7$%/(2) &217(176

$UF 7KURXJK 3RLQWV
$UF 7KURXJK 3RLQWV ZLWK /LPLWV
$UF
(OOLSVH
/LQH
,QILQLWH /LQH
%LWDQJHQW /LQH
%LVHFWLQJ /LQH
/LQH 1RUPDO WR &XUYH
$[LV /LQH
3RLQW
3RLQW E\ 8VLQJ &RRUGLQDWHV
(TXLGLVWDQW 3RLQWV
,QWHUVHFWLRQ 3RLQW
3URMHFWLRQ 3RLQW
$OLJQ 3RLQWV
6SOLQH
&RQQHFW &XUYH
3DUDERO
+\SHUERO
&RQLF
(ORQJDWHG +ROH
&\OLQGULFDO (ORQJDWHG +ROH
.H\KROH
7H[W
3URILOHV
&RQVWUDLQWV
'LPHQVLRQDO &RQVWUDLQWV
*HRPHWULFDO &RQVWUDLQWV
2SHUDWLRQV RQ 3URILOHV
&RUQHU
7DQJHQW $UF
&KDPIHU
7ULP DQG %UHDN
6SHFLILFDWLRQ 7UHH
+LGH 6KRZ
&RQ_ <$UF 7KURXJK 3RLQWV

6 R O L G & R P E L Q H
0XOWL 6HFWLRQ 6ROLGV
5HPRYH 0XOWL 6HFWLRQ 6ROLGV
& O R V H 6 X U I D F H
7 K L F N 6 X U I D F H
6 K H O O
6 W L I I H Q H U
2SHUDWLRQV RQ 6KDSHV
)LOOHW
& K D P I H U
' U D I W V
7 K L F N Q H V V
5 H P R Y H) D F H
5HSODFH)DFH
6SOLW 6XUIDFH
6 H Z 6 X U I D F H

$ S S H Q G L [(
$ G Y D Q F H G ' U H V V 8 S) H D W X U H V
' U D I W % R W K 6 L G H V
$ G Y D Q F H G ' U D I W
$ X W R P D W L F ' U D I W
$XWRPDWLF)LOOHWLQJ

,QWURGXFWLRQ

&$7,$ '(;3(5,(1&(3DUW 'HVLJQ DQG 6NHWFKHU

8SRQ FRPSOHWLRQ RI WKLV FRXUVH WKH VWXGHQW ZLOO EH DEOH WR XVH WKH IROORZLQJ WRSLFV

- &UHDWLQJ VNHWFKHV
- &RQVWUDLQLQJ VNHWFKHV
- 0RGLI\LQJ VNHWFKHV
- &UHDWLQJ SDUWV
- 0RGLI\LQJ SDUWV
- 3HUIRUPLQJ ERROHDQ RSHUDWLRQV RQ SDUWV
- %DVLF XVH RI VXUIDFHV LQ SDUW GHVLJQ
- $SSO\LQJ PDWHULDOV WR SDUWV

0DQXDO)RUPDW

,W LV LPSRUWDQW WR XQGHUVWDQG WKH LQWUHQGHG IRUPDWWLQJ RI WKH
7KLV PDQXDO LV GHVLJQHG WR EH ZHOO GRFXPHQWHG DQG FRQVLVWHQW
ORW RI UHDGLQJ DV ZHOO LQ RUGHU WR (QVXUH WKDW
H[HUFLVHV LQ WKLV ERRN ZLOO
LQIRUP \RX DERXW ZKDW \RX KDYH
VWHSV DUH LQ EROG W\SH DQG
\QWKLQJ WKDW DSSHDUV RQ WKH
&$7,$ SURYLGHV²W
LQIRUPDWLRQ LQ SXOO GRZQ PHQXV SRS XS ZLQGRZV DQ

