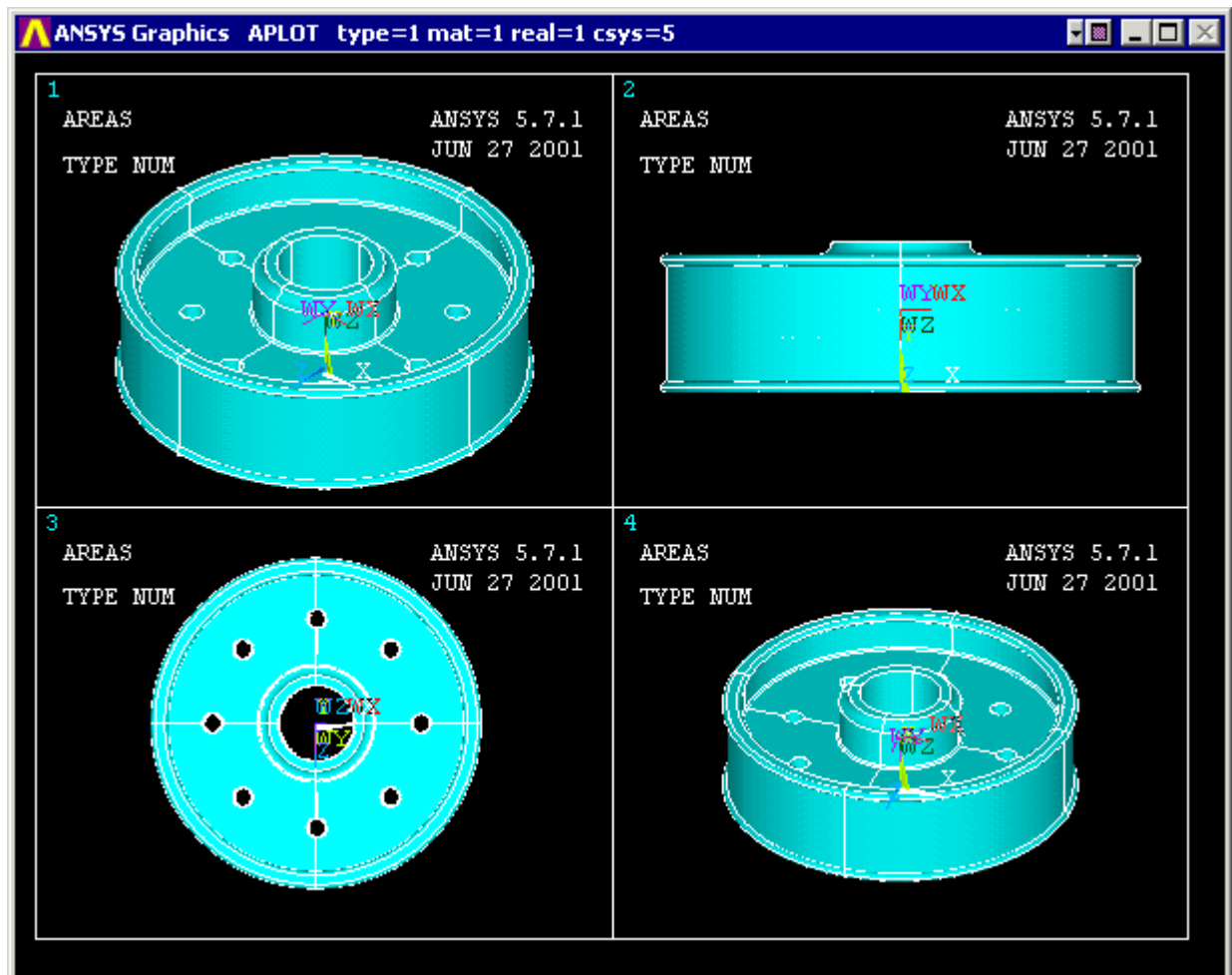
## Introduction

This tutorial is the last of three basic tutorials devised to illustrate common features in ANSYS. Each tutorial builds upon techniques covered in previous tutorials, it is therefore essential that you complete the tutorials in order.

