When I met Ursula Wirtz in 1999, she was a qualified dental technician working in the Orthodontic Clinic at the University Clinic in Aachen, Germany. I was immediately struck by her enthusiasm for the diversity of orthodontics and her inquisitiveness for new, innovative appliances. We worked together for many years on optimizing the fabrication of appliances for molar distalization and Class II correction in the laboratory, particularly those not requiring patient compliance. Over the years, Ursula Wirtz also worked on writing detailed descriptions of the many different orthodontic appliances and documented them in images.

The o-atlas, her "lifetime achievement", was published in 2003 together with Dentaurum. Since its publication, it has become the standard reference book for removable orthodontic appliances and techniques. It has also been translated into several languages and is read not only by dental technicians, but also dentists and orthodontists worldwide.

In the meantime, Ursula Wirtz has retired but remains active, and I am sure she will not stop documenting new orthodontic appliances, meaning the o-atlas can be updated from time to time.

I wish you the same enjoyment as I have as you read through the chapters. The o-atlas II will help to demonstrate again and again the wide range of orthodontic appliances available for treatment. Dental technicians, dental practitioners and patients alike will benefit from this compendium.

Tönisvorst, Germany, March 2017

Prof. Dr. med. dent. Gero Kinzinger
When I began describing orthodontic appliances at the University Clinic in Aachen, Germany many years ago, I had no idea that I would receive such positive feedback. In cooperation with Dentaurum, my many years of work have resulted in a reference work for removable orthodontic appliances. Since it was first published in 2003, several thousand copies of the o-atlas have been sold and it has been translated into English, Spanish and Polish. It is fair to assume that it will be translated into even more languages since interest in this illustrated compendium continues to grow.

As the feedback was so positive and many were asking for descriptions of further appliances, I continued to work on the book and have now included a further 44 appliances in this new edition. The content has been completely revised and updated. A total of 235 appliances are illustrated and more than 800 new images were taken by a specialist for macro photography. He was a master in capturing the finer details of the appliances and making them visible to the reader in the images. The images are in high quality and show details with a fascinating precision not seen before. However, it wasn’t possible to replace all the images from the first edition.

o-atlas II makes clever use of the advantages of print media and online media at the same time. The 50 most interesting appliances can be viewed and studied in detail from all sides on the o-atlas II website (www.o-atlas.com).

A decisive factor in determining whether orthodontic treatment will produce the desired result lies in the treatment method used and the appliance. A good fit and secure retention are key to how effective active and passive orthodontic appliances are. The result of the treatment and the efficiency of the appliance are dependent on the competence of the dental operator, the dental technician and the patient and their cooperation.

I am quite aware that this reference book will never truly be finished since research in this field is ongoing and existing, tried-and-trusted appliances are constantly being modified and developed.

I hope that this new edition will be of help to you in your practical work and will bring you enjoyment as you study it.

Ursula Wirtz
With the purchase of this o-atlas II, you receive exclusive access to the protected area of the website www.o-atlas.com. On this website, you have the possibility of viewing and examining 50 of the most interesting orthodontic appliances from all sides.

Please register at www.o-atlas.com to gain access to the protected area.

Registration
1. Open www.o-atlas.com and click on 360° product view.
2. Fill in the registration form and enter your 12-digit registration code (see page 3 of this book). Click on Register.
3. An activation link will be sent to the email address given. Click on the activation link to activate your user account prior to the initial login.
4. Log into www.o-atlas.com with your email address and password. You will find the Login button in the top right-hand corner on the menu bar. Confirm with "Login".

You can now look at the 360° product views.
For 50 of the orthodontic appliances in this book, you will find in the top left-hand corner of the image a QR code and a web address printed in blue underneath the image caption. Scan the QR code with your smartphone/tablet or enter the web address into your internet browser to open the Login for www.o-atlas.com. Register with your email address and your password.

On pages 374 – 377 you will find an additional overview of all 360° product views.
Chapter 1 | Models, labial bows, appliance retaining elements, support elements.

