

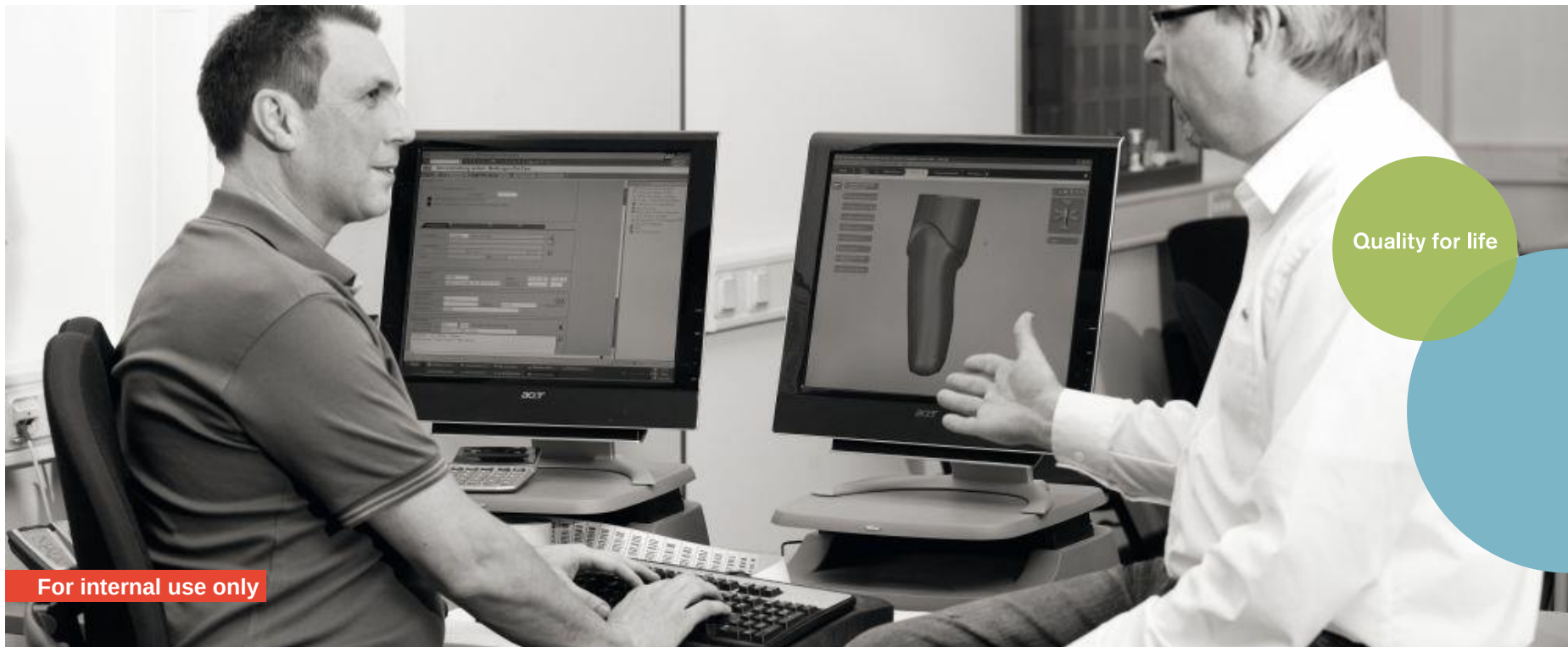
TF Design

Clinician training II – Advanced + tips & tricks

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Quality for life

For internal use only

Agenda

1. Measurements
2. Software
3. Socket shapes
4. Software settings
5. Fabrication
6. Fitting

Measurements



Measurements

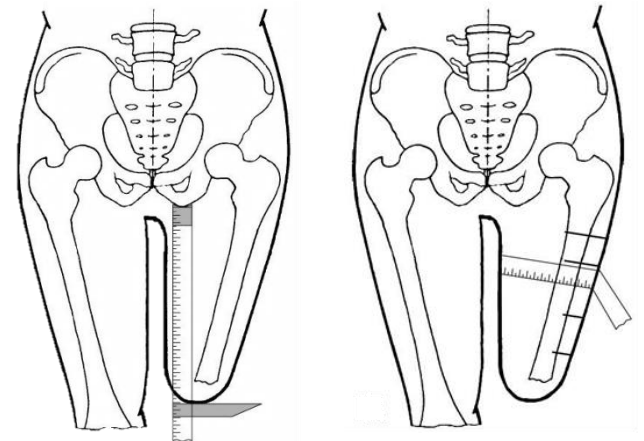
Taking measurements

Minimum

- Residual limb length
- 3 residual limb circumferences

Optional

- 2 more residual limb circumferences
- Perineum AP measurement
- Bony ML measurement
- Soft tissue ML measurement
- Flexion angle
- Adduction angle



Measurements

Order form

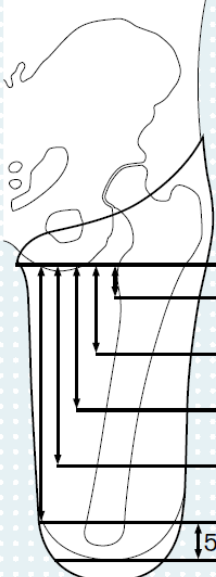
° Flexion angle

° Adduction angle

mm Bony ML measurement

mm Soft tissue ML measurement

mm Perineum AP measurement



	Distance from ischial tuberosity	Residual limb circumference	Reduced circumference	Residual limb length	Socket length
	+ 30 mm			mm	mm
	+ mm				
	+ mm				
	+ mm				
	+ mm				

... or reduction in %

☐ 0%
☐ 0%

☐ 1%
☐ 1%

☐ 2%
☐ 2%

☐ 3%
☐ 3%

☐ 4%
☐ 4%

☐ 5%
☐ 5%

☐ 6%
☐ 6%

proximal

distal

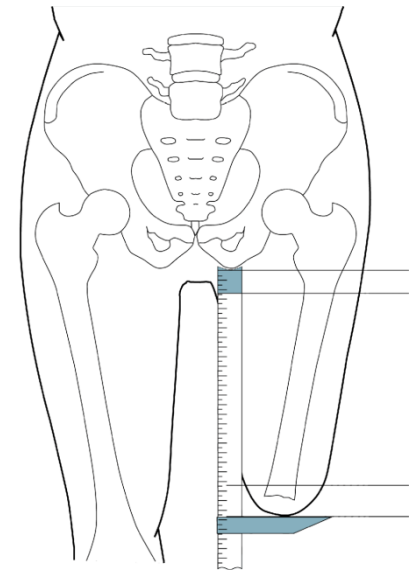
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Measurements

Length measurement

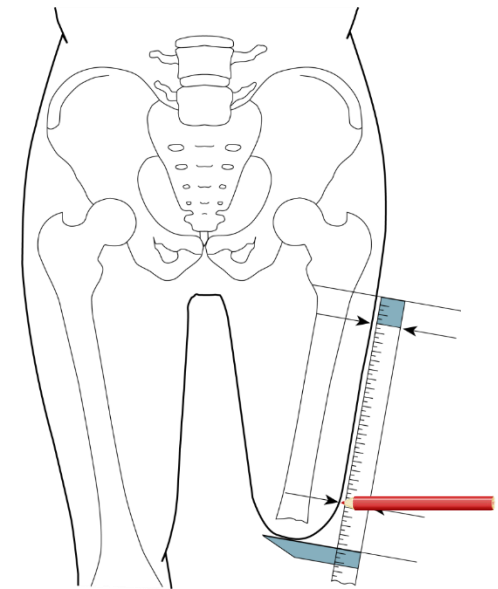
- Involve the user when taking measurements
- Ask whether the callipers are properly positioned under the ischial tuberosity
- Checking measurements
 - If you have measured the distance to the ischial tuberosity correctly, the first circumference measurement (30 mm below the ischial tuberosity) should be at approximately the same height as the perineum
- Do not compress the end of the residual limb while measuring (excess tissue will require space later on)
- A socket that is too short always results in insufficient enclosure of the ischial tuberosity



Measurements

Circumferences and their heights (1/2)

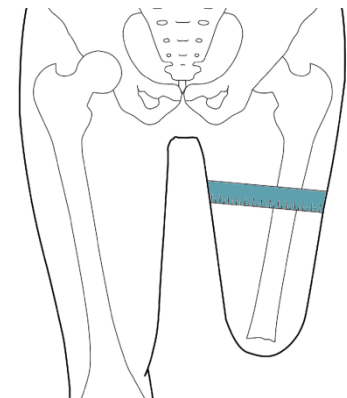
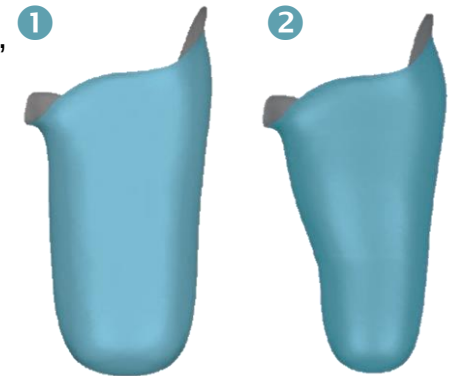
- Position the callipers, with the residual limb length still set, laterally on the residual limb so you can transfer the heights for the circumferences
- Mark the height of the proximal circumference 30 mm below the height of the ischial tuberosity on the residual limb
- Mark the height of the distal circumference 50 mm above the end of the residual limb
- Define at least one more circumference height between these measurements



Measurements

Circumferences and their heights (2/2)

