



**SR Ortholingual® DCL**

**SR Orthoplane® DCL**

**Dental Technical Documentation**



# Preface

To meet the functional and aesthetic requirements of patients the possibilities for occlusal design in complete dentures are manifold. Ivoclar Vivadent is well aware of these high requirements and, therefore, offers artificial teeth which support the users in shapes, function, and shades and cover the entire range of possible occlusion concepts ranging from fully anatomical to zero-degree occlusion.

As a reaction to the popularity of "lingualized" and "zero-degree" occlusion, Ivoclar Vivadent has introduced two new tooth lines in addition to the existing SR Postaris DCL and SR Orthotyp DCL: SR Ortholingual DCL and SR Orthoplane DCL. These tooth lines were especially developed to meet the specific theoretical and technical requirements of these occlusion concepts.

*Sandra Goergen*

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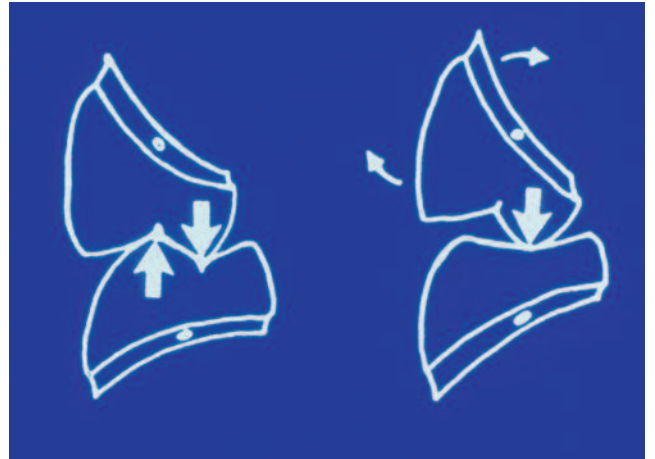
# History of lingualized occlusion

In 1941, Payne reported on "modified posterior set-up" by Dr. Edison J. Farmer.

This occlusion scheme consisted of prominent maxillary lingual cusps that occluded with relatively flat and uncomplicated mandibular occlusal surfaces. Only the maxillary lingual cusps were in contact with the mandibular teeth.

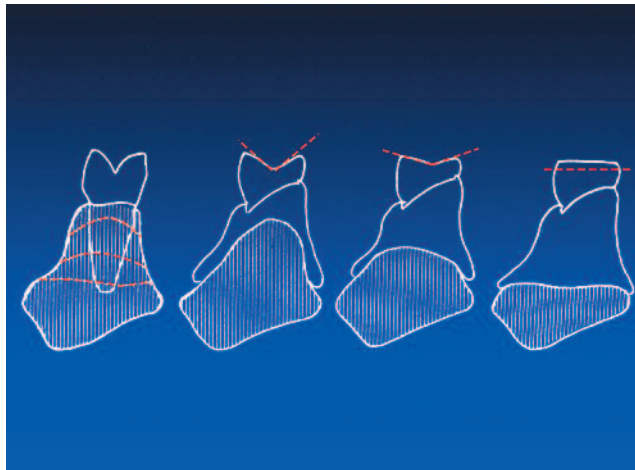
The forces of occlusion were transferred lingual to the mandibular ridge, thus the origin of the term "lingualized occlusion" so that it would not be confused with the suggestion that the teeth are set more lingual to the lower ridge, which can crowd the tongue space. This concept of denture occlusion has gained acceptance through the years primarily because of its aesthetics, biomechanics, simplicity, and favourable patient acceptance. Although the denture tooth debate continues, there does seem to be significant justification of the growing trend toward "lingualized (lingual contact) occlusion".

"Lingualized (lingual contact) occlusion is an attempt to maintain the aesthetic and food-penetration advantages of the anatomic form, while maintaining the mechanical freedom of the non-anatomic form".  
(Becker et al, JPD 1977).



Dr. Edward Mehringer, 1969  
Veterans Administration Medical Center, Buffalo N.Y.