Dental models ................................................................. 20
Simple labial bow ............................................................... 21
Acrylic-coated labial bow ...................................................... 22
Labial bow with vertical M-loop .............................................. 23
Labial bow with retractive canine loop ................................. 24
Labial bow with canine loop .................................................. 25
Labial bow with Andresen loop .............................................. 26
Labial bow with intrusion hooks ............................................ 27
Modified labial bow .............................................................. 28
Intermaxillary bow .............................................................. 31
Triangular clasp ................................................................. 32
Triangular clasp according to Zimmer ................................. 33
Triangular clasp according to Tränkmann ......................... 34
Double triangular clasp ....................................................... 35
Adams clasp according to Adams ........................................... 36
Double Adams clasp ............................................................ 37
Adams clasp according to Tenti ............................................. 38
Six modifications of the Adams clasp .............................. 41
Delta clasp according to Clark ............................................. 43
Adams clasp with spring for headgear .......................... 45
Adams delta clasp ............................................................... 46
Poncini clasp .................................................................... 47
Loop clasp according to Pohl ............................................... 48
Loop clasp over several teeth according to Pohl ............. 49
Arrowhead clasp ............................................................... 50
Modified arrowhead clasp .................................................. 51
Single arrowhead clasp ...................................................... 52
Circumferential clasp with mesial stop .............................. 53
Eyelet clasp according to Groth ........................................... 54
Eyelet clasp according to Stahl ............................................ 55
Double eyelet clasp ............................................................ 56
Universal clasp .............................................................. 57
Ball clasp ............................................................................. 58
Lorenz spring ........................................................................... 59
Occlusal rest ............................................................................ 60
Incisal rest .............................................................................. 61

Chapter 2 | Spring elements.

Active circumferential clasp ..................................................... 64
Canine retracting spring ........................................................... 66
Modifications of the canine retracting spring ............................ 67
Helical finger spring ................................................................. 69
Finger spring .......................................................................... 70
Protrusion spring .................................................................... 71
Free-end protrusion spring with retaining function .................... 72
Free-end protrusion spring with mesial arm .............................. 73
Double loop spring .................................................................. 74
Double helical spring ............................................................... 75
Helical protrusion spring .......................................................... 76
Closed protrusion spring for incisors ....................................... 77
Buccal box spring ..................................................................... 78
Paddle spring .......................................................................... 79
Paddle spring over several teeth .............................................. 80
Intrusion hook ......................................................................... 81
Leaf spring .............................................................................. 82
Beam spring ............................................................................ 83
Buccal spring .......................................................................... 84
Buccal spring according to Schneemann ................................. 85
Pressure spring ....................................................................... 86
T-loop spring ........................................................................... 87
Lingual/palatal spring .............................................................. 88
Oral spring .............................................................................. 89
Crossed-over mesial springs .................................................... 90
Closed intermediate spring with loop ...................................... 91
Chapter 3 | Shield elements, different orthodontic plates.

<table>
<thead>
<tr>
<th>Shield elements</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual vestibular screen</td>
<td>94</td>
</tr>
<tr>
<td>Tongue guard</td>
<td>95</td>
</tr>
<tr>
<td>Lip activator according to Dass</td>
<td>96</td>
</tr>
<tr>
<td>Lip bumper</td>
<td>97</td>
</tr>
<tr>
<td>Labial pads with an engaged labial bow</td>
<td>98</td>
</tr>
<tr>
<td>Inclined plane</td>
<td>99</td>
</tr>
<tr>
<td>Active plate</td>
<td>100</td>
</tr>
<tr>
<td>Labial bow plate for retraction</td>
<td>101</td>
</tr>
<tr>
<td>Cetlin appliance</td>
<td>102</td>
</tr>
<tr>
<td>Pivot plate according to Groth-Schenderlein</td>
<td>103</td>
</tr>
<tr>
<td>Upper and lower plate with compression-traction screw according to Heller</td>
<td>106</td>
</tr>
<tr>
<td>Appliance with open screw</td>
<td>107</td>
</tr>
<tr>
<td>Gap closing plate with diastema screw</td>
<td>108</td>
</tr>
<tr>
<td>Active plate with rotation screw</td>
<td>109</td>
</tr>
<tr>
<td>Plate or appliance with piston spring screw</td>
<td>110</td>
</tr>
<tr>
<td>Lever activating screw</td>
<td>111</td>
</tr>
<tr>
<td>Lingual arch appliance</td>
<td>112</td>
</tr>
<tr>
<td>Coffin appliance with Coffin spring in posterior region</td>
<td>113</td>
</tr>
<tr>
<td>Coffin appliance with anterior and posterior Coffin springs</td>
<td>114</td>
</tr>
<tr>
<td>Y-shaped appliance with two expansion screws</td>
<td>115</td>
</tr>
<tr>
<td>Appliance with open transverse screw</td>
<td>116</td>
</tr>
<tr>
<td>Appliance with Bertoni screw (Y-plate)</td>
<td>118</td>
</tr>
<tr>
<td>Plate with three-dimensional screw according to Beutelspacher</td>
<td>119</td>
</tr>
<tr>
<td>Fan-type expansion plate with different screws and applications</td>
<td>120</td>
</tr>
<tr>
<td>Mandibular plate with bow screw according to Müller</td>
<td>124</td>
</tr>
<tr>
<td>Labial spring bow plate according to Bandulet</td>
<td>125</td>
</tr>
<tr>
<td>Roberts retractor</td>
<td>126</td>
</tr>
<tr>
<td>Bite jumping appliance</td>
<td>127</td>
</tr>
<tr>
<td>Modifications of the protrusive bars/pins</td>
<td>128</td>
</tr>
<tr>
<td>Bite jumping plate system according to Schaneng</td>
<td>129</td>
</tr>
<tr>
<td>Class III double plate</td>
<td>132</td>
</tr>
<tr>
<td>Class III double plate with screw according to Sander</td>
<td>133</td>
</tr>
</tbody>
</table>
Chapter 4 | Double plates, bimaxillary appliances.

Roberts retractor as bite jumping appliance .................................................. 136
Double plate according to Planas ............................................................ 137
Berlin reactivator ................................................................................. 138
Bimaxillary prognathism upper plate according to Buño ......................... 139
Bi-block appliance according to Chateau ............................................... 140
Maxillator according to Rank ................................................................ 141
Bimler appliance type A ..................................................................... 143
Bimler appliance type B..................................................................... 145
Bimler appliance type C ..................................................................... 147
Twin Block appliance in connection with headgear............................... 149
Twin Block according to Clark with mounting tool according to RealKFO .... 150
Double plate with intermaxillary elastics according to Neuner ................. 153
Bimaxillary appliance according to Sevinc .............................................. 154
Buccal double plate according to Bierschenk ....................................... 156
Rilinator ......................................................................................... 157
Rilinator with Jasper Jumper................................................................. 158
Bass appliance ................................................................................. 159
Hansa plate according to Hasund ......................................................... 161
Selective orthopedic double plate according to Marillo ......................... 164
Double plate with distal spring loops according to Schwarz .................... 165
LS-Duobloc according to Leger/Soeren sen ............................................ 166
Areas of application for the LS-Duobloc screws ..................................... 168
Chapter 5 | Bimaxillary appliances, activators, bionators, function regulator appliances.

Activator .................................................................................................. 172
Herren activator ....................................................................................... 173
Propulsor according to Mühlemann/Hotz ............................................. 174
Headgear activator according to van Beek ............................................. 175
Activator according to Pfeiffer and Grobety ............................................. 176
Functionator according to Eschler .......................................................... 178
Multi-functionator according to G. Ph. Heller. Basic appliance for class II 179
Activator with spring bow according to Schwarz .................................. 182
Open bite activator with tongue crib ...................................................... 183
SKEL activator according to Ruhland type II-1 ..................................... 184
SKEL activator according to Ruhland type II-2 ..................................... 185
SKEL activator according to Ruhland type III-a ................................... 186
SKEL activator according to Ruhland type III-b ................................... 187
SKEL activator according to Ruhland type III-c ................................... 188
Elastic open activator according to Klammt (EOA) ................................ 189
Rigid open activator (ROA) .................................................................... 190
Modifications of the EOA and the ROA ................................................ 191
Activator according to Ergenzinger with high labial bow ...................... 192
Activator according to Scheer ................................................................. 194
Activator according to Antonie ............................................................... 195
Spring activator according to Sander ..................................................... 197
Kinetor according to Stockfisch ............................................................. 199
Divided activator with screw for the maxilla ........................................ 202
Prognathism activator according to Wunderer with screw according to 204
Weise ....................................................................................................... 204
U-bow activator according to Karwetzky .............................................. 206
Teuscher activator ................................................................................... 208
Six modifications of the Teuscher activator .......................................... 209
Harvold-Woodside activator for class II-1 ......................................... 211
Harvold-Woodside activator for class III .............................................. 213
Bionator according to Balters ............................................................... 215
Kybernator .............................................................................................. 219
**Chapter 6** Wire appliances, rapid maxillary expansion (RME) appliances.

- Bite restrainer according to van Thiel ........................................................ 220
- Function regulator according to Fränkel (FR 1 to FR 3) .............................. 221

<table>
<thead>
<tr>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crozat appliance</td>
<td>230</td>
</tr>
<tr>
<td>Wire appliance according to Meyer: bite ramp appliance, shield appliance and multi-band appliance</td>
<td>238</td>
</tr>
<tr>
<td>Frozat appliance according to Mayes</td>
<td>240</td>
</tr>
<tr>
<td>Manufacture of lingual arch according to Kinzinger</td>
<td>241</td>
</tr>
<tr>
<td>Lizat appliance (Lip bumper and Frozat) according to Kinzinger</td>
<td>243</td>
</tr>
<tr>
<td>Lingual arch according to Mershon</td>
<td>244</td>
</tr>
<tr>
<td>Herbst bite jumping hinge</td>
<td>245</td>
</tr>
<tr>
<td>Herbst appliance with soldered bands</td>
<td>246</td>
</tr>
<tr>
<td>Removable Herbst appliance</td>
<td>249</td>
</tr>
<tr>
<td>Functional Mandibular Advancer (FMA) according to Kinzinger</td>
<td>250</td>
</tr>
<tr>
<td>Tongue guard for mesial movement of molars in the mandible according to Reck</td>
<td>252</td>
</tr>
<tr>
<td>Appliances with spikes</td>
<td>254</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME appliance) with hyrax®/palex® screw</td>
<td>255</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME) according to McNamara</td>
<td>256</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME) with interchangeable hyrax®/palex® screw</td>
<td>257</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME) with Nardella screw</td>
<td>259</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME) with hooks for the Delaire face mask</td>
<td>260</td>
</tr>
<tr>
<td>Rapid maxillary expansion appliance (RME) according to Haas</td>
<td>261</td>
</tr>
<tr>
<td>Modified rapid maxillary expansion appliance (RME) with fan-type expansion screw</td>
<td>262</td>
</tr>
<tr>
<td>Further modified rapid maxillary expansion appliances (RME)</td>
<td>264</td>
</tr>
<tr>
<td>Hilgers Palatal Expander (HPE)</td>
<td>269</td>
</tr>
<tr>
<td>Modified HPE appliance</td>
<td>270</td>
</tr>
<tr>
<td>Quad-Helix appliance</td>
<td>271</td>
</tr>
<tr>
<td>Modified Quad-Helix with prosthetic restoration</td>
<td>272</td>
</tr>
<tr>
<td>Modifications of the Quad-Helix or Bi-Helix appliances</td>
<td>273</td>
</tr>
</tbody>
</table>
Chapter 7

Nance and pendulum appliances, space maintainers, cleft and stimulation plates.

Soldered Nance appliance ........................................................................276
Modified Nance appliances ....................................................................277
Removable modified Nance appliance ....................................................278
Manufacture of the pendulum spring ......................................................279
Standard pendulum appliance with horizontal U-loops according to Hilgers 282
Pendex/Pend-X: The pendulum appliance with transverse screw according to Hilgers ............................................................. 283
RME-pendulum appliance according to Snodgrass .................................284
M-pendulum according to Scuzzo ............................................................285
Pendulum appliance according to Byloff ................................................286
F-pendulum according to Favero ............................................................287
Penguin pendulum according to Mayes ..................................................288
K pendulum type DS (Distal Screw) according to Kinzinger ....................289
K pendulum type TDS (transverse distal screw) according to Kinzinger ....290
Bi-pendulum according to Kinzinger ......................................................291
Quad pendulum according to Kinzinger ................................................292
Aachener Implant Pendulum (AIP) according to Kinzinger .....................293
Skeletal K pendulum according to Ludwig/Kinzinger .............................295
Further modifications of the pendulum ..................................................298
Frog appliance according to Walde .......................................................300
Frog II appliance ....................................................................................302
Distal jet according to Carano and Testa ................................................305
Skeletonized distal jet appliance with supporting mini-screw anchorage according to Kinzinger ......................................................307
BENEslider according to Wilmes ...........................................................311
Space maintainer with teeth ..................................................................313
Gap or space maintainer .......................................................................315
Cleft plate ...............................................................................................316
Stimulation plate according to Castillo Morales ......................................318
NAM plate (nasalveolar molding) ...........................................................319
**Chapter 8** Retention appliances, splints, snoring appliance.

- Retention plate ................................................................. 326
- Splint-type retainer .......................................................... 327
- Essix retainer .................................................................... 328
- OSAMU-Retainer® ............................................................ 329
- Van der Linden retainer ..................................................... 330
- Begg retainer .................................................................... 331
- Hawley retainer ............................................................... 332
- Retention plate with engaged labial bow ......................... 333
- Retention plate with inter-dental spurs ......................... 334
- Spring retainer .................................................................. 335
- Retention splint according to Damon .............................. 337
- Positioner .......................................................................... 338
- Sports mouthguard ......................................................... 341
- Sports mouthguard in connection with a multi-band appliance ......................................................... 344
- Bonded retainer according to Wiechmann ...................... 349
- Occlusal splint .................................................................. 352
- Gelb splint ......................................................................... 353
- Reduced splint ................................................................... 354
- Distraction splint ............................................................. 355
- CA® Clear Aligner splint with VECTOR® screw ............... 356
- Vacuum-formed splint for correction of misalignments .... 359
- Cemented bite ramps ....................................................... 363
- Fixed bite ramps ............................................................... 364
- IST appliance according to Hinz ...................................... 365
- Functional Mandibular Advancer (FMA) as anti-snoring appliance according to Kinzinger .......... 366
- Surgical splint ................................................................. 368

**Annex I** QR code overview, alphabetical index, bibliography, imprint.

- QR code overview .......................................................... 374
- Alphabetical index ........................................................... 378
- Bibliography ..................................................................... 392
- Imprint ............................................................................. 397
It is also possible to solder springs on to achieve tooth movements in different directions.

To use elastics, different hooks can be attached by laser or by soldering, or they can be bent to shape. Force is applied on the anterior segment by the elastics and consequently the incisors are tipped in a lingual/palatal direction.

Elastics can also be installed vertically. They allow the extrusion of retained teeth. The elastics are attached at one end to fixtures which have either been soldered onto the labial bow or have been shaped on the labial bow, and at the other end to an attachment that has been bonded onto the tooth.

Function: Attachment of elastics and soldering of springs.
Two loops integrated into the labial bow allow elastics to be placed vertically between the loops and the attachment bonded onto the tooth in order to align the incisors.

To align the canines, a hook is soldered onto the U-shaped loop on the labial bow to engage elastics vertically.

To rotate an incisor, two hooks are soldered in opposite directions onto the labial bow around which elastics can be placed.

www.o-atlas.com/1-2
The author Ursula Wirtz has succeeded in producing this unique reference work of orthodontic techniques for removable appliances with more than 1000 images. Its content is completely revised, extended and brought up-to-date. More than 800 images have been replaced with new images of high quality.

It is divided into eight chapters and gives practical tips for the fabrication of orthodontic appliances. These vary from the making of models to the making of retainers. All standard appliances, classic pieces of equipment and rare special appliances are explained in the o-atlas II with many helpful tips and enlightening images showing much detail. The book shows and describes a total of 235 different orthodontic appliances. A 360 degree product view of the 50 most interesting orthodontic appliances is available online at www.o-atlas.com, giving the reader the opportunity to study them from all sides.

The index is very comprehensive so readers can quickly find what they are looking for. The o-atlas II is an invaluable source of knowledge for beginners and professionals as well as for students and teachers in orthodontics. It should be given a permanent place in every orthodontic library.