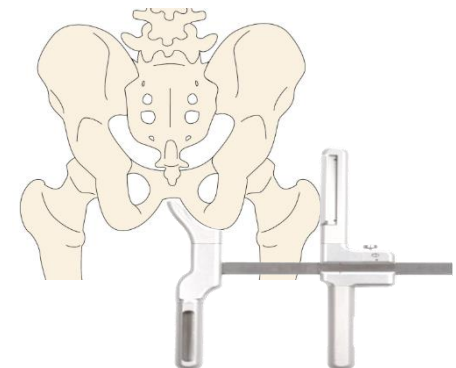
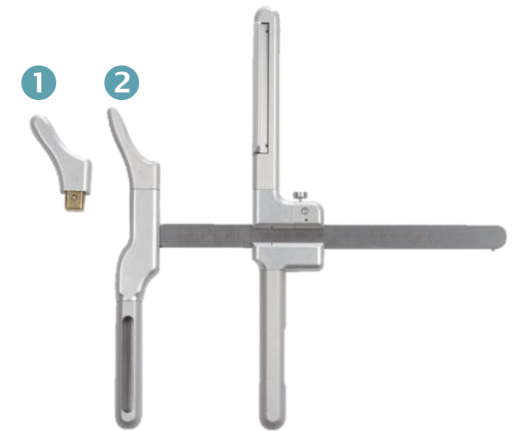
- If the residual limb has a consistent shape (1), three circumferences are sufficient even for longer residual limbs (if too many measurements are taken, the surface of the socket becomes crimped due to the “caterpillar effect”)
- For more complex residual limb shapes (2), four to five circumference measurements may be helpful – e.g. in the case of bulb-shaped residual limbs or if the residual limb circumference decreases abruptly towards the distal end
- Use the 743B4 spring-tensioned measuring tape for measuring
- Position the measuring tape at a 90° angle to the longitudinal axis of the residual limb
- Take the measurement with the muscles tensed and relaxed and use the average of the measurements
- Tip: take as few measurements as possible so the socket wall remains uniform



Measurements

Bony ML measurement

- Use the 743S21 or 743S20 callipers
- Select the appropriate angle support for women (1) or men (2)
- Position the callipers and angle support under the ischial tuberosity and slide them behind the ramus in the medial direction
- Lock the callipers laterally
- The callipers can be moved horizontally to check that it is positioned correctly – the movement should be transmitted to the patient at a ratio of 1 : 1
- The measurement should be repeated to ensure correct positioning behind the ramus



Measurements

Liners

Liners

- For liner treatment, always measure the length and circumference measurements on top of the liner
- Include the liner cap when measuring the socket length

For new treatments

- Carry out compression therapy at least one week in advance
- The user should wear the liner for at least half an hour before measurements are taken



Software



Software

Hardware requirements

	Recommended Specification	Minimum Requirements	
Operating system	Windows 7, 8, 10	Windows 7, 8, 10 32bit	Windows 7, 8, 10 64 bit
CPU	Intel Core2Duo or better	Intel pentium 650/3,4 Ghz	Intel Core2Duo or better
RAM	4 GB or more	1,5 GB	2 GB
Memory	1,5 GB free storage space	1,5 GB free storage space	
Display	1024 x 768/32 bit		
Drive	CD/DVD drive	----	----
Input device	mouse/keyboard		

Software Workflow

Order Details

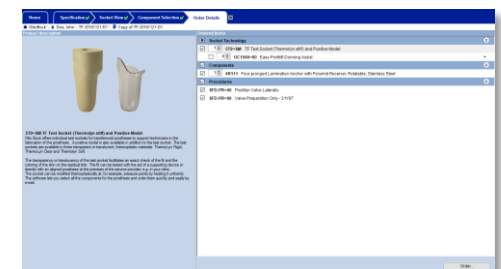
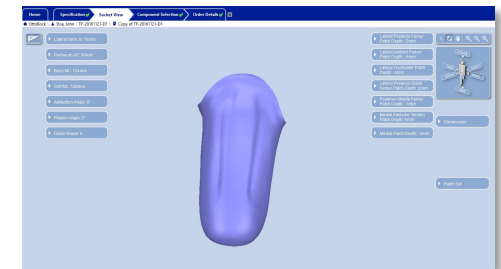
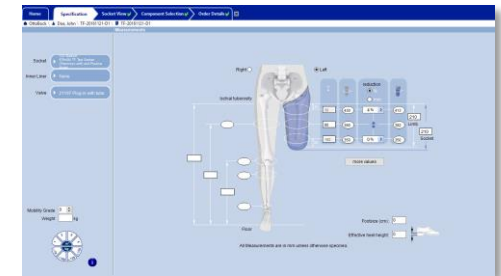
- Selection of the socket-specific data and entry of the patient measurements

Socket Design

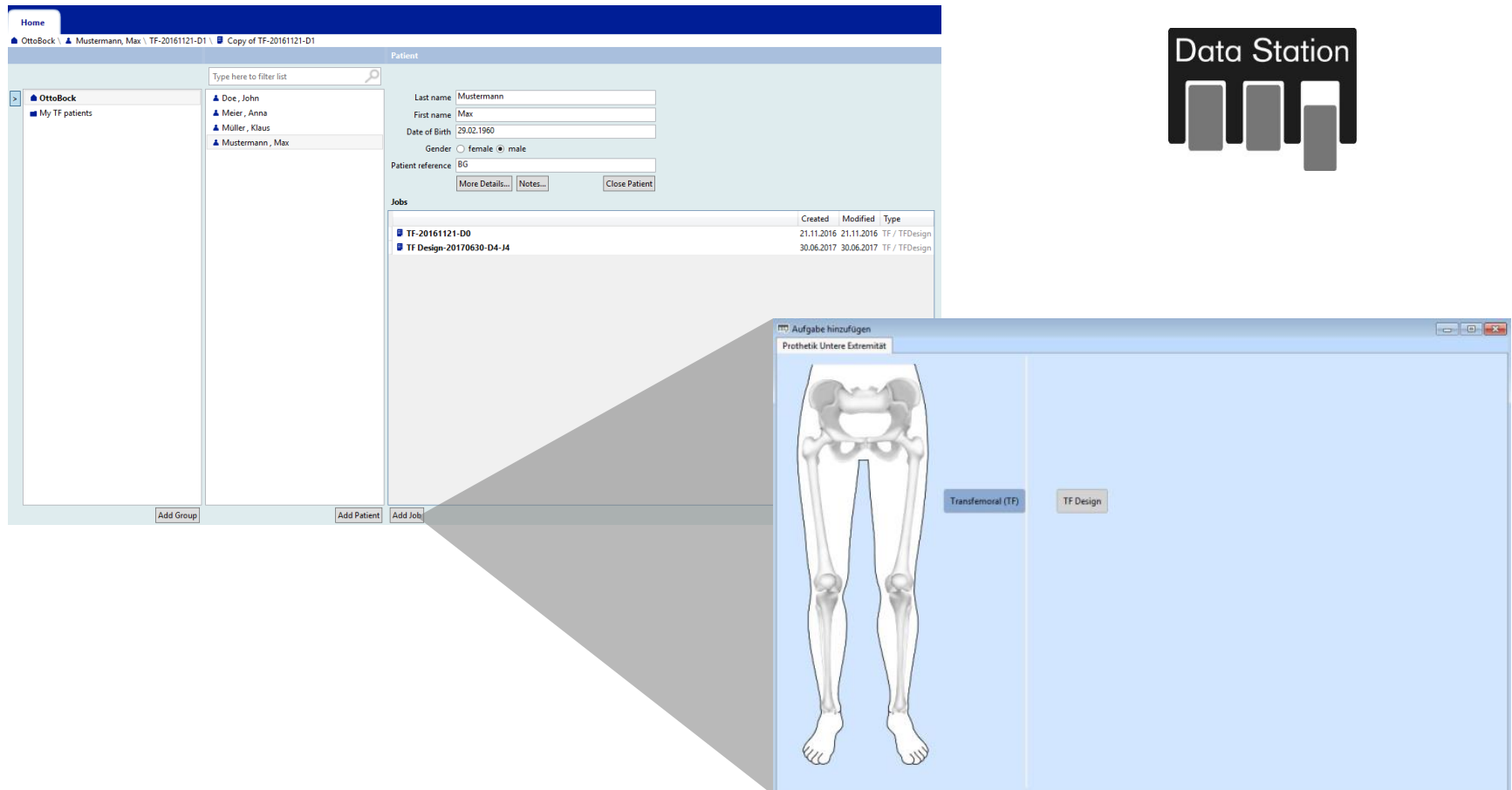
- Three-dimensional view of the prosthetic socket, with the option to make corrections

Order

- Display and processing of the purchase order for the current job



Software DataStation



Software Specification

Home Specification Socket View Component Selection Order Details

OttoBock \ Doe, John \ TF-20161121-D1 \ Copy of TF-20161121-D1

Measurements

Socket: ICS Medium
ST9=SM TF Test Socket (Thermolyn stiff) and Positive Model

Inner Liner: Socket Style ICS Medium

Valve: Requirements Socket and Model

Type: ☒ Test Socket

Material: Thermoplastic - ThermoLyn® Stiff

Vacuum Type: ☐ Elevated (Harmony) ☒ Ordinary Suction (valve) ☐ None

Cancel OK

Ischial tuberosity

Right Left

30 430 4% 413 210

90 390 382

160 350 0% 350 210

more values

Footsize (cm): 0

Effective heel height: 0

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000

Floor

All Measurements are in mm unless otherwise specified.

Software Reduction

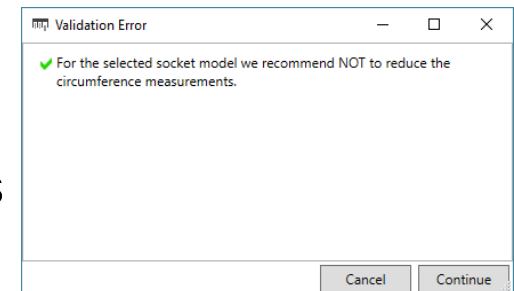
Standard reduction for circumferences

- If there is no liner, reduce by 4% proximally and 0% distally
- If there is a liner, reduce by 2% to 3% proximally and 0% distally
- The intermediate measurements should be reduced equally

Proximal	Intermediate	Reduction	Distal
30	430	4 %	413
90	390	0 %	382
160	350	0 %	350

Exception

- With the ProSeal socket shape, the measurements should not be further reduced if the measurements are taken with a liner



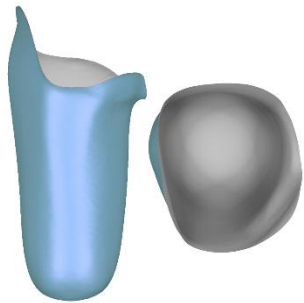
These measurements are recommendations; they must be individually adapted to the residual limb condition for unusual residual limb shapes

Socket shapes

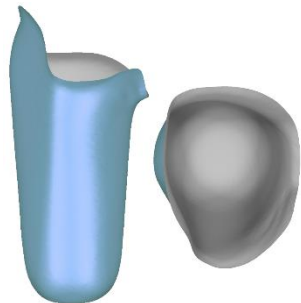


Socket shapes

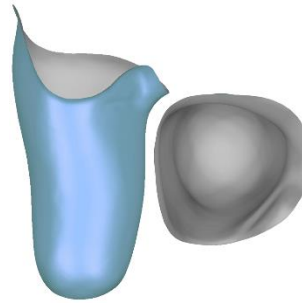
Overview



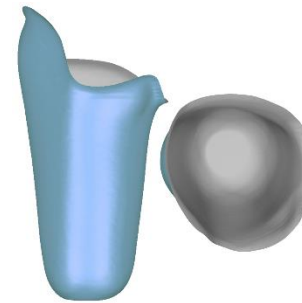
SIT-Cast Medium



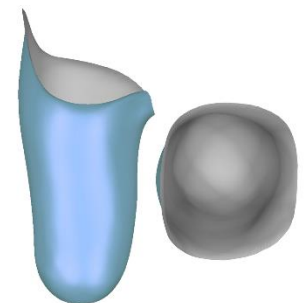
SIT-Cast
Contoured



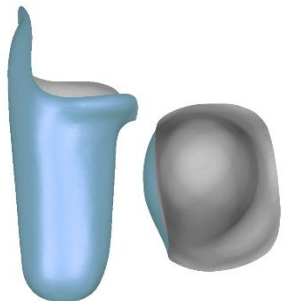
SIT-Cast
Advanced



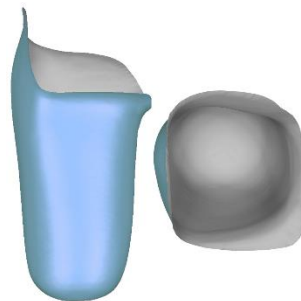
SIT-Cast
Feminine
Contoured



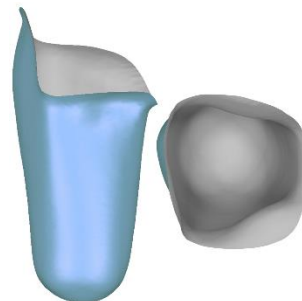
ProSeal



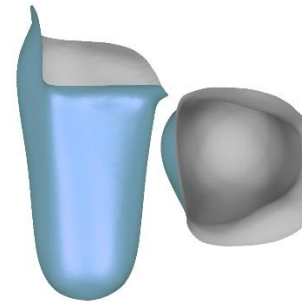
Hybrid



Quadrilateral
Medium



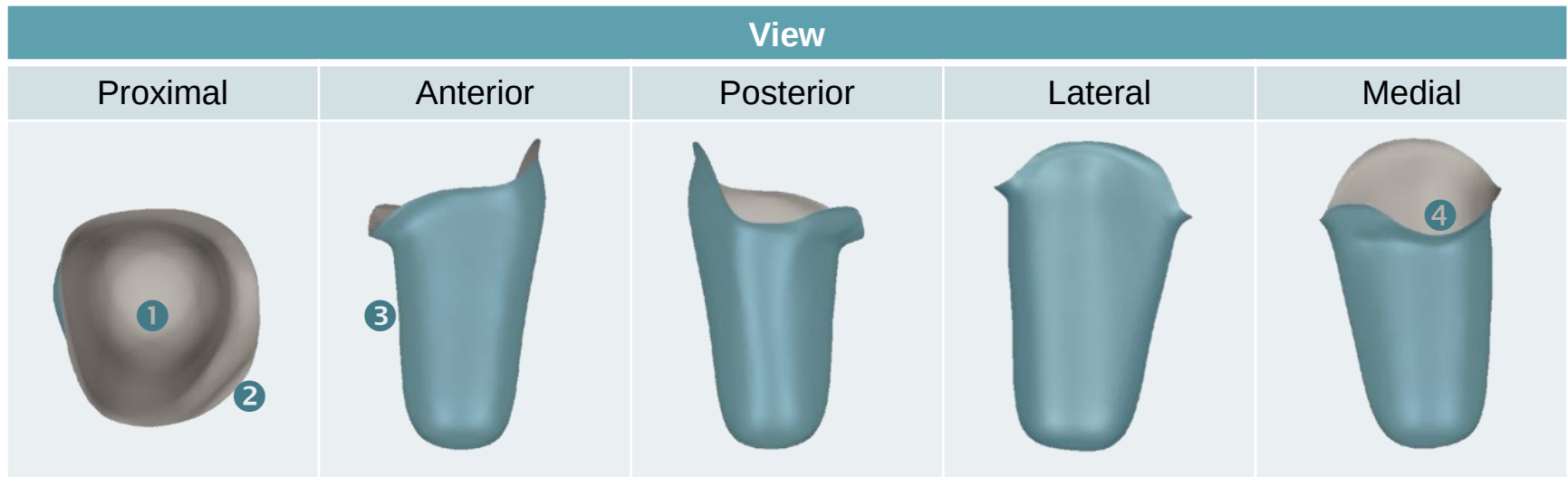
Quadrilateral
Contoured



Quadrilateral
Feminine
Contoured

Socket shapes

SIT-Cast Medium

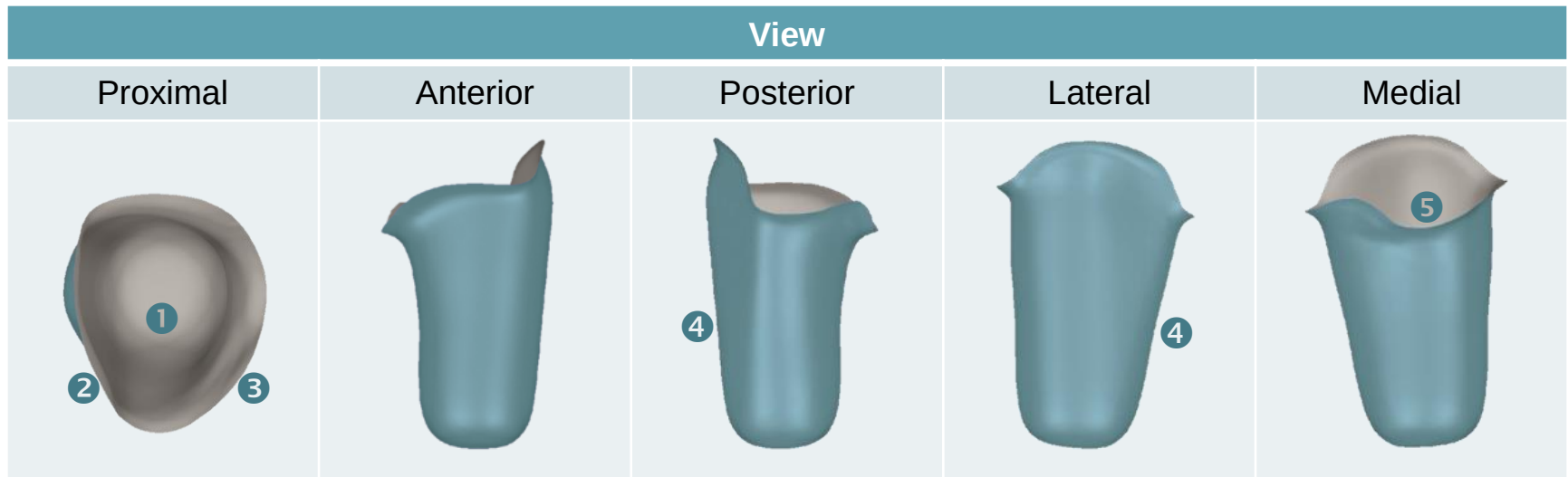


Classic ICS model

- ① Rounded socket entry plane
- ② Bevelled ischial tuberosity support (angle not too high)
- ③ Straight socket shape with socket brim extended in the medial direction ⇒ more comfortable soft tissue guidance, reduction of edge pressure
- ④ Exposed exit for ramus ⇒ prevents pressure problems

Socket shapes

SIT-Cast Contoured

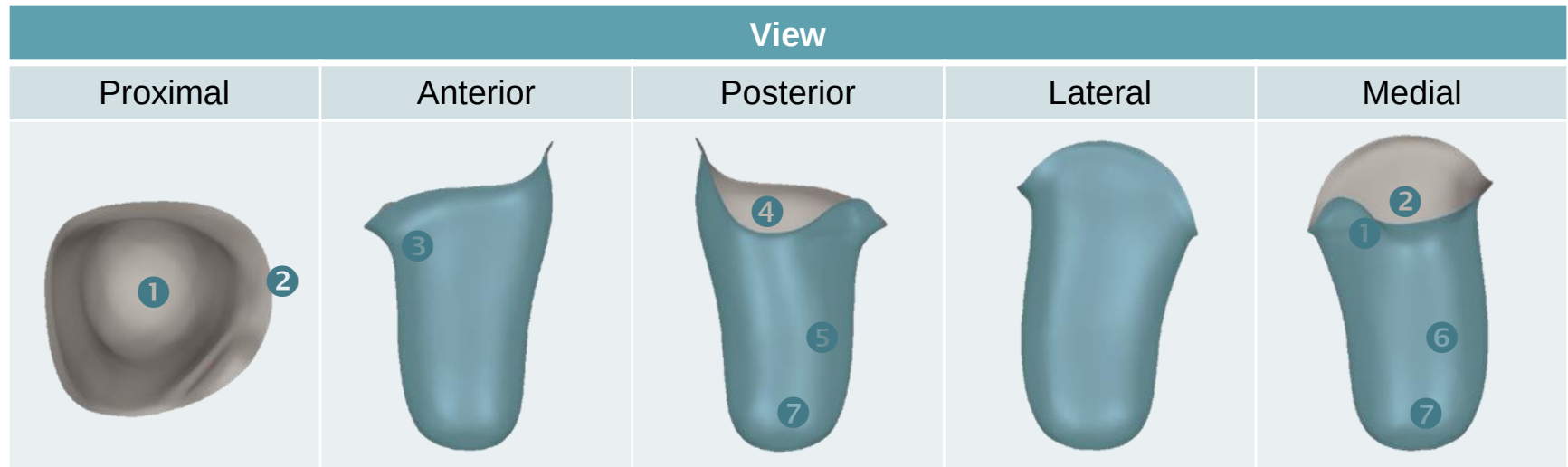


Classic ICS model

- ① Contoured socket entry plane (ischial containment)
- ② Better dorsolateral positioning of the support to guide the femur ⇒ improved control of the prosthesis
- ③ High-angle support for ischial tuberosity ⇒ provides pronounced enclosure
- ④ Straight socket shape
- ⑤ Exposed exit for ramus ⇒ prevents pressure problems

Socket shapes

SIT-Cast Advanced



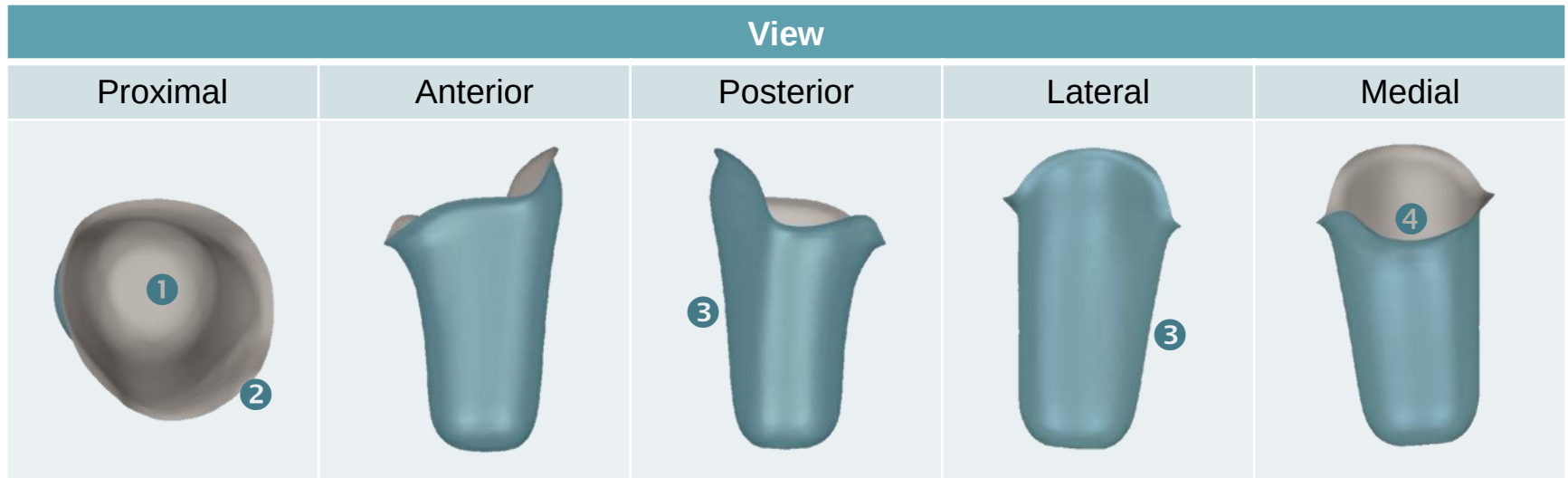
Reworked ICS model

- ❶ Contour near the point of intersection adjusted
- ❷ Area of the adductor tendon extended in the medial direction ⇒ prevents pressure problems
- ❸ Frontal trim line is drawn significantly outwards in the medial direction and given a large radius ⇒ more comfortable soft tissue guidance, reduction of edge pressure during pronounced hip flexion
- ❹ Dorsal socket brim is anatomically rounded and positioned lower down ⇒ prevents strong pressure on the gluteal musculature
- ❺+❻ Central socket area is curved in the medial (❺) and frontal (❻) directions ⇒ lateral and dorsal support surface for the femur
- ❼ End area of the residual limb extended in the distolateral and dorsal directions ⇒ relief for the tip of the femur and more adducted position for the femur due to banana shape

Not suitable for femur lengths below 18 cm: the ICS Medium is an alternative

Socket shapes

SIT-Cast Feminine Contoured

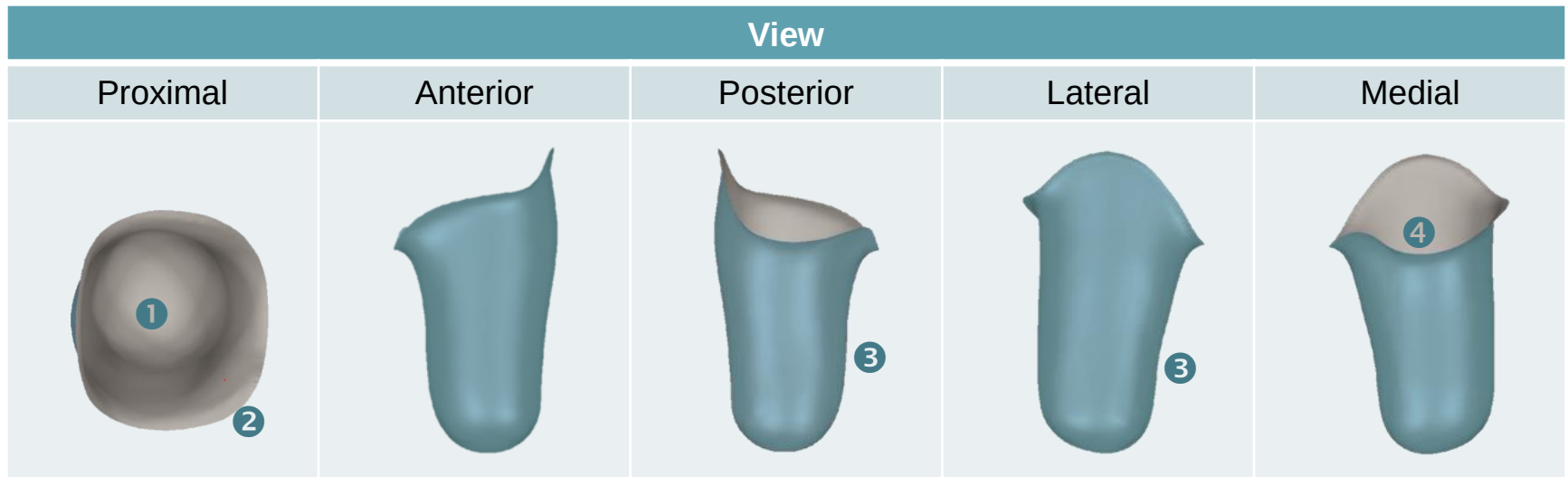


ICS model – adapted to feminine anatomy

- ① Rounded socket entry plane
- ② Ischial tuberosity enclosure approx. 45° to medial plane
- ③ Straight socket shape
- ④ Exposed exit for ramus → prevents pressure problems

Socket shapes

ProSeal

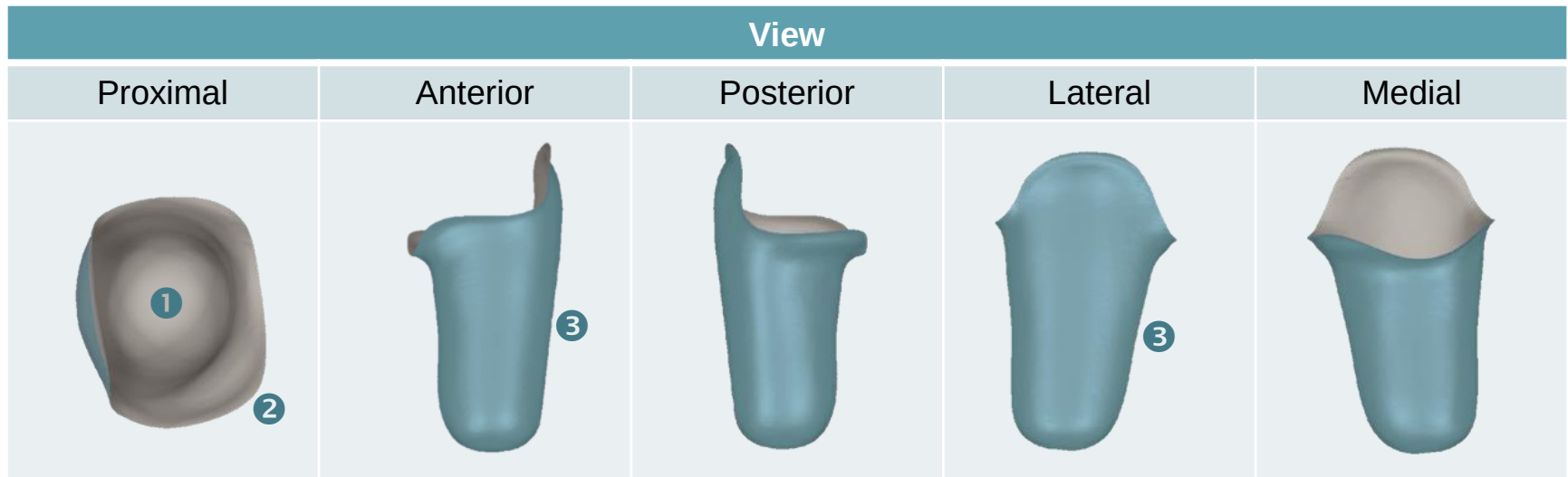


Socket model optimised for ProSeal liner + ProSeal ring (can also be ordered without either)

- ① Rounded socket shape (for ProSeal ring)
- ② Ischial tuberosity support bevelled for comfort
- ③ Slight banana shape (similar to ICS Advanced)
- ④ Exposed exit for ramus → prevents pressure problems

Socket shapes

Hybrid



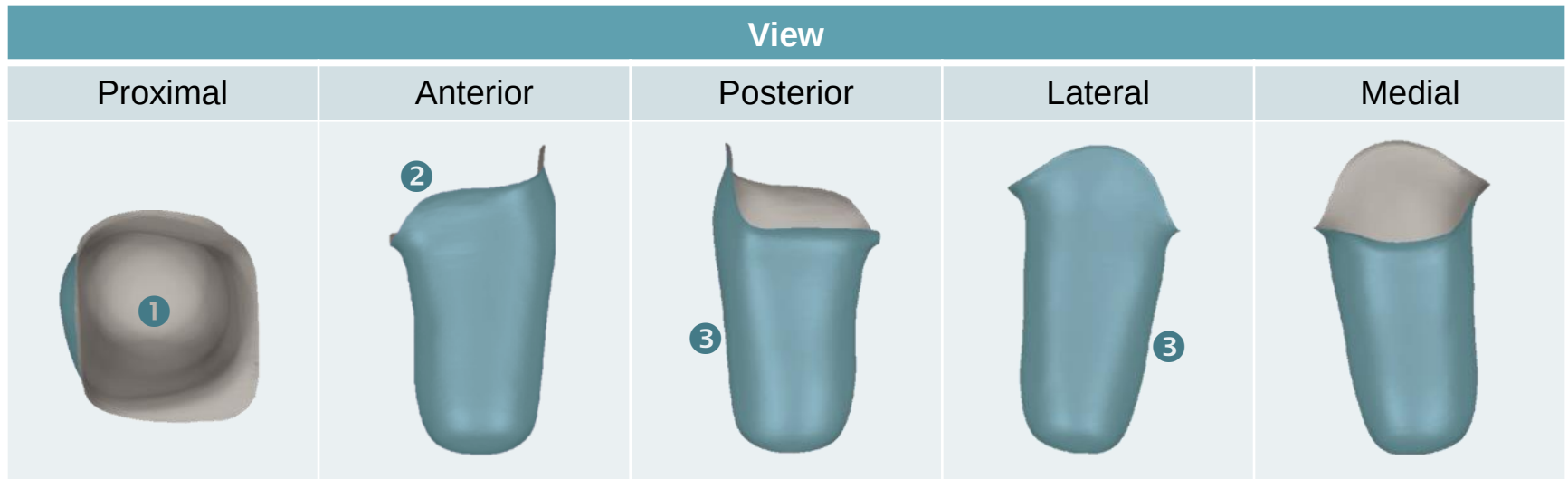
ICS model with bevelled “ischial tuberosity slide”

- ① Hybrid between quadrilateral and elliptical socket design
- ② Ischial tuberosity support bevelled for comfort → prevents pelvis from tipping forwards therefore less pressure on the femoral vessels
- ③ Straight socket shape

- Option for mobility grades 1+2 and older patients
- A good option for converting from a quadrilateral to an ischial containment socket

Socket shapes

Quadrilateral Medium

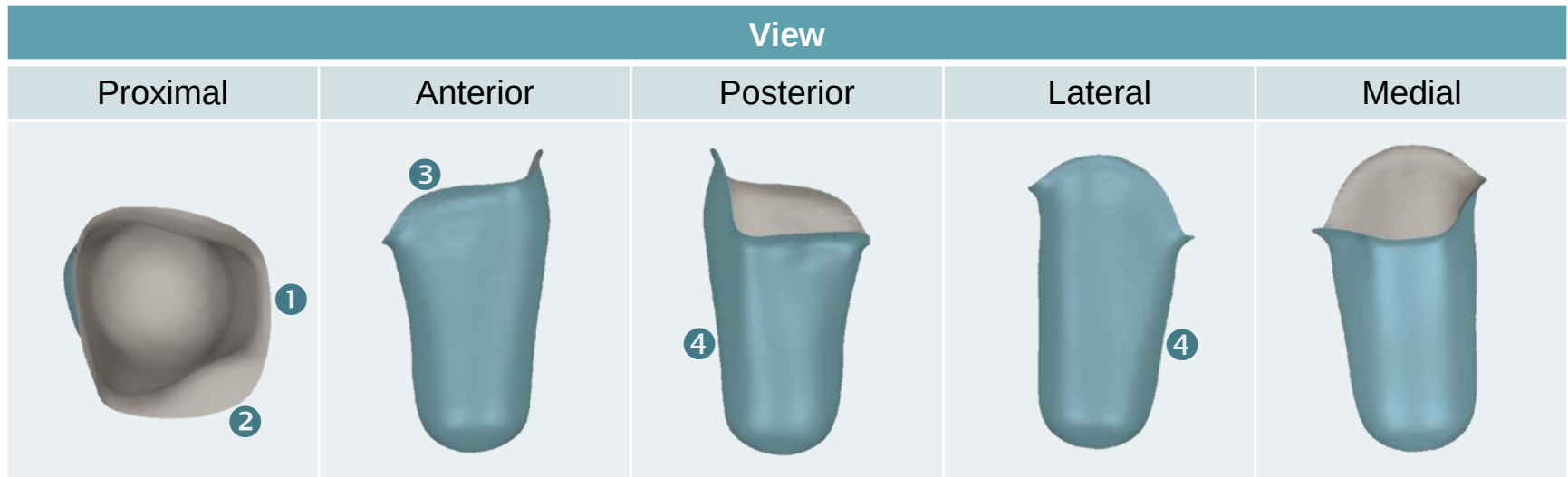


Quadrilateral model

- ① Round, bevelled socket shape with ischial support
- ② Forward tipping of the pelvis reduced with adjustable anterior patch
- ③ Straight socket shape

Socket shapes

Quadrilateral Contoured

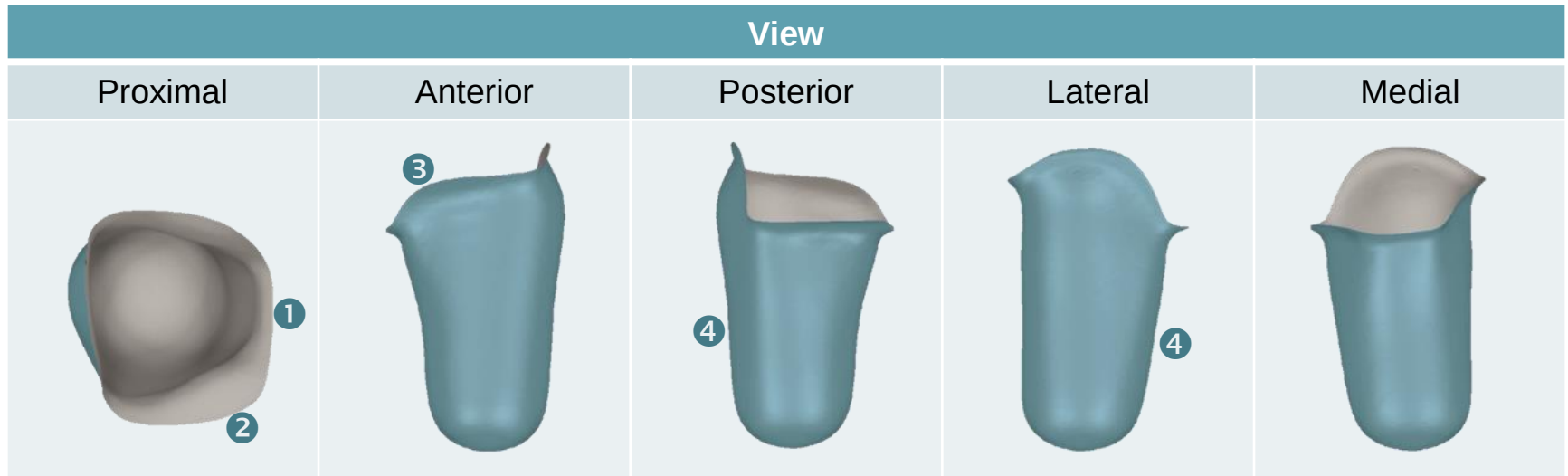


Quadrilateral model

- ① Narrow perineum width results in triangular socket shape
- ② Contoured ischial support
- ③ Adjustable anterior patch → reduces forward tipping of the pelvis
- ④ Straight socket shape

Socket shapes

Quadrilateral Feminine Contoured



Quadrilateral model especially for women

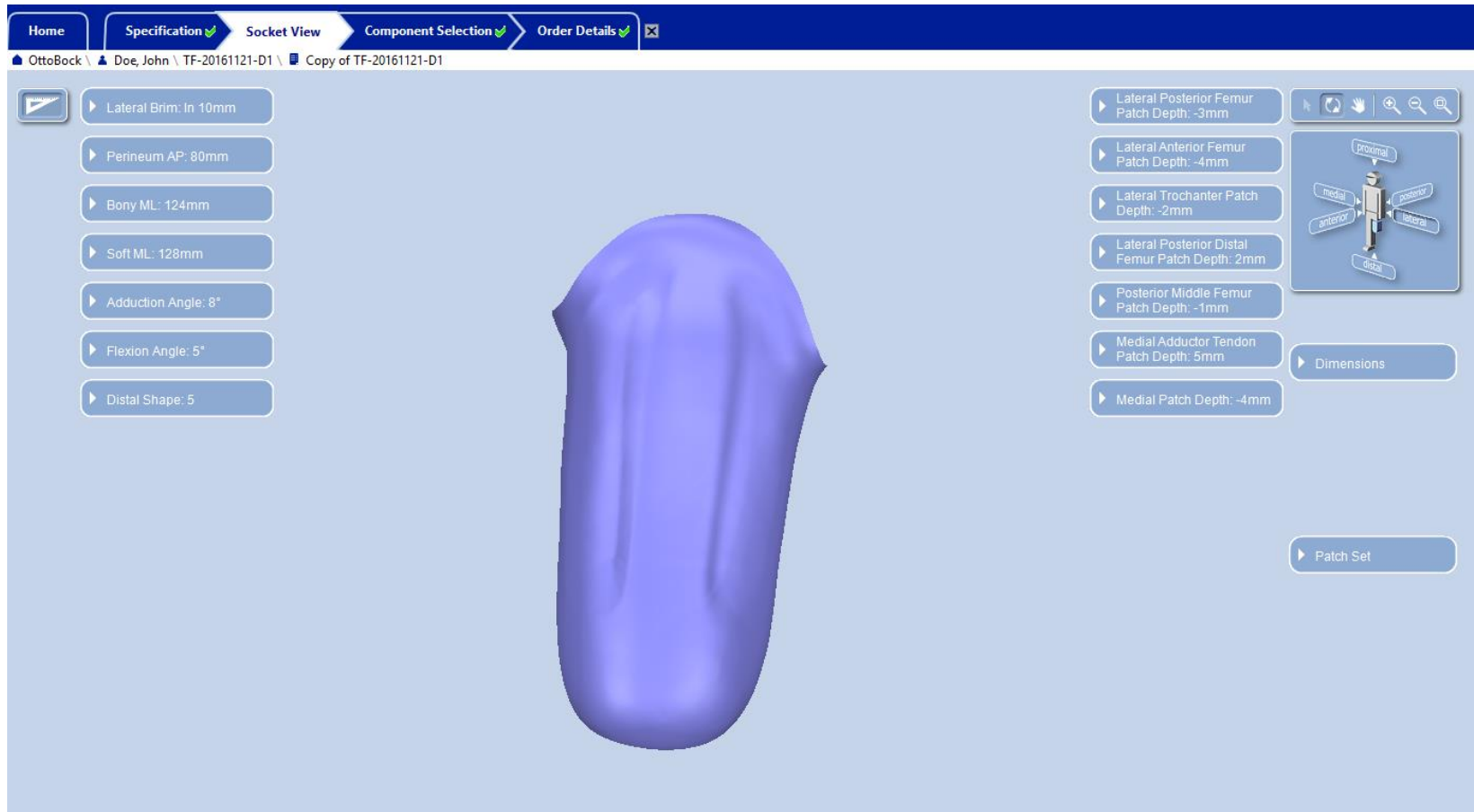
- ① Narrow perineum width results in triangular socket shape
- ② Ischial support enclosure approx. 45° to medial plane
- ③ Adjustable anterior patch → reduces forward tipping of the pelvis
- ④ Straight socket shape

Software settings



Software settings

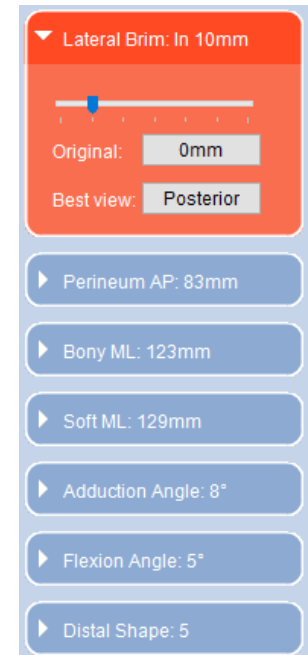
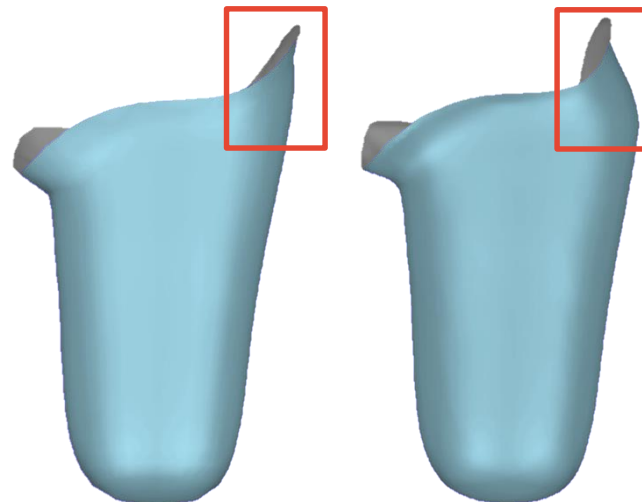
Socket view



Software settings

Proximal brim adjustment

- The proximal brim is the area above the trochanter
- Adjustment of the lateral support for an improved pretension of the gluteal musculature (prevents pelvis from tipping forwards)
- Improved control of the prosthesis



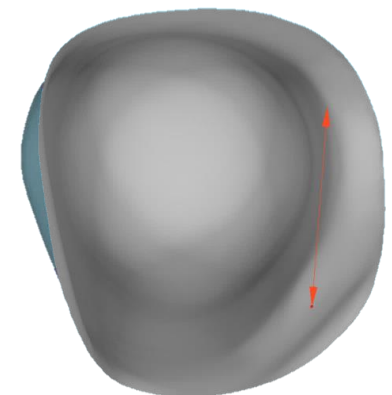
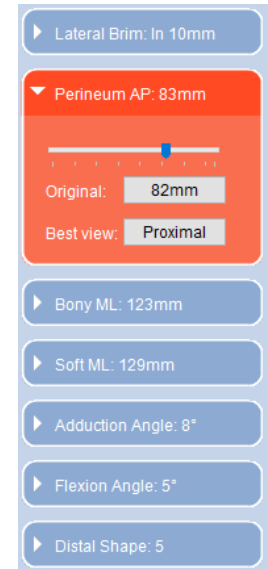
Software settings

Perineum AP measurement

- The software is designed such that the entered **circumference remains constant**, i.e., if a measurement is changed in the frontal plane, it also changes in the sagittal plane
- The perineum AP measurement **should not be edited in the software if possible**

Reason:

- The perineum AP measurement results from the position of the model reference points of the ischial tuberosity and the adductor tendon (red arrow head) and is calculated by the software
- There is no fixed reference point here due to the individual position of the adductor tendon



Software settings

Bony ML measurement

- The bony ML measurement is located in the socket entry plane – the dimensions of the socket entry plane are calculated based on the measured circumferences
- Minor adjustments to the ML measurement can be carried out in the software
 - The bony ML measurement results from the position of the model reference points of the ischial tuberosity and the lateral socket wall (red arrow head) and is calculated by the software
 - The measurement is rendered relatively accurately if the circumferences are measured correctly
 - The calculated measurement can be compared with the measured ML measurement

▶ Lateral Brim: In 10mm

▶ Perineum AP: 83mm

▼ Bony ML: 123mm

Original: 119mm

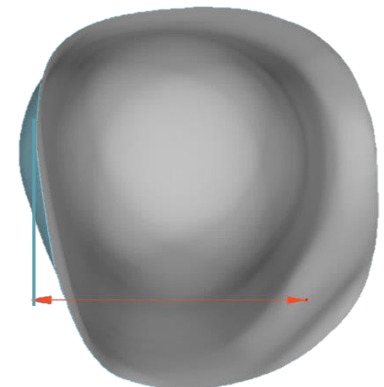
Best view: Proximal

▶ Soft ML: 129mm

▶ Adduction Angle: 8°

▶ Flexion Angle: 5°

▶ Distal Shape: 5



Software settings

Soft tissue ML measurement

- The soft tissue ML measurement is located 30 mm below the tuber ischii, on the level of the first proximal circumference
- Adjustments of the ML measurement are possible but **not necessary**
 - The measurement is reproduced relatively accurately with correctly measured circumferences
 - The calculated measurement can be compared with the measured ML measurement

Lateral Brim: In 10mm

Perineum AP: 83mm

Bony ML: 123mm

Soft ML: 129mm

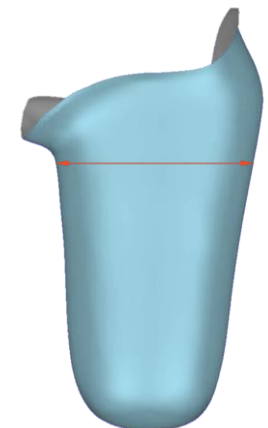
Original: 123mm

Best view: Proximal

Adduction Angle: 8°

Flexion Angle: 5°

Distal Shape: 5



Software settings

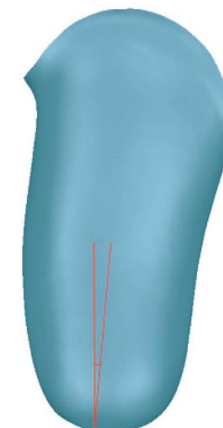
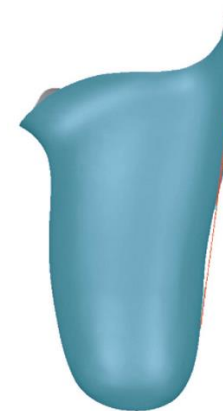
Adduction and flexion

Adduction angle

- The adduction angle is determined in relation to the lateral socket wall and not in relation to the longitudinal axis of the residual limb
- For checking purposes, the position of the socket in the 3D view should be examined first and foremost and less focus placed on the value of the displayed adduction angle

Flexion angle

- The model is always pre-flexed by 5° (default setting in the software)



▶ Lateral Brim: In 10mm

▶ Perineum AP: 83mm

▶ Bony ML: 123mm

▶ Soft ML: 129mm

▼ Adduction Angle: 8°

Original: 4°

Best view: Anterior

▶ Flexion Angle: 5°

▶ Distal Shape: 5

▶ Lateral Brim: In 10mm

▶ Perineum AP: 83mm

▶ Bony ML: 123mm

▶ Soft ML: 129mm

▼ Adduction Angle: 8°

▼ Flexion Angle: 5°

Original: 5°

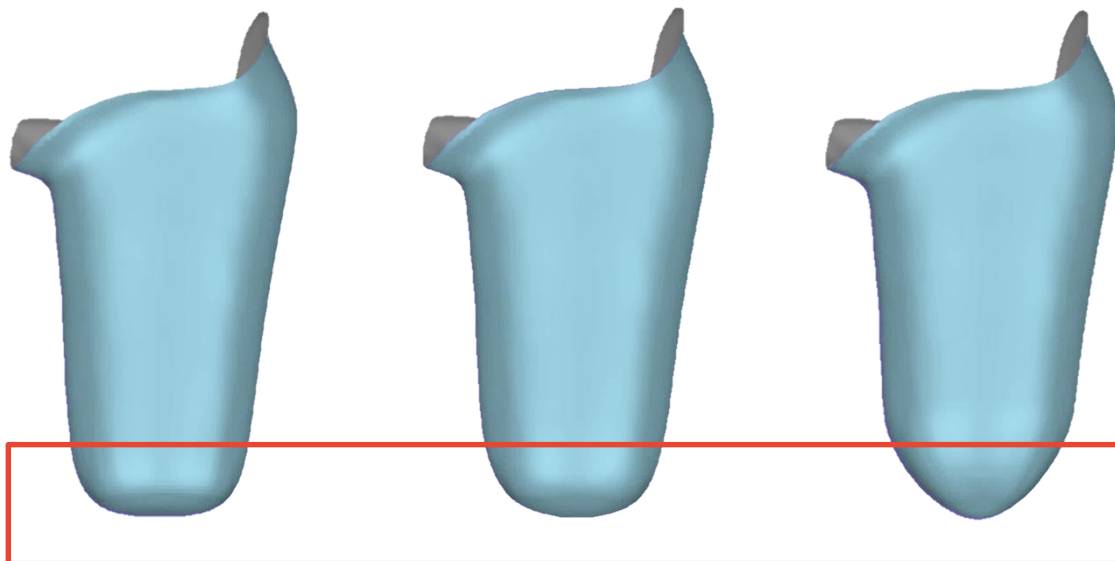
Best view: Lateral

▶ Distal Shape: 5

Software settings

Distal shape

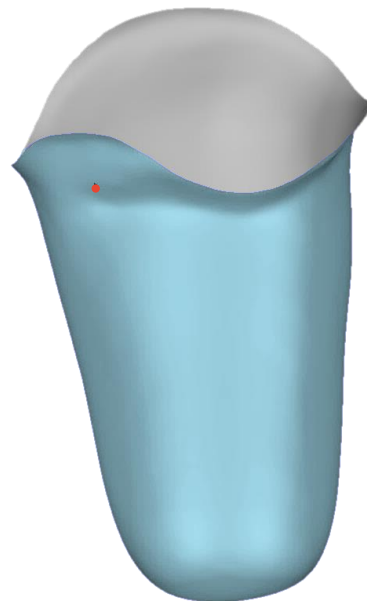
- The shape of the distal end can be adjusted
- When using a liner with pin, the diameter is adapted to the diameter of the distal cap



Software settings

Showing measurements

- X;Y;Z, Circumference and volume can be read at any point below the tuber
- The 0 - point is the tuber ischiadicum

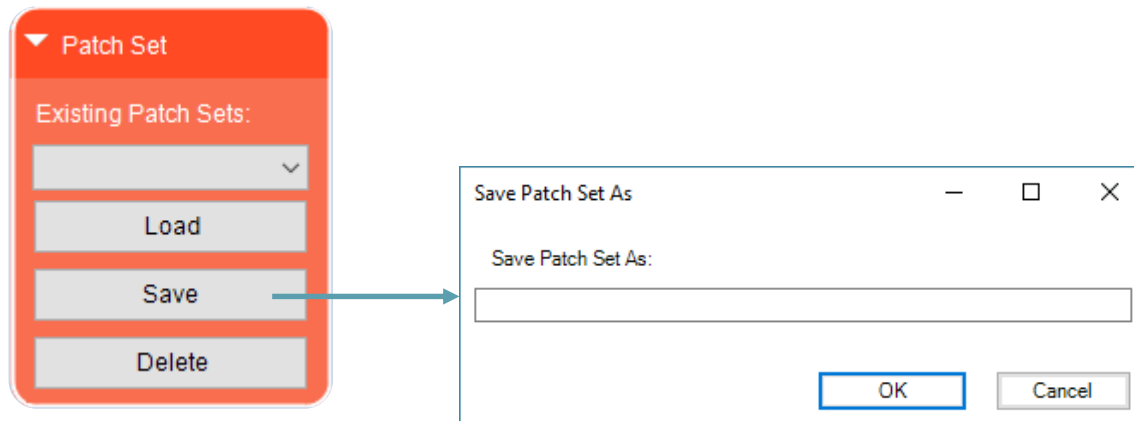


Measurements
Z: 102mm
ML: 148mm
AP: 160mm
Circumference: 488mm
Volume: 1880cc

Software settings

Patch groups

- Patch groups can be saved shape specific
- Ability to use a patch configuration for different patients



Software settings

Patches for all socket shapes (1/2)

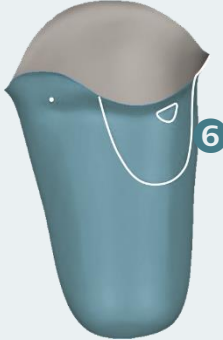
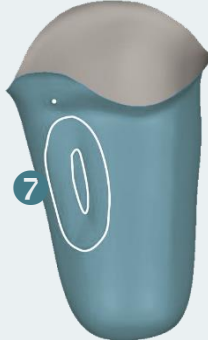
Lateral view			
Lateral Anterior Femur Patch	Lateral Posterior Femur Patch	Lateral Trochanter Patch	Lateral Posterior Distal Femur Patch
			

Based on experiences with ICS Advanced

- ①+② Patches used as frontolaterally and dorsolaterally positioned supports for guiding the femur ⇒ improved control of the prosthesis
- ③ Patch used as lateral support surface for the femur ⇒ support below the trochanter and more adducted position for the femur
- ④ Patch on distal end of the femur ⇒ relief for the tip of the femur

Software settings

Patches for all socket shapes (2/2)

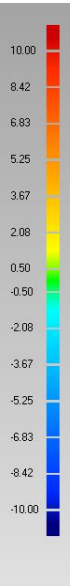
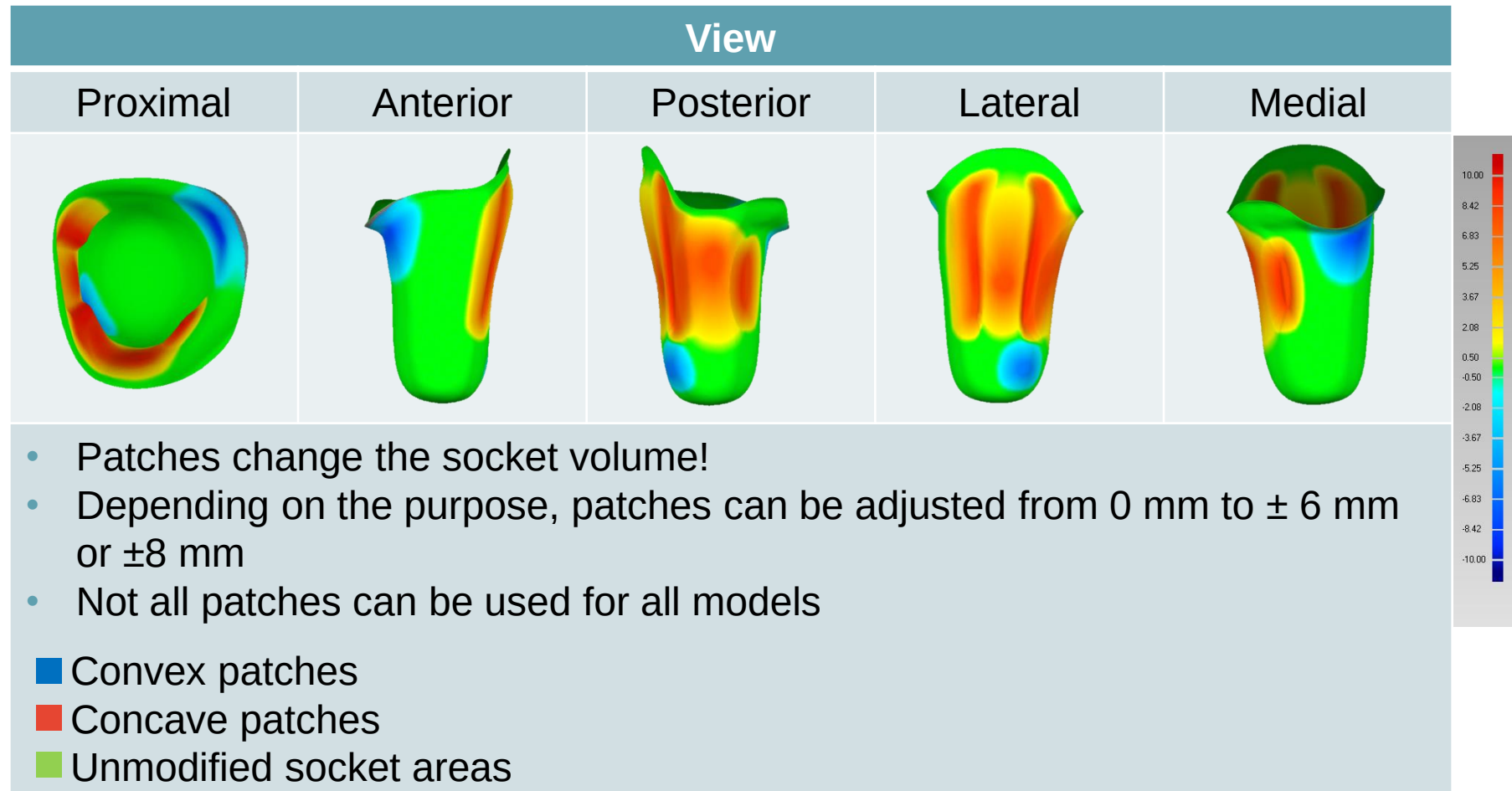
Posterior view	Medial view		Frontal view
Posterior Middle Femur Patch	Medial Adductor Tendon Patch	Medial Patch	Anterior Patch
			

Biomechanically useful positioning of patches

- ⑤ Patch as dorsal element for femur ⇒ dorsal support / prevents formation of pockets
- ⑥ Patch for exposing adductor tendon ⇒ creates space, thereby preventing pressure problems
- ⑦ Patch below the ischial tuberosity ⇒ increases pre-tensioning of the ischiocrural muscle group
- ⑧ Anterior patch ⇒ anterior pad prevents pelvis from tipping forwards due to ischial support

Software settings

Maximum patch settings



Software settings

General rule for patches

General use of patches

It is easier to deform patch areas thermically outwards than subsequently reinforcing it

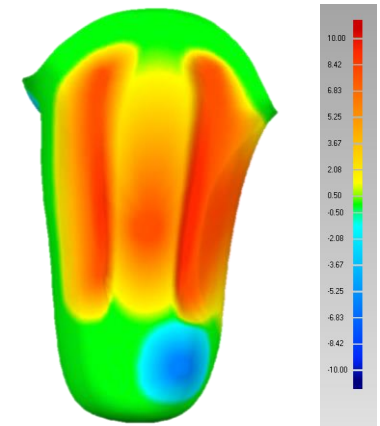
Recommendation

- For adipose residual limbs approx. 6 mm – 8 mm
- For normal residual limbs approx. 4 mm – 6 mm
- For thin residual limbs approx. 2 mm – 4 mm

General rule

If large concave patches are used intensively (e.g. if 75% of the patches are set at 75 % – 100 % of the patch depth): **decrease the reduction of the socket volume by 1 % – 1.5 %**

⚠ Using patches influences the socket volume

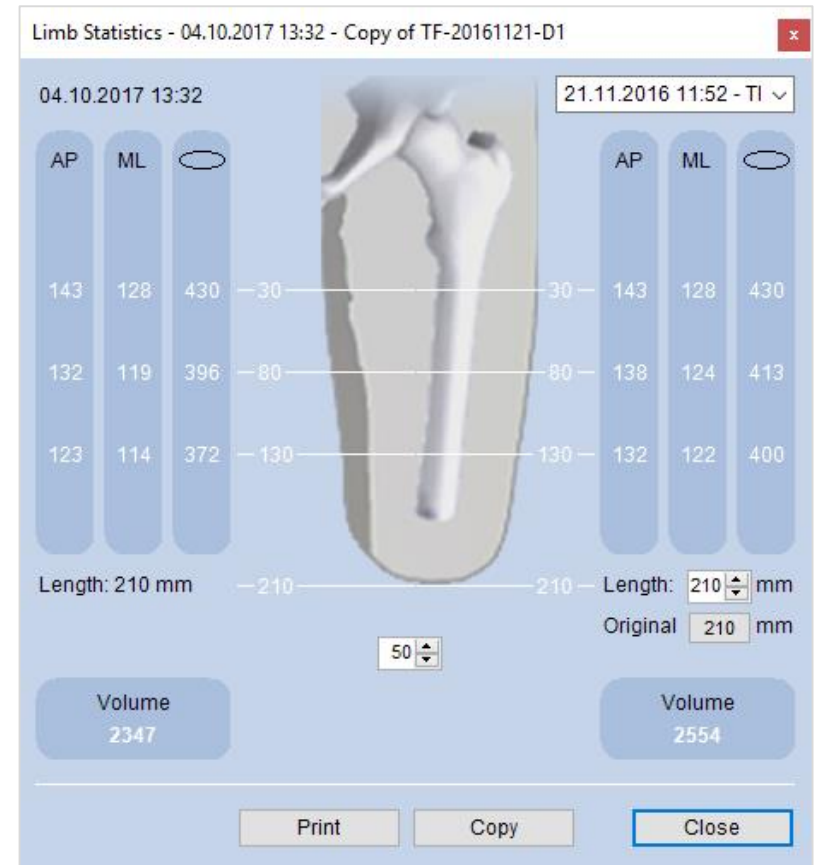


▶ Lateral Posterior Femur Patch Depth: -3mm
▶ Lateral Anterior Femur Patch Depth: -4mm
▶ Lateral Trochanter Patch Depth: -2mm
▶ Lateral Posterior Distal Femur Patch Depth: 2mm
▶ Posterior Middle Femur Patch Depth: -1mm
▶ Medial Adductor Tendon Patch Depth: 5mm
▶ Medial Patch Depth: -4mm

Software settings

Limb statistics

- Stump dimensions and volume at different points in time can be compared on a patient-specific basis



Software settings

Component selection

Home Specification **Socket View** Component... Order Details

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Prosthesis Components

Socket Technology

None

4R160=1 4R160=2 4R163 4R164 6A20=10 6A20=20

Adapter Type

- ☐ Wood Block
- ☐ Lamination Disk
- ☐ Draping
- ☐ 3 Prong
- ☐ 4 Prong

Socket adapter: 4R111 Four-pronged Lamination Anchor with Pyramid Receiver, Rotatable, Stainless Steel

None

4R111 4R111=N 4R111=T 4R116 4R116=T 4R117

Adapter Type

- ☐ Wood Block
- ☐ Lamination Disk
- ☐ Draping
- ☐ 3 Prong
- ☒ 4 Prong

Software settings

Order

[Home](#)
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Product description



5T9=SM TF Test Socket (Thermolyn stiff) and Positive Model

Otto Bock offers individual test sockets for transfemoral prostheses to support technicians in the fabrication of the prosthesis. A positive model is also available in addition to the test socket. The test sockets are available in three transparent or translucent, thermoplastic materials: ThermoLyn Rigid, ThermoLyn Clear and ThermoLyn Soft.

The transparency or translucency of the test socket facilitates an exact check of the fit and the coloring of the skin on the residual limb. The fit can be tested with the aid of a supporting device or directly with an aligned prosthesis at the premises of the service provider, e.g. in your clinic. The socket can be modified thermoplastically at, for example, pressure points by heating it uniformly. The software lets you select all the components for the prosthesis and order them quickly and easily by e-mail.

Ordered Items

- ☒ **Socket Technology**
 - ☒ 1 **5T9=SM** TF Test Socket (Thermolyn stiff) and Positive Model
 - ☐ 0 **OC1560=00** Easy-Proth® Donning Assist
- ☒ **Components**
 - ☒ 1 **4R111** Four-pronged Lamination Anchor with Pyramid Receiver, Rotatable, Stainless Steel
- ☒ **Procedures**
 - ☒ **SFD-PR=40** Position Valve Laterally
 - ☒ **SFD-PR=90** Valve Preparation Only - 21Y97

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Fabrication



Fabrication Process at Service Fabrication



Model carving



Vacuum
forming



Grinding



Quality
control

Fitting



Fitting

Static fitting



Fitting

Dynamic fitting



Fitting

Video of dynamic fitting



Thank you for your attention!

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