# Zero-degree occlusion

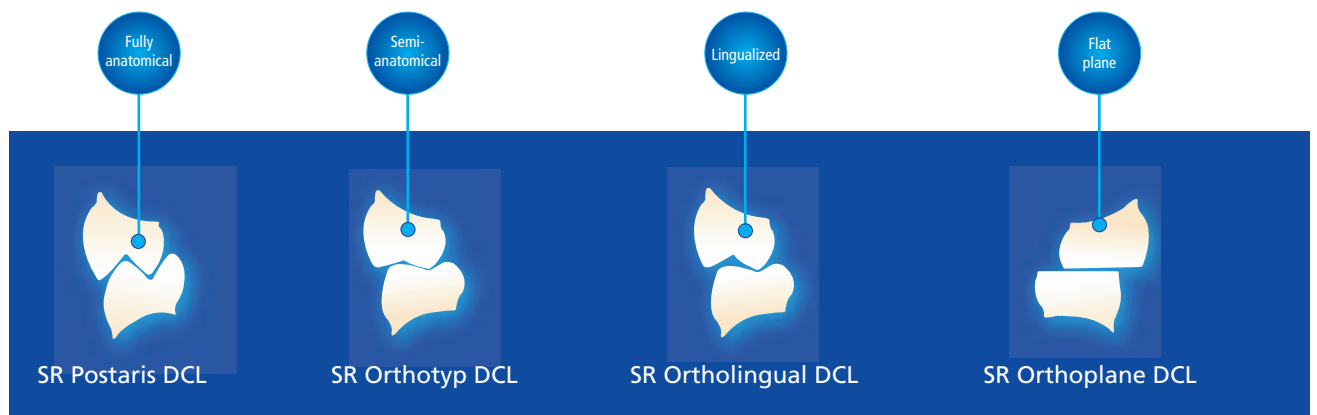


Ortman; JPD 1977; „The flatter the ridge, the flatter the cusp angles“

There are different recommendations for the selection of posterior tooth moulds and they are mainly based on the functional requirements of chewing and the stability of the denture base. The traditional point of view is "the flatter the ridge, the flatter the cusp angles". This principle seems to be justified and various studies have provided this concept with a certain validity with reports of stronger distortion of the denture base during the function with steeper cusp inclinations. From these findings, it is concluded that more pronounced movements of the dentures on the denture bearing area results in higher stress to the soft tissues, which, in turn, accelerates the resorption of the alveolar bone.

Given the many and diverse influential factors, however, it is very difficult to give any fact-based recommendations for the selection of posterior tooth moulds and/or occlusion concepts.

## Overview of the occlusion concepts



### Fully anatomical occlusion

Teeth with a true-to-nature occlusal relief, such as SR Postaris DCL, intend to enable an intercuspation that is similar to that of the natural occlusion and permit the implementation of the most important set-up philosophies. A relatively steep cusp inclination facilitates bilaterally balanced occlusion and demonstrates a high mastication efficiency. In this way, the fully anatomical occlusion is particularly suitable for partial, combination, and implant-supported dentures and requires exact definition of the individual centric.



### Semi-anatomical occlusion

In semi-anatomically designed denture teeth, the cusp inclinations usually range from 10° to 30° and therefore demonstrates a somewhat more "tolerant" intercuspation. The intercuspation also corresponds with that of the natural dentition and the semi-anatomical mould is often used for balanced occlusion and/or group guidance situations. Therefore, it is the most frequently used tooth mould for complete dentures.

With the three different tooth types of the SR Orthotyp tooth mould, the users are provided with the necessary teeth required for different bite types (normal bite, deep overbite and crossbite).



**N mould for normal bite**



**T mould for deep overbite**



**K mould for crossbite**



### Lingualized occlusion

Teeth which have been designed for lingualized occlusion, such as SR Ortholingual DCL, are distinguished for a more dominant palatal cusp in the maxilla and a functional central fossa in the mandible (Mörser-Pistill principle). In this way, the buccal masticatory forces, which are unfavourable for the dentures, can be reduced and the dentures are optimally stabilized on the denture bearing area by the masticatory forces being shifted towards the lingual area.



### Zero-degree occlusion

Teeth with a flat occlusal relief, such as SR Orthoplane DCL, are distinguished especially by the far-reaching freeway spaces in the centric relations. Since sagittal and lateral masticatory forces are reduced, they are particularly suitable for patients with a flat alveolar ridge and for geroprosthodontics.



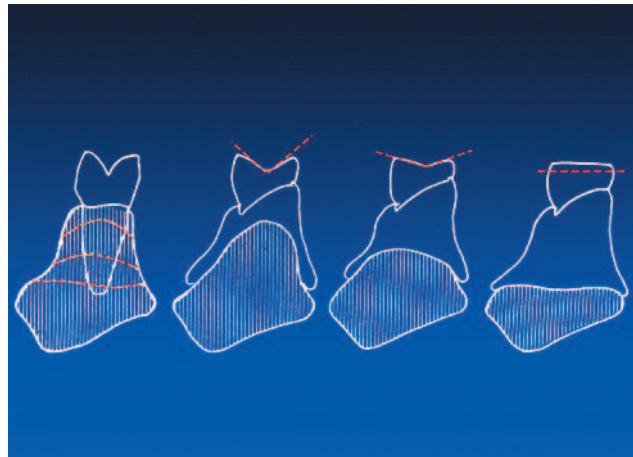
# Criteria for the selection of posterior tooth moulds

## Vertical forces

The vertical forces necessary to penetrate a food bolus are minimized in fully anatomical tooth moulds, while they are maximized in flatter tooth moulds.

## Horizontal forces

Patients with a significant residual alveolar ridge are more likely to support an anatomical occlusion. The complete ridge contours may better withstand the resulting horizontal forces so that the patient can benefit from the steeper cusp inclinations. In contrast, a severely resorbed alveolar ridge can most probably not withstand the same horizontal forces. Therefore, a tooth mould with flatter cusp inclination should be taken into consideration.



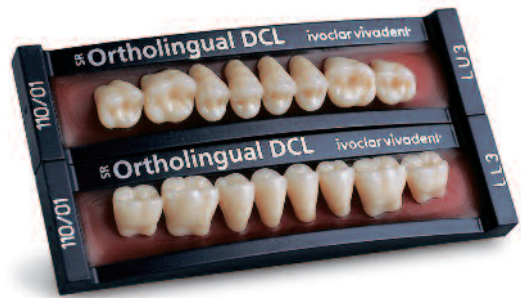
Ortman; JPD 1977; "The flatter the ridge, the flatter the cusp angles"



# SR Ortholingual DCL

## Characteristics

- ✦ Quick and easy set-up
- ✦ Compatible with the Ivoclar Vivadent 2D and 3D templates
- ✦ A reduced basal design shortens the grinding time during tooth set-up
- ✦ Pronounced basal cusps in the maxilla result in a defined, lingualized centric
- ✦ The buccal cusp inclination is 20° and the lingual cusp inclination 15°
- ✦ The continuous central fossa minimizes interfering contacts in the area of the mesial and distal marginal ridges
- ✦ Extra long facies of the premolars enhance the aesthetic appearance



## Set-up of the SR Ortholingual DCL

Model analysis and tooth set-up are basically conducted according to biofunctional aspects, which are comprehensively described in the Handbook of Complete Denture Prosthetics by Ivoclar Vivadent. The sagittal course of the ridge must also be taken into consideration in the lingualized occlusion concept.

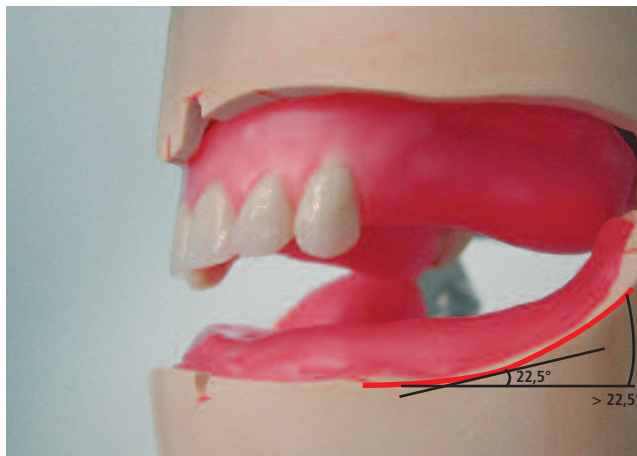
After model orientation and anterior tooth set-up, the posterior tooth set-up will be described in more detail, due to the different requirements during set-up.

## Model analysis



1)

## Positioning of the maxillary anterior teeth



2)



3)

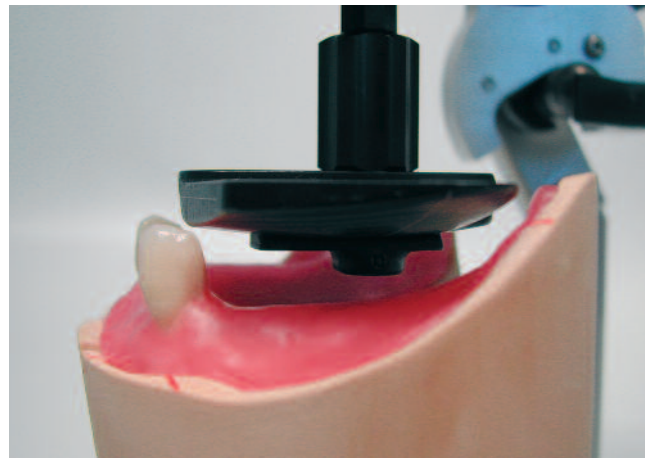
Since a "one-on-one" tooth relation typical for lingualized occlusion is the aim, the canines are set-up more in the corresponding neutral positioning. Furthermore, the necessary overjet and overbite must be taken into consideration.

### Set-up of posterior teeth

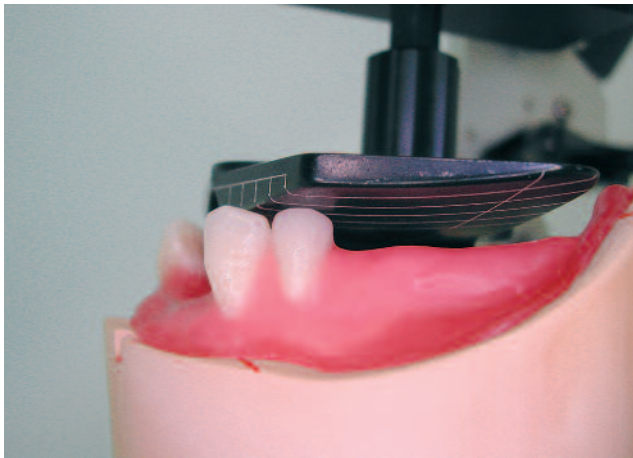
For aesthetic and functional reasons, it must be made sure during set-up that the mandibular posterior teeth are not set-up too low in relation to the canines (4).

The setting-up template is aligned with the canine and/or the mandibular first premolar and the occlusal plane is marked on the retromolar triangles (5).

If the canines are positioned correctly, the following general guideline can be applied: the mesial proximal contact of the mandibular first premolar should be aligned with the height of the distal margin of the canine.



4)



5)

### Practical tips and tricks

- Adjustment by grinding of the second lower premolar:
- 1) bucco-distal ridge (to prevent a centric contact in the buccal area)
  - 2) linguo-distal share of the central fissure (for a clear, centric contact the upper palatal cusp (lingualized), which results in protrusive guidance on the mesial ridge of the first molar.

### Set-up possibility I

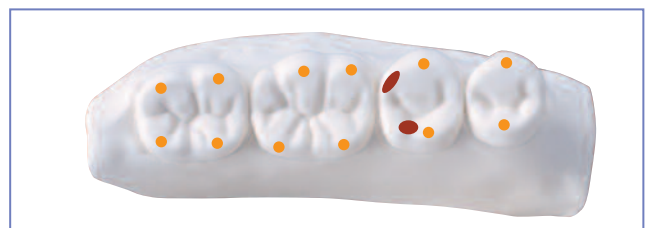
#### Mandible

#### First and second premolars

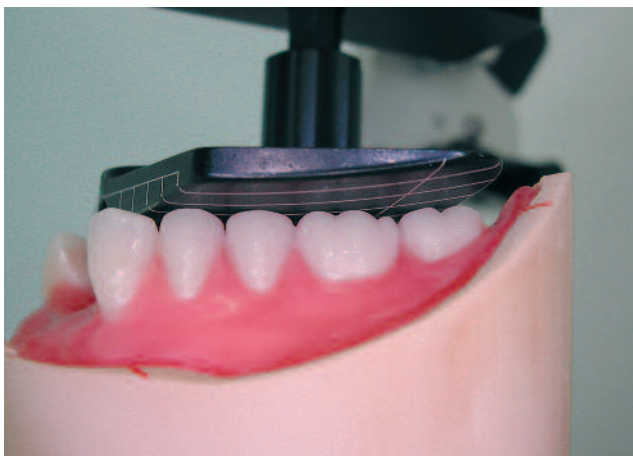
It must be made sure that the tooth axes of both premolars are straight when viewed from the buccal and that both the buccal and the lingual cusps come into contact with the template.

#### First and second molars

As shown in the picture below, both all the cusps of both molars come into contact with the template, which automatically results in the correct position of the tooth axes.



● Kontakte zur Aufstellungskalotte    ● Zone for adjustments by grinding



1) Buccal view of the posterior tooth position in relation to the setting-up template



2) Lingual view of the posterior tooth position in relation to the setting-up template



3) Frontal view of the set-up to the setting-up template



4) Contact relations to the setting-up template

### Maxilla

Basically, the palatal cusp contacts in the central fossae of the mandibular teeth has to be achieved.

Besides of the first premolar, lingualized occlusion does without buccal contacts. For that version, the cervical areas of maxillary posterior teeth must be slightly rotated towards the palatal.

Viewed from the buccal and the palatal, the teeth are set-up in a tooth-to-tooth relation.

### Remark

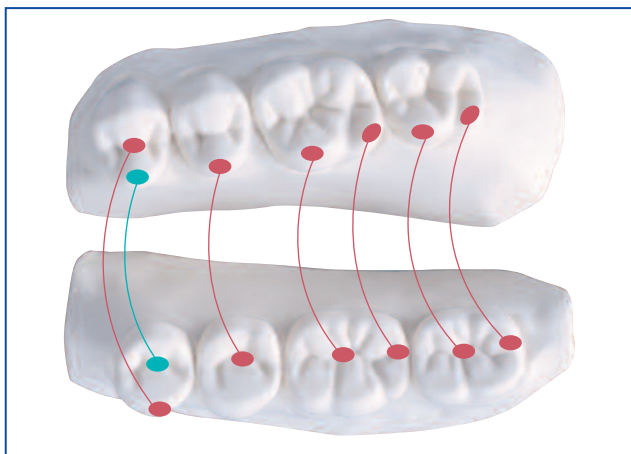
Given the reduced marginal ridges of the SR Ortholingual DCL, a more free positioning of the palatal maxillary cusps in relation to the V-shaped fossae of the mandibular teeth can be achieved.

### Recommendation

It is recommended to start with the antagonist relation of the first molar in the maxillary posterior region once the mandibular teeth have been set-up.



The continuous central fossae in the mandible enable a more free positioning of the maxillary posterior teeth in a sagittal direction.

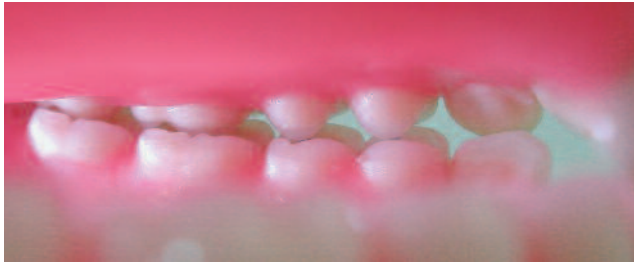


● Occlusal contact relations

● Secondary contact



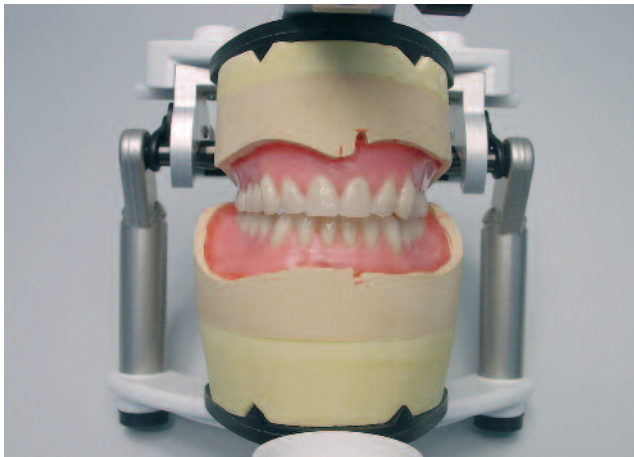
5) Positioning of the maxillary first molar



6) Lingual view of the posterior tooth set-up



7) Buccal view of the posterior tooth set-up



8) Buccal and frontal view of the posterior tooth set-up (e.g. in the Stratos 100)

## Set-up possibility II

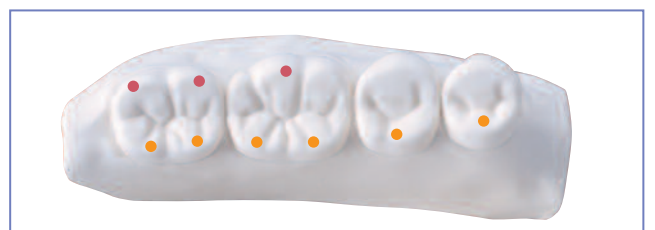
### Mandible

#### First and second premolars

Both in the buccal and the frontal view, the tooth axes for the two premolars are straight (no Wilson curve). In this set-up variant, only the lingual cusps come into contact with the template.

#### First and second molars

The molars are aligned with the setting-up template with the contact points shown below. **A harmonious course of the curve of Spee must be ensured.** The buccal contact point of the first molars are not imperative.



- Contact points with the setting-up template
- Contacts with the setting-up template *not imperative*

## Grinding-in instructions

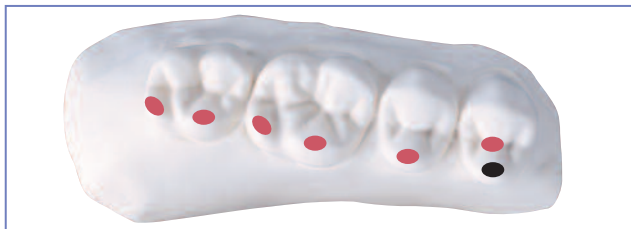
### Selective grinding-in

In general, do not carry out major adjustments by grinding in complete dentures before the wax-up is converted into acrylate dentures.

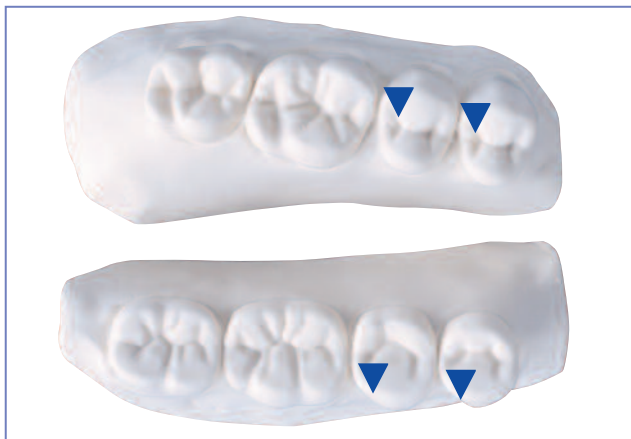
If the conventional packing technique is used, the increase in vertical dimension has to be adjusted in a first step.

This is done as follows:

- ✘ Do not grind in the working cusps
- ✘ Reduce premature contacts in the antagonist fossa



- Primary contact surfaces, do not grind-in the working cusps, reduce premature contacts in the antagonist fossa

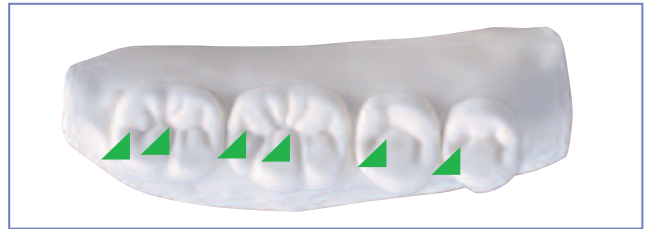


- ▼ Depending on the set-up variant and the rotation of the premolars, the distal cusp slopes of the buccal surfaces might require slight adjustment by grinding.

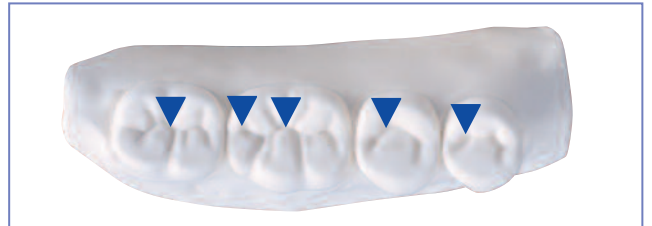
**These centric contacts must not be adjusted by grinding after that!**

Starting from the centric, the following guiding surfaces are desired. They should be checked and, if necessary, achieved by adjusting the position of the tooth or by selective grinding-in.

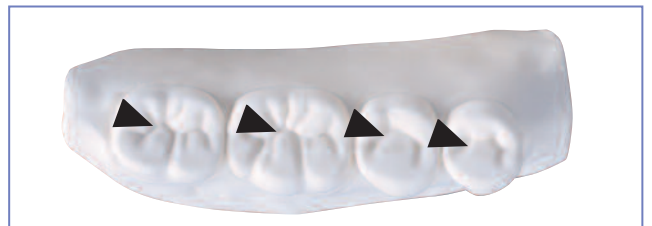
This also applies to the anterior teeth, with the guiding surfaces being grinded-in from the palatal in the maxilla and from the labial in the mandible according to the abrasion in the natural dentition.



- ▲ On the mediotrusion side (balancing side) the maxillary palatal cusps run from the central fossa along the buccal cusp slopes of the mandibular posterior teeth.



- ▼ On the laterotrusion side (working side), the maxillary palatal cusps run from the central fossa along the lingual cusp slopes of the mandibular posterior teeth.



- ▶ During a protrusive movement, the maxillary palatal cusps run from the central fossa along the disto-lingual cusp slopes of the mandibular posterior teeth. Depending on the set-up of the anterior teeth and/or the protrusion angle, at least a guidance by the molars should be achieved.

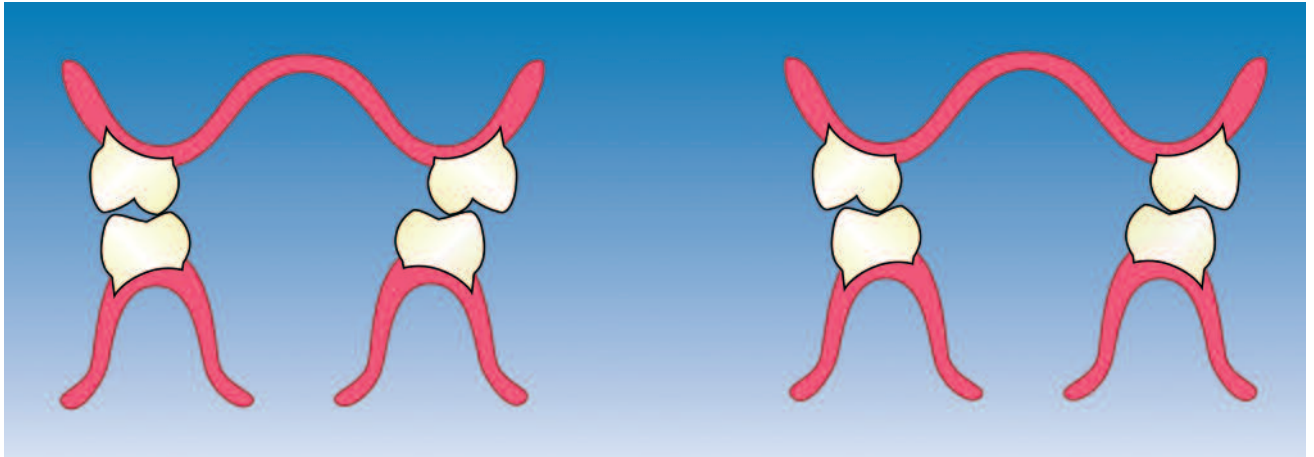


Diagram: Lateral movement

Diagram: Centric



Buccal view of the working side



View of the balancing contacts



Centric contacts in terminal occlusion

# SR Orthoplane DCL

## Characteristics

- ✦ Quick and easy tooth set-up
- ✦ A reduced basal design shortens the grinding time during tooth set-up
- ✦ Reduction of interfering contacts during lateral movements through plane occlusal design
- ✦ Appealing aesthetic appearance
- ✦ Despite the 0° occlusal surface, the tooth appears to have cusps
- ✦ Extra long facies of the premolars
- ✦ A tooth especially designed for geroprosthodontics

