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OH30 2012 Design and manufacture removable orthodontic appliances

OVERVIEW

This standard describes the manufacture of removable orthodontic appliances. To design and manufacture removable orthodontic appliances, you need to understand, and be able to apply, the theoretical principles of the required orthodontic treatment and the role of the appliance within that treatment plan. The standard covers the processes of manufacturing components, assembling components, blocking out, surveying and undercut relief; application of appropriate baseplate material, processing of polymeric and the final finishing processes.The term â€˜client' has been used to mean the clinician who has prescribed and specified the orthodontic appliance. Clients may be external to the organisation (such as other laboratories, dental practitioners, training schools) or internal (within a dental hospital). The patient is the individual for whom the appliance is being made.Users of this standard will need to ensure that practice reflects up to date information and policies.Version No 2

KNOWLEDGE AND UNDERSTANDING

You will need to know and understand:

1. skeletal anatomy, physiology and tooth morphology necessary for removable orthodontic appliance manufacture
2. the function and movement of the oral musculature and temporomandibular joint
3. principles of occlusion and its effect on function of removable orthodontic appliances
4. disorders and diseases affecting the oral cavity
5. the aetiology and classifications of malocclusions
6. growth and eruption patterns of both deciduous and permanent teeth
7. the physiological changes related to tooth movement
8. the broader factors (sociological, behavioural, environmental and economic) that contribute to oral health and illness
9. the aims and objectives of orthodontic treatment
10. key factors in the success of orthodontic treatment specifically anchorage, fixation, retention, common problems and the common causes of failure of treatment
11. the stages in, and types of, orthodontic treatment and how they relate to each other
12. the principles of removable orthodontic appliance design and manufacture
13. the scope of orthodontic treatment using removable orthodontic appliances
14. the different types of removable orthodontic appliances and the components that are required

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15. the different components used in removable orthodontic appliances, the purposes and uses of each
16. the use of casts in the design, manufacture and positioning of components for appliances
17. the principles of current best practice in relation to model trimming, how to apply them and evaluate the outcomes
18. principles of baseplate and biteplane design and manufacture
19. the nature and purpose of study casts
20. application and magnitude of the forces used in the movement of teeth
21. methods of activation and reactivation of components
22. methods of activation and reactivation of removable appliances
23. how appliances are fitted, adjusted and activated
24. methods of modification and maintenance of removable appliances
25. the records (paper and material) that are required
26. how the curing process affects the choice of materials and manufacturing processes
27. how to identify the size and type of components that will be required
28. the range of pre-formed components that are available and methods to assess their suitability for use in constructing an appliance
29. the different gauges of wire that are used for different types of components and methods for identifying which is required and suitable
30. methods of straightening and bending wire and the tools that are used
31. handling tolerances of wires, the effects of over-handling and how to identify when this has happened
32. methods of assessing the suitability of manufactured components
33. the purpose and use of the different types of biteplanes and how these are constructed
34. methods for the application of polymeric material, why different techniques are used
35. uses of spot welding and soldering
36. how the duration and level of current affects the strength and viability of the join produced
37. how to judge when metals have been heated sufficiently to melt solder, but not interfere with the metal's mechanical structure
38. the consequences of over-heating metals and solder during soldering including weakening and softening metals and causing solder to spatter rather than flow smoothly, the effect of these on the strength and integrity of the join and the remedial action that can be taken
39. how to identify reasons for soldered joint failure
40. the different curing methods, how each works, their effect and the situations in which each is best used
41. how the curing process affects the materials and components that can be used
42. physical characteristics of materials used in appliances and how the curing processes affect them
43. the different separating media, when and why these are used
44. methods of deflasking
45. the ways in which appliances are cleaned in preparation for finishing and polishing
46. techniques for finishing and polishing appliances
47. the different types of abrasive and polish, the purposes and uses of each
48. methods for the safe and effective cleaning of appliances
49. methods of assessing and checking the safety, aesthetic, functional and clinical acceptability of completed appliances
50. the selection of a suitable articulator for the type of appliance being designed and manufactured

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51. centric occlusion records
52. the importance of aesthetics in the manufacture of orthodontic appliances and the necessity to include artificial teeth if required
53. lateral and protrusive movement records and their uses
54. methods of developing, maintaining and improving communication and information relating to the provision of custom-made dental devices
55. the importance of communicating with individuals at a pace, in a manner, and at a level appropriate to their understanding, needs and preferences, whilst maintaining their dignity and choice
56. methods of protection against contamination and infection control when handling received impressions and other items which may have been in the mouth, or which are intended to be placed in the mouth; why it is important to do so
57. the purpose of personal protective equipment
58. the range of equipment used in the design and manufacture of dental devices; methods of using equipment and materials safely including the use of chemicals and other hazardous substances; methods of storing different equipment and materials safely and securely; methods of cleaