**Landmark Protocol**

**Landmarks used for fusion of CBCT-dataset and surface scan**

**Landmarks CBCT:**

toothcrown\_CBCT\_lm-1: mb cusp maxilla 7 right

toothcrown\_CBCT\_lm-2: dental cusp maxilla 3 right

toothcrown\_CBCT\_lm-3: incisal point maxilla maxilla

toothcrown\_CBCT\_lm-4: dental cusp maxilla 3 left

toothcrown\_CBCT\_lm-5: mb cusp maxilla 7 left

toothcrown\_CBCT\_lm-6: mb cusp mandible 7 left

toothcrown\_CBCT\_lm-7: dental cusp mandible 3 left

toothcrown\_CBCT\_lm-8: incisal point mandible mandible

toothcrown\_CBCT\_lm-9: dental cusp mandible 3 right

toothcrown\_CBCT\_lm-10: mb cusp mandible 7 right

**Landmarks plaster cast:**

toothcrown\_plaster\_lm-1: mb cusp maxilla 7 right

toothcrown\_plaster\_lm-2: dental cusp maxilla 3 Right

toothcrown\_plaster\_lm-3: incisal point maxilla maxilla

toothcrown\_plaster\_lm-4: dental cusp maxilla 3 left

toothcrown\_plaster\_lm-5: mb cusp maxilla 7 left

toothcrown\_plaster\_lm-6: mb cusp mandible 7 left

toothcrown\_plaster\_lm-7: dental cusp mandible 3 left

toothcrown\_plaster\_lm-8: incisal point mandible mandible

toothcrown\_plaster\_lm-9: dental cusp mandible 3 right

toothcrown\_plaster\_lm-10: mb cusp mandible 7 right

**Landmarks set at tooth crowns on the plaster cast model**

**Maxilla**

arch\_plaster\_17\_lm-1 distobuccal dental cusp 17

arch\_plaster\_17\_lm-2 mesiobuccal dental cusp 17

arch\_plaster\_17\_lm-3 distal edge 17

arch\_plaster\_17\_lm-4 midpoint of central fissure 17

arch\_plaster\_17\_lm-5 mesial edge 17

arch\_plaster\_17\_lm-6 distolinduale dental cusp 17

arch\_plaster\_17\_lm-7 mesiolingual dental cusp 17

arch\_plaster\_16\_lm-1 distobuccal dental cusp 16

arch\_plaster\_16\_lm-2 mesiobuccal dental cusp 16

arch\_plaster\_16\_lm-3 distal edge 16

arch\_plaster\_16\_lm-4 midpoint of central fissure 16

arch\_plaster\_16\_lm-5 mesial edge 16

arch\_plaster\_16\_lm-6 distolingual dental cusp 16

arch\_plaster\_16\_lm-7 mesiolingual dental cusp 16

arch\_plaster\_15\_lm-1 buccal dental cusp 15

arch\_plaster\_15\_lm-2 distal edge 15

arch\_plaster\_15\_lm-3 midpoint of central fissure 15

arch\_plaster\_15\_lm-4 mesial edge 15

arch\_plaster\_15\_lm-5 lingual dental cusp 15

arch\_plaster\_14\_lm-1 buccal dental cusp 14

arch\_plaster\_14\_lm-2 distal edge 14

arch\_plaster\_14\_lm-3 midpoint of central fissure 14

arch\_plaster\_14\_lm-4 mesial edge 14

arch\_plaster\_14\_lm-5 lingual dental cusp 14

arch\_plaster\_13\_lm-1 distal contact point 13

arch\_plaster\_13\_lm-2 buccal dental cusp 13

arch\_plaster\_13\_lm-3 mesial contact point 13

arch\_plaster\_13\_lm-4 tuberculum lingual 13

arch\_plaster\_12\_lm-1 distal incisal edge 12

arch\_plaster\_12\_lm-2 mesial incisal edge 12

arch\_plaster\_12\_lm-3 tuberculum lingual12

arch\_plaster\_11\_lm-1 distal incisal edge 11

arch\_plaster\_11\_lm-2 mesial incisal edge 11

arch\_plaster\_11\_lm-3 tuberculum lingual 11

arch\_plaster\_21\_lm-1 mesial incisal edge 21

arch\_plaster\_21\_lm-2 distal incisal edge 21

arch\_plaster\_21\_lm-3 tuberculum lingual 21

arch\_plaster\_22\_lm-1 mesial incisal edge 22

arch\_plaster\_22\_lm-2 distal incisal edge 22

arch\_plaster\_22\_lm-3 tuberculum lingual 22

arch\_plaster\_23\_lm-1 mesial contact point 23

arch\_plaster\_23\_lm-2 buccal dental cusp 23

arch\_plaster\_23\_lm-3 distal contact point 23

arch\_plaster\_23\_lm-4 tuberculum lingual 23

arch\_plaster\_24\_lm-1 buccal dental cusp 24

arch\_plaster\_24\_lm-2 mesial edge 24

arch\_plaster\_24\_lm-3 midpoint of central fissure 24

arch\_plaster\_24\_lm-4 distal edge 24

arch\_plaster\_24\_lm-5 lingual dental cusp 24

arch\_plaster\_25\_lm-1 buccal dental cusp 25

arch\_plaster\_25\_lm-2 mesial edge 25

arch\_plaster\_25\_lm-3 midpoint of central fissure 25

arch\_plaster\_25\_lm-4 distal edge 25

arch\_plaster\_25\_lm-5 lingual dental cusp 25

arch\_plaster\_26\_lm-1 mesiobuccal dental cusp 26

arch\_plaster\_26\_lm-2 distobuccal dental cusp 26

arch\_plaster\_26\_lm-3 mesial edge 26

arch\_plaster\_26\_lm-4 midpoint of central fissure 26

arch\_plaster\_26\_lm-5 distal edge 26

arch\_plaster\_26\_lm-6 mesiolingual dental cusp 26

arch\_plaster\_26\_lm-7 distolingual dental cusp 26

arch\_plaster\_27\_lm-1 mesiobuccal dental cusp 27

arch\_plaster\_27\_lm-2 distobuccal dental cusp 27

arch\_plaster\_27\_lm-3 mesial edge 27

arch\_plaster\_27\_lm-4 midpoint of central fissure 27

arch\_plaster\_27\_lm-5 distal edge 27

arch\_plaster\_27\_lm-6 mesiolingual dental cusp 27

arch\_plaster\_27\_lm-7 distolingual dental cusp 27

**Mandible**

arch\_plaster\_37\_lm-1 distobuccal dental cusp 37

arch\_plaster\_37\_lm-2 mesiobuccal dental cusp 37

arch\_plaster\_37\_lm-3 distal edge 37

arch\_plaster\_37\_lm-4 midpoint of central fissure 37

arch\_plaster\_37\_lm-5 mesial edge 37

arch\_plaster\_37\_lm-6 distolingual dental cusp 37

arch\_plaster\_37\_lm-7 mesiolingual dental cusp 37

arch\_plaster\_36\_lm-1 distobuccal dental cusp 36

arch\_plaster\_36\_lm-2 mesiobuccal dental cusp 36

arch\_plaster\_36\_lm-3 distal edge 36

arch\_plaster\_36\_lm-4 midpoint of central fissure 36

arch\_plaster\_36\_lm-5 mesial edge 36

arch\_plaster\_36\_lm-6 distolingual dental cusp 36

arch\_plaster\_36\_lm-7 mesiolingual dental cusp 36

arch\_plaster\_35\_lm-1 buccal dental cusp 35

arch\_plaster\_35\_lm-2 distal edge 35

arch\_plaster\_35\_lm-3 midpoint of central fissure 35

arch\_plaster\_35\_lm-4 mesial edge 35

arch\_plaster\_35\_lm-5 lingual dental cusp 35

arch\_plaster\_34\_lm-1 buccal dental cusp 34

arch\_plaster\_34\_lm-2 distal edge 34

arch\_plaster\_34\_lm-3 midpoint of Zebtralfissure 34

arch\_plaster\_34\_lm-4 mesial edge 34

arch\_plaster\_34\_lm-5 lingual dental cusp 34

arch\_plaster\_33\_lm-1 distal contact point 33

arch\_plaster\_33\_lm-2 dental cusp 33

arch\_plaster\_33\_lm-3 mesial contact point 33

arch\_plaster\_33\_lm-4 tuberculum lingual 33

arch\_plaster\_32\_lm-1 distal incisal edge 32

arch\_plaster\_32\_lm-2 mesial incisal edge 32

arch\_plaster\_32\_lm-3 tuberculum lingual 32

arch\_plaster\_31\_lm-1 distal incisal edge 31

arch\_plaster\_31\_lm-2 mesial incisal edge 31

arch\_plaster\_31\_lm-3 tuberculum lingual 31

arch\_plaster\_41\_lm-1 mesial incisal edge 41

arch\_plaster\_41\_lm-2 distal incisal edge 41

arch\_plaster\_41\_lm-3 tuberculum lingual 41

arch\_plaster\_42\_lm-1 mesial incisal edge 42

arch\_plaster\_42\_lm-2 distal incisal edge 42

arch\_plaster\_42\_lm-3 tuberculum lingual 42

arch\_plaster\_43\_lm-1 mesial contact point 43

arch\_plaster\_43\_lm-2 dental cusp 43

arch\_plaster\_43\_lm-3 distal contact point 43

arch\_plaster\_43\_lm-4 tuberculum lingual 43

arch\_plaster\_44\_lm-1 buccal dental cusp 44

arch\_plaster\_44\_lm-2 mesial edge 44

arch\_plaster\_44\_lm-3 midpoint of central fissure 44

arch\_plaster\_44\_lm-4 distal edge 44

arch\_plaster\_44\_lm-5 lingual dental cusp 44

arch\_plaster\_45\_lm-1 buccal dental cusp 45

arch\_plaster\_45\_lm-2 mesial edge 45

arch\_plaster\_45\_lm-3 midpoint of central fissure 45

arch\_plaster\_45\_lm-4 distal edge 45

arch\_plaster\_45\_lm-5 lingual dental cusp 45

arch\_plaster\_46\_lm-1 mesiobuccal dental cusp 46

arch\_plaster\_46\_lm-2 distobuccal dental cusp 46

arch\_plaster\_46\_lm-3 mesial edge 46

arch\_plaster\_46\_lm-4 midpoint of central fissure 46

arch\_plaster\_46\_lm-5 distal edge 46

arch\_plaster\_46\_lm-6 mesiolingual dental cusp 46

arch\_plaster\_46\_lm-7 distolingual dental cusp 46

arch\_plaster\_47\_lm-1 mesiobuccal dental cusp 47

arch\_plaster\_47\_lm-2 distobuccal dental cusp 47

arch\_plaster\_47\_lm-3 mesial edge 47

arch\_plaster\_47\_lm-4 midpoint of central fissure 47

arch\_plaster\_47\_lm-5 distal edge 47

arch\_plaster\_47\_lm-6 mesiolingual dental cusp 47

arch\_plaster\_47\_lm-7 distolingual dental cusp 47

**Landmarks set along the dental root(s)**

In the following the landmarks for tooth 16 (FDI-scheme) is explained. All other teeth received landmarks according to this procedure.

tooth\_16\_lm-1 midpoint of toothroot at level of

Regression line

describes tooth

axis

the CEJL

tooth\_16\_lm-2 midpoint of toothroot 2 mm in direction

of apex

tooth\_16\_lm-3 midpoint of toothroot 4 mm in direction

of apex

tooth\_16\_lm-4 midpoint of toothroot 6 mm in direction

of apex

tooth\_16\_lm-5 apical end of root(s)