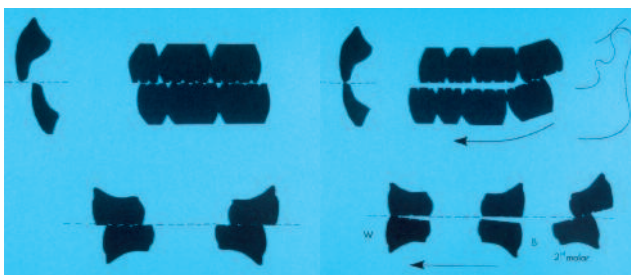


## Set-up of the SR Orthoplane DCL

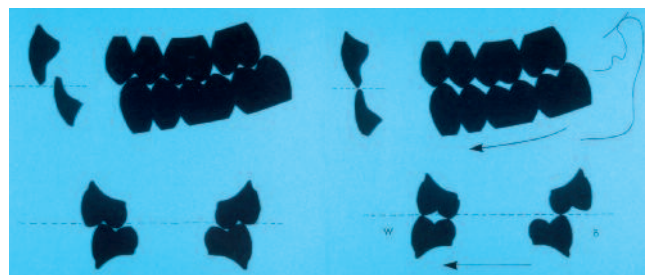
Model analysis and tooth set-up are basically conducted according to biofunctional aspects, which are comprehensively described in the Handbook of Complete Denture Prosthetics by Ivoclar Vivadent.

If 0° teeth are used, achieving a balanced occlusion is more difficult, since the guiding surfaces at cusp slopes are missing. In order to prevent Christensen's phenomenon during advancing movement, the anterior teeth may be set-up in a 0° occlusion with only a slight overbite.

Anatomically designed posterior teeth enable the necessary disclusion of the anterior teeth during protrusive movements.



1) Teeth without marked cusp-slopes with grinding surfaces



2) Teeth with marked occlusal cusp slopes

### Set-up of posterior teeth

If a template is used, it is aligned with the canines and the posterior teeth are set-up with plane contacts to the template.

#### First premolar

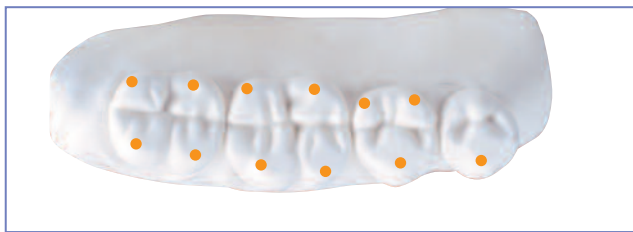
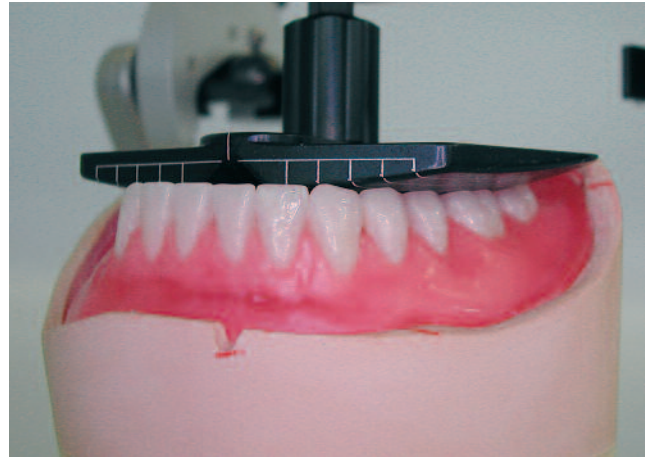
The buccal cusp comes into contact with the template. Viewed from the anterior, the first premolar is in line with the mandibular canine.

#### Second premolar

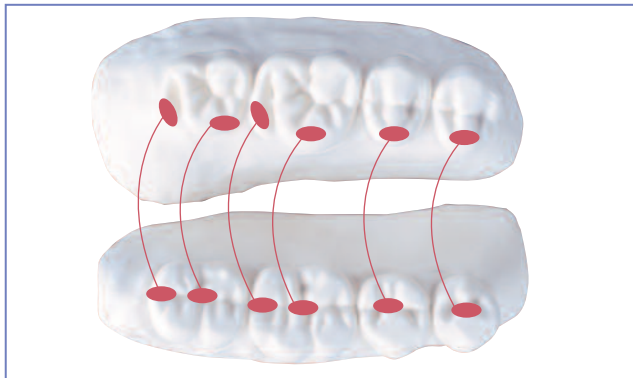
Both the buccal and lingual cusps come into contact with the template.

#### First and second molars

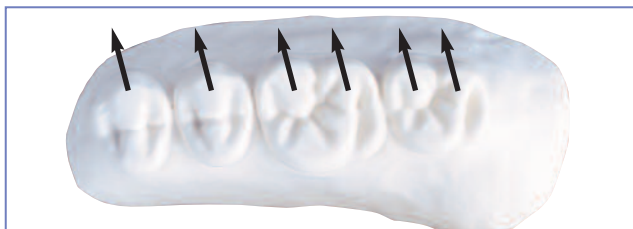
All cusps come into plane contact with the template.