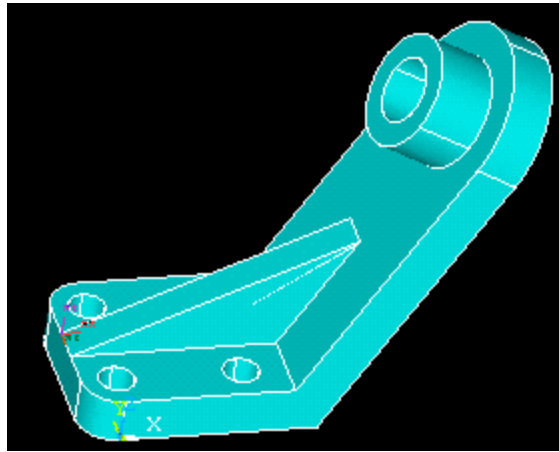
The Solid Modelling Tutorial will introduce various techniques which can be used in ANSYS to create solid models. Filleting, extrusion/sweeping, copying, and working plane orientation will be covered in detail.

Two Solid Models will be created within this tutorial.

We will create a solid model of the pulley shown in the following figure.



We will also create a solid model of the Spindle Base shown in the following figure.



## ANSYS Command Listing

### Pulley Model

```

/PREP7

BLC4,2,0,1,5.5           ! Create rectangles
BLC4,3,2,5,1
BLC4,8,0,0.5,5

AADD,ALL                 ! Add the areas together

CYL4,3,5.5,0.5           ! Create circles
CYL4,8.5,0.2,0.2

ASBA,4,1                 ! Subtract an area

AGEN,2,2,,,,4.6         ! Mirrors an area
AGEN,2,1,,, -0.5

AADD,ALL                 ! Adds all areas

LFILLT,22,7,0.1,,       !Create a fillet radius of 0.1mm between lines 30
LFILLT,26,7,0.1,,

AL,3,6,9                 ! Creates fillet area (arbitrary area using lines
AL,10,11,14

AADD,ALL

! Sweep

K,1001,0,0,0             ! Keypoints
K,1002,0,5,0

VROTAT,3, , , , ,1001,1002,360, , ! Sweep area 4 about axis formed by keypoints 1001

K,2001,0,3,0
K,2002,1,3,0
K,2003,0,3,1

```

```

KWPLAN,1,2001,2002,2003      !Align WorkPlane with keypoints
CSYS,5                       ! Change Active CS to Global Cartesian Y

CYL4,5.5,0,0.5, , , ,1     ! Create circle

VGEN,8,5, , , ,45, , ,0    ! Pattern the circle every 45 degrees

!Subtract areas

vsbv,all,5
vsbv,13,6
vsbv,all,7
vsbv,4,8
vsbv,all,9
vsbv,2,10
vsbv,all,11
vsbv,2,12

```

## Spindle Base Model

```

/PREP7

BLC4,0,0,109,102           ! Create rectangle

K,5,-20,82                 ! Keypoints
K,6,-20,20
K,7,0,82
K,8,0,20

LARC,4,5,7,20              ! Line arcs
LARC,1,6,8,20
L,5,6

AL,4,5,6,7                 ! Creates area from 4 lines

AADD,1,2                   ! Now called area 3
CYL4,0,20,10               ! Area 1
AGEN,2,1, , ,69           ! Mirrors area 1
AGEN,2,1,2, , ,62        ! Mirrors again
ASBA,3,ALL                 ! Subtracts areas

VOFFST,6,26                ! Creates volume from area

K,100,109,102,0           ! Keypoints
K,101,109,2,0
K,102,159,102,sqrt(3)/0.02

KWPLAN,-1,100,101,102     ! Defines working plane

BLC4,0,0,102,180          ! Create rectangle
CYL4,51,180,51            ! Create circle
AADD,25,26                ! Add them together

VOFFST,27,26              ! Volume from area

VADD,1,2                   ! Add volumes

AADD,33,34,38             ! Add areas
AADD,32,36,37

```

```

CYL4,51,180,32, , , ,60      ! Create cylinder
VADD,1,3                      ! Add volumes
CYL4,51,180,18.5, , , ,60   ! Another cylinder
VSBV,2,1                      ! Subtract it

WPCSYS,-1,0                  ! This re-aligns the WP with the global coordinate system

K,200,-20,61,26             ! Keypoints
K,201,0,61,26
K,202,-20,61,30

KWPLAN,-1,200,201,202      ! Shift working plane
CSYS,4                      ! Change active coordinate system

K,203,129-(0.57735*26),0,0   ! Keypoints
K,204, 129-(0.57735*26) + 38, sqrt(3)/2*76,0

A,200,203,204              ! Create area from keypoints

VOFFST,7,20,               ! Volume from area
VADD, ALL                  ! Add it together

```