\Q H[DPSOH RI D VWHS DQG LWV
EH WKHUH

6HOHFW D ORFDWLRQ WR
<RX ZLOO FRQWLQXH
VLPLODU WR WKH GLDJUDP VKRZQ EHORZ

\V \RX FDQ VHH WKH
LQIRUPDWLRQ IROORZLQJ WKH
JRLQJ QH[W ,W LV
&$7,$ '(;3(5,(1&(

\OVR \RX ZLOO
\RX NQRZ KRZ WR
QRW TXLWH
UHYLHZ LW
DVVXPH WKDW \RX
ZLOO EH

3DUW 'HVLJQ 6NHWFKHU

&$7,$ '(;3(5,(1&(XVHV WKH 6NHWFKHU GDVSRS FDUVHDWWVH SWUORQ
7KHVH SURILOHV FDQ EH VKDSHG EVQ GRIORRFQVWHGDYLQDWWF DQ
REMHFWLYH RI WKH FRXUVH LV WRWRHDRUQVkVRUZDLQR SXUVHIL6
GHVLUHG VSHFLILFDWLRQV 6NHWFKHDWLQJ SYURUI\LSRZHU
HDV\ WR XVH

7KH VHFRQG REMHFWLYH RI WKH 3FDRXWVHLVQWR 7XKVHVWkM
GHILQH WZR GLPHQVLRQDO FURVVHHFLFDWLRQQVLRQDEHVkDE
7KHUH DUH VHYHUDO GLIIHUHQW VRkSHUDWWLRQW WFDkQWEHF
SHUIRUPHG RQ WKHP %\ FRPELQLQJX WkEVGHWkLDSHDV YDQ
SDUWV

7KH WKLUG REMHFWLYH RI WKH FRXGYDQLFVHGRPHDVkORGLVDU
FUHDWLQJ VNHWFKHV DQG SDUWVJHR7PHLWUQFQGXSHUVkEY
WKUHH GLPHQVLRQDO JHRPHWU\ XRQHWWR WWkHXWHHWIFkRSHE
VHW XS W\SLFDO YDOXHV DW PXRPSLSHOHURFXDWLVQWR SDU
PRUH G\QDPLF VNHWFK ,Q WHUPVZRWSDXWWM EkVOLWJLQS O\HX
KRZ WR SHUIRUP ERROHDQ RSHUDWLRQV RQ WKHP

7KH IRXUWK REMHFWLYH LV WR EHHVRPHVIkLRXHQDQ DPWRGL
\RXU GHVLJQ HLWKHU E\ FKDQJLQJQWkHU SEDUPRFHLWHQJ WWk
VNHWFK WKDW ZDV XVHG 7KLV LV'D3I(DL(U1G&\(VDPSOLHWSLUV
WKH UHDO VWUHQJWK RI 3DUW 'HVLJQ

7KH ILIWK REMHFWLYH LV WR LQWUDRFHXFHQWWkHXSEURW ZGL
SURFHVV DQG KRZ WR DSSO\ YDULRXV PEHDQWLRQQV\WRR\
LQWURGXFWLRQ DQG LW LV QRW D FRPSOHWH FRXUVH R

,Q FRQFOXVLRQ \RX VKRXOG EH DE6NHWWFKGHUVDJQG P3DQW\W
DSSV LQ DQ HIILFLHQWLQGQLQWHUUXkWRVXEPXWL QJWDWkRIXOG IH
QDWXUDO E\ WKH HQG RI WKH FRXUVH

6HOHFW D ORFDWLRQI DWEKRHY HO LWQKHH WRXULQHG EOXH EHIRUH
ORFDWLRQ LW VKRXOG DSSHDUL NZLH WWKKWKRHQ MHVUKWRIZFQDEHFO
VXUH ZKHQ \RX VSHFLI\ WKH RWKHOVRO EHSSWDEQEOXHK DEWIW
VHOHFWLQJ LQ WKH ZRUNVSDFH

6HOHFW D ORFDWLRQ WR WKH UWJKWRXOGWKHSSHUDVLZRLXWK
KRUL]RQWDO FRQVWUDLQW RQ WKJHUEHPKHQZQ EEQGRZR N

6HOHFW D ORFDWLRQ EHORZ WKHD$LUHWLVRKXRXOHFDSSLHRQU
WR WKH GLDJUDP VKRZQ EHORZ L<URFOPLDKWVHQRWLFKLD
FRLQFLGHQFH FRQVWUDLQW 7KLVFRQLQHWQRHEHRQVW
WKHD[LV 7KLV DQG RWKHU FRQVWUDLQWDZLEOEG GLV

6HOHFW D ORFDWLRQ WR WKH HQG SRLQW RI WKH YHUWLFDO OLQH DQG WKH VKRUWHVW GLVWDQFH EHWZHHQ WKH FRQVWUDLQHG &RQVWUDLQWV ZLOO EH GLVSOD\HG

6HOHFW D ORFDWLRQ DERYH WKH SUHYLRXV ORFDWLRQ WR VKRZ EHORZ

6HOHFW D ORFDWLRQ WR WKH OHIW RI WKH SUHYLRXV ORF

6HOHFW D ORFDWLRQ EHORZ XWKHVNSHUWHFKLRVXKVRXOGGDOWRLRQV
VKRZQ KHUH

6HOHFW WKH RULJLQ SRLQWORRQWKHVVRXWFKHDWHLQWKH H
WLPH VHOHFWLQJ WKH VWDUW GSRLQGWWDKHLFRPZLDOQGFORR
XQGR VHOHFWLRQV LQ WKH PLGGOHRGEFURQDWLQJ\RXULQ
WK&W=UNH\ERDUG VKRUWFXWRQ LV 7KHVWDQGDUG LFRQ VR
HDFK RI WKH WRROEDU VHFWLRQV

7KH VXE R S W3 1 U R R Q V L O R U W K H

6HOHFW D ORFDWLRQ WR WKH U,WJKVWRRIOGKDHSSUHEYLRLVL
GLDJUDP VKRZQ EHORZ

6HOHF7WKUWHKH3RLQWRQUFTRdPaWktWRROEDU7KLV LFRQ ZLOO
DOORZ \RX WR VSHFLI\ D ORFDWLRQORFUDWLKQDIUFU WKHSDW
DW 7KH DUF ZLOO EHJLQ DW WLKQHWOKLVWFDWRHDWLRQKSHH
WKH KRUL]RQWDO OLQH

6HOHFW XS DQG WR WKH ULJK7KLRV WSKHFSULHYLWXH OORFDW
VKRXOG SDVV WKURXJSKHFL7KHVQWKSHRQGQWRLQW RI

6HOHFW GRZQ DQG WR WKH ULJ7KVLRO WFKDHSURQYLRXOOR
DFURVV IURP WKH VWDUW RI WKHKEUFLDJWDPKRXZQDESHO
1RWLFH KRZ3HRLQFWQSULQ WKH 6NHWFK WRROV WRROED
DQG/LQHF RQ WXUQHG EDFN RQ

6HOHFW WR WKH ULJKW RI WKH SUHYLRXV ORFDWLRQ

6HOHFW EHORZ WKH SUHYLRXV OLQH RU GRQ¶W VHOHFW DQ\WKLQJ WR XVH WKH GHIDXOW
VKRZQ EHORZ

6HOHFW WR WKH OHIW RI WKH SUHYLRXV ORFDWLRQ

6HOHFW DERYH WKH SUHYLRXV ORFDWLRQ DV VKRZQ EHOR

6HOHFW EHORZ WKH SWHVKLRXOGRSFDHWDLRQLPLODU WR WKH

6HOHFW WKH RULJLQ SRLQW, IFWKHVHVNHWFKSDUDILQHH DQG H
FRPPDQG

%DVLF 3DUW 'HVLJQ

7KH IROORZLQJ VHFWLRQ ZLOO FRQWHUURUWKEHHEQDFKLWRXVHUHD
,W ZLOO FRQVLVW RI WKUHH SDSWWV DEQGLFQWKHDUSHEVLQJH
3DUW 'HVLJQ DQG 6NHWFKHU

%DVLF 6KDSHV

7KLV SDUW ZLOO GLVFXVV WKH YDXULRQXJV WKHSLFRQWKDWLW
3DUW 'HVLJQ ZRUNEHQFK 7KH SXUSRVH LRQ WKHGXFOHORZ
WKH LFRQV DQG WKHLU RSWLRQVDUWKHXU DXWHIWOQHQJVVG
LV LPSRUWDQW IRU \RX WR XQGHUVWDQGMKRQZWRRXVHLW
VNHWFKHV LQ RUGHU WR SURGXFH D ILQDO SDUW

3DG

7KH ADGRSWLRQ DOORZV \RX WR XVH D VNHWFK RQ WR RHSUHVHQW WKH FURVV VROLG SDG <RX FDQ FUHDWH DHWVNHWFK WR SURYLGH WKH SURILOH *Profile* WR [7KLV DOORZV \RX WR XVH RQH DWKH DYDL SURILOH LI \RX GLG QRW DOUHDG\ KDYH SDGGHG :K DSSHDUV DV VKRZQ KHUH

&UHDWHV D VWDQGDUG OLQHDU H[WUXGHG SDG

&UHDWHV D WKLQ WHKDHWXHOHSDGGHGZKHUHRNLQHVFDQ KDY DGGHG

Profile 6SHFLILHV ZKLFK VNHWFK ZLOO EDXVHG RQ WKH VNHWFK WR WKH ER[<RX FDQ VXUIDFH WR XVH DV \RXU SURILOH

Direction 6SHFLILHV WKHGLUHFWRREQHRUWXGHSDQ%DUGHIDX SURILOH LV VHOHFWHG LW ZLOOHHUXGGLQRUPDO GLUHFWLRQ FDQ EH VHOHFWHG QH[W WR WKH VHOHFWLRQ SDQH

,QLWLDOO\ WKH ZLQGRZ *First Limit* GLVSOD\V D VLPSOLILHG <RXU FKRLFH RI 7\SH
Second Limit WR H[SDQG WKH RSWLRQV 6LQFH WKLV RSWLRQV
ZLOO RQO\ EH GLVFXVVHG RQFH

Type

Dimension $OORZV \RX WR HQWHU D OHQJWK YDOXH

Up to next ([WHQGV WR WKH QH[W IHDWXUH RI DQ H

Up to last ([WHQGV WR WKH ODVW IHDWXUH RI DQ H

Up to plane ([WHQGV WR D VHOHFWHG *Limit* SODQH ZKLFK

Up to surface ([WHQGV WR D VHOHFWHG *Limit* VXUIDFH ZKLF

Length 6SHFLILHV WKH OHQJWK RI WKH H[WUXVLRQ <RX FDQ HQWHU D QXPHULFDO YDOXH
ZLOO H[WUXGH WKH VDPH GLVWDQFH LQ ERW
0LUURU RQ QH[W WR WKH LQSXW SDQH

Thin solid ,I WKLV RSWLRQ LV VHOHFWHG *Thin solid* RSWLRQV ZLOO DSSH

Thickness1/2 6SHFLILHV WKH ZDOO WKLFNQHVV RI WKDW
HOHPHQW

Neutral Fiber)RUFHV WKH VNHWFK HOHPHQW WR EH LQ
WKLFNQHVV LV DGGHG WR ERWK VLGHV H

Merge Ends ([WHQGV RU WULPV WKH HOHPHQWV WR H

:KHQ \RX VHOHFW WKH *Type* RSWLRQ *Dimension* DQG ZLOO KDYH WKH *Offset* RSWLRQ W
YDOXH IURP WKH FRUUHVSRQGLQJ OLPLW

6HOHFW7KH SDG VKRXOG DSSHDU VLPLODU WR WKH ZGLVDJ
DXWRPDWLFDOO\ KLGGHQ DIWHU WEROLQJ VHOHFWHG GLEJ XQGHHSUDW
GRZQ P*Preferences*

<RX DUH QRZ JRLQJ W*Types* H\[RSXORDHQ WKH WKHHULQH OLPLW

6HOHF3MDGWKRQ *Thick* ZLQGRZ DSSHDUV

6HOHSketch2 7KLV VSHFLILHV WKH VNHWFK \RX ZDQW WR XV

6HOHF,QYHUWKRQ VR WKDW LW H[WHQGV WRZDUGV WKH JRRL
WR VHH ZKDW*Types* WKHOHRZKRXU WR GR

&KDQJH WKH to next DQG Preview WR WLFH WKDW WKH SDG RQO\
QH[W VLGH RI WKH RWKHU SDG DJDLQ

&KDQJH WKH to last DQG Preview WR WLFH WKDW WKH SDG JRHV
WKH ODVW VLGH RI WKH SUHYLRXV

&KDQJH WKH to plane :KHQ \RX XVH WKLV RSWLRQ \RX KDYH W
D SODQDU VLGH WKDW \RX ZDQW WKH SDG WR EH OLPLWHG

6HOHFW WKH SODQH LQ GPreviewW H1GRWEHHDRZWKDKWHQWKHHSHDFGWJ
SODQH DQG WKHQ VWRSV ,W VKRXOG DSHUHDU VLPLODU

<RX PD\ KDYH WR URWDWH WKH SDWDWLRQ REHGGLQU RUGKHU
surface RSWLRQ ZRUNV YHU\ VLPLODU RQ WHFKHS WKDW \RX
VXUIDFH LQVWHDG RI D SODQH

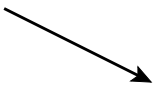
7KH *Offset* ILHOG LV QRZ DYDLODEOH DQGHVRXQGHJDEOLHYWR
YDOXHV $ SRVLWLYH YDOXH ZLOO WHQSGHFWLFKLHHSGDGPERX
ZKHUHDV D QHJDWLYH YDOXH ZLOWKHVRSHFKLHLSGDRQ

(QWHU Offset WKH Preview HFWR P WKH VLGH \RX FDQ VHH
H[WHQGV SDVW WKH VHOHFWHG OLPLW SODQH

&XUUHQW *Direction* WKHDXOWV WR EH QRUPDO WR WKH SURILOH
HOHPHQW WR EH XVHG IRU WKH GLUHFWLRQ LQVWHDG

6HOHFW WKH Second Limit WR H[SDQG WKH RSWLRQV Second Limit DQG WKH ZLQGRZ W
RSWLRQV <RXU ZLQGRZ VKRXOG DSSHDU VLPLODU WR V

8QGHU Second Limit FKDQJH WKH Type WR Up to plane WKHQ VHOHFW WKH IDFH
EHORZ DQG Preview OLFN RN SDG ZLOO QRZ SURMHFW EHWZHHQ WKH
Limit DQG WKH VHOHFWHG *Second Limit* IDFH XVLQJ WKH RIIVHW YDOXH <R
IRU *Up to Plane* RSWLRQ DV ORQJ DV WKH\ DUH SURMHFWHG <RX
Surface RSWLRQ



& K D Q J H W K H U H I H U H Q F H W \ S H W R U H I H U H Q F H O L P L W W R S R L Q W W R V X U I D F H D Q G V H O H F W W K H I D F H F O R V H
Sketch.2 W K H Q H Q W H U 2 I I V H W D Q G G U D Z D O L Q H W K D W F R X U S D G V K R X O G D S S H D U
G H S L F W H G E H O R Z

6 H O H F W W K H I L Q D O S D U W V K R X O G O R R N V L P L O D U W R W K H L P

7 K L V H [H U F L V H V K R Z H G P R V W R I W K H S R L Q W V R Q W K H D Y D L O D E O H R E M H
V K D S H V \ R X Z L O O V H H W K D W K D Y H O H V V R U P R U H R I W K H D J R U H V S W
X Q G H U V W D Q G L Q J R I Z K D W H D F K R S W L R Q D O O R Z V \ R X W R G

Note: Open profiles (sketches) can be used to create pads or pockets, as long as they will be closed by the other faces of your existing part. You will see this demonstrated in the next exercise.

6 D Y H D Q G F O R V H W K H G R F X P H Q W

2SHQ 3WSKH 3DGGRFXPHQWVNHWFK KDV DOUHDG\ EHHQ FUHD
XVHTWhkRd RSWLRQV WR ILQLVK WKH PRGHO

6HOHF3WDGWKRQ 7KLV ZLOO DOORZ \RX WR FUHDWH D SD
Definition ZLQGRZ DSSHDUV

6HOSkeWch1 $Feature Definition Error ZLQGRZ DSSHDUV ,W LV EHFDX
FRQWDLQV RSHQ SURILOHV +RZHYHUL QWKHLV RND\ VL
RSWLRQ

6HORRFpW

2SHQ 3WSKH 3DGGRFXPHQWWKUH DUH WKUHH VNHWFKHV DOUHDG

6HOHF3WDGWKRQ 7KUHZLQGRZ DSSHDUV

6HWTypeKWDRmension ZLWLengtdh RI WKSketchHDQGFWKLFNH
SDG VKRXOG DSSHDU VLPLODU WR WKH GLDJUDP VKRZQ EH

6HOHF3WDGWKRQ DJDLQ SkewtchHQ VHOHFW

6HWTypeKWDRmension ZLWLengtdh RI WKHQ VHOHFWSDUW VKRXOG O
OLNH WKLV

'R QRW FORVH WKH GRFXPHQW \QX[ZLOHQHRQWLQXH WR XV

3RFNHW

7KHSRFNHWWRRODOORZV\RXWRXVHDVNHWFKHVWRHQPRYHH
SURGXFLQJDSRFNHW<RXFDQIFUHEDVWLQWRDVWUDLJKWRUS
PRXVHEXWWRRProfileKELFN[HLQHWQKHRX VHDPocketWZLWQKGRZFDSQSHDU
OLNHWKHRQHVKRZQEHORZ

,QLWLDOO\ WKH ZLQGRZ *First Limit* DVNV IRU ZKDW W\SH RI OLPLW W
Second Limit WR H[SDQG WKH RSWLRQV 1RWLFH WKDW WKH
3DUDPHWHUV RSWLRQV 7KH PDMRU GLIIHUHQFH EHWZHHQ DDG
PDWHULDO WR \RXU SDUW ZKLOH UDSDUWHW UHPRYHV PDW

Type

Dimension $OORZV \RX *Length* HQWHU D

Up to next ([WHQGV WR WKH QH[W IHDWXUH RI DQ H[LV

Up to last ([WHQGV WR WKH ODVW IHDWXUH RI DQ H[L

Up to plane ([WHQGV WR D VSHFLILHG *Limit* SODQH ZKLFK LV

Up to surface ([WHQGV WR D VSHFLILHG *Limit* VXUIDFH ZKLFK L

Length 6SHFLILHV WKH GLVWDQFH R<RXWKHDEQWSLRQ WKH
ZLOO H[WUXGH WKH VDPH GLVWDQFH LQ ERWK
0LUURU RQ QH[W WR WKH LQSXW SDQH

Thin solid ,I W7KHQ)HDWXUH V *Thin solid* SHFLILHV WKDW ZLOO DSSHDU

Thickness1/2 6SHFLILHV WKH ZDOO WKLFNQHVV WKDW ZL
HOHPHQW

Neutral Fiber)RUFHV WKH VNHWFK HOHPHQW WR EH LQ W
WKLFNQHVV LV DGGHG WR ERWK VLGHV HTX

Merge Ends ([WHQGV RU WULPV WKH HOHPHQWV WR H[L

:KHQ \RX *Type* RQH WKH *Dimension* DQ\ RX ZLOO KDYH WKH *Offset* SWLRQ WR
YDOXH IURP WKH FRUUHVSRQGLQJ OLPLW

<RX ZLOO QRZ FUHDWH D SRFNHW LQ WKH H[LVWLQJ SDU

6HOHFW3WRFWKHHWRQ ,W LV ORFDWHG LQ3DGFKRQXE7KLVRZLOO
DOORZ \RX WR FUHDWH D SRFNHW XVLQJ RQH RI WKH VN

6HOSkHFWW3 WKHQ VHQYHHLWRQ KH <RX QHHG WR SRFNHW WRZ
VROLG ,I \RX DWWHPSW WR SRFNHWDWLQRQ SDFKHZLOO
Warning PHVVDJH ZLOO DSSHDU

6HWTypeKHFust Limit WR to Next DQG VOHFW SRFNHW VKRXOG DS
VLPLODU WR WKH GLDJUDP VKRZQ EHORZ

%\ XVLQJ Up to Next \RX DUH HQVXULQJ WKDW WKH SRFNHW ZLOO
LQGLFDWHG DPaterR YEH PRGRXOHG WDength DYHOXH WKDW
VWLOO H[WHQG DOO WKH ZD\ WKURXJK WKH SDG EHFDXV

6DYH DQG FORVH WKH GRFXPHQW