● Plane contacts of the mandibular cusps with the setting-up template



● SR Orthoplane shows free occlusal allocation in contact surfaces



↖ It is important that the maxillary posterior teeth are set-up with adequate gliding motion in relation to the mandibular posterior teeth in order to prevent "biting the cheeks".





Set-up of SR Orthoplane in the Stratos 100 with adequate gliding motion.



# Lingualized occlusion for implant-supported removable dentures

The importance of occlusion as a key factor in implant success has been emphasized by many authors. In particular, it has been suggested that the maintenance and preservation of osseointegration can be achieved by limiting the lateral forces of occlusion. It seems prudent to select an occlusal scheme that has the potential to minimize lateral forces, while maintaining the patient's ability to masticate efficiently. For patients with mixed dentition, it has been suggested that whenever possible the patient's natural teeth should provide anterior guidance (or at minimum a group function that would share the anterior guidance with natural teeth).

For the edentulous patient, the challenge becomes more difficult, since it is virtually impossible to remove all lateral forces as there are no natural teeth present to share the occlusal loading. In addition, the use of dental implants has resulted in improved denture base stability which increases occlusal force transmission during chewing, swallowing, and particularly clenching and bruxism. Hence the choice of denture tooth form and occlusal scheme can be extremely influential to the health of the implants and associated oral structures during occlusal contact."

Given this challenge, the concept of lingualized (lingual contact) occlusion has become the occlusal scheme of choice for implant-supported removable denture restorations in an attempt to minimize lateral forces.

*Dr. F. Lauciello*

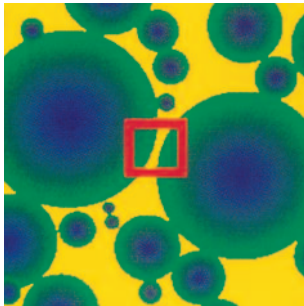
# General Information

## DCL Material (Double-Cross Linked)

The DCL resin was selected because of its outstanding abrasion behaviour.

### Characteristics

- ✦ Increased mechanical strength
- ✦ High resistance to plaque and discolouration
- ✦ Reduced water absorption
- ✦ Minimized monomer release
- ✦ Outstanding abrasion behaviour
- ✦ Excellent polishability
- ✦ Good bond to denture base materials
- ✦ Good grindability for adjustments by grinding



- Matrix**  
Homogenous cross-linked polymer
- Filler**  
Insoluble, swellable cross-linked PMMA sphere
- Diffusion layer**  
Matrix embedded in the cross-linked sphere

## Shade systems

The SR Ortholingual DCL and SR Orthoplane DCL tooth lines are available in the following shade systems:

- ✦ 20 Chromascope shades
- ✦ 2 Bleach shades
- ✦ 16 A–D shades



## BPS (Biofunctional Prosthetic System)

BPS is a brand product, which enables most efficient working as a result of the interplay of the individual components. It is inexpensive and practice-oriented. Moreover, it provides reliability with the accompanying training courses with certificate, as well as personal consulting for all questions.

## Literature references

For a detailed description of the denture teeth for complete dentures and the various occlusion concepts for complete dentures, we recommend the following sources:

1. Lang BR, Kelsey CC (eds), International Prosthodontic Workshop on Complete Denture Occlusion, Ann Arbor, University of Michigan School of Dentistry, 1973.
2. Parr GR, Loft GH, The Occlusal Spectrum and Complete Dentures, The Compendium of Continuing Education, Vol III. No. 4 July/Aug 1987
3. Ortman HR. Complete denture occlusion. In: Winkler S, ed. Essentials of Complete Denture Prosthodontics, 2nd ed. St. Louis: Mosby-Year Book; 1988: 217-249.
4. Modifiziert aus Mehringer EJ: Function of steep cusps in mastication with complete dentures, J Prosthet Dent, 30:367-372, 1973.  
"The flatter the ridge the flatter the cusp angles"  
Ortman  
(Je flacher der Kieferkamm, desto flacher die Höckerneigung. Ortman)

## Acknowledgement

The conception and development of these new tooth lines were based on the scientific investigations and expertise of Dr. S. Howard Payne, Dr. Harold R. Ortman, Dr. Sheldon Winkler, Dr. Glen P. McGivnes und Dr. Edward J. Mehringer, Dr. Brian R. Lang. We would also like to thank the many other dentists and dental technicians, whose expert knowledge has influenced the development of these tooth lines, or who made their experiences available to us. We are especially grateful to Lee Culp, CDT, whose knowledge of the anatomy of teeth supported this project, and to Sandra Goergen, who significantly contributed to the realization of this Technical Documentation.

Descriptions and data constitute no warranty of attributes.

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The logo for Ivoclar Vivadent features the company name in a white, sans-serif font. Above the text, a series of white dots of varying sizes are arranged in a semi-circular arc, resembling a stylized dental arch or a smile. The word "ivoclar" is on the top line, "vivadent" is on the bottom line, and a registered trademark symbol (®) is positioned to the right of "vivadent". Below the company name, the tagline "passion vision innovation" is written in a smaller, lowercase, sans-serif font.

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**vivadent**®  
passion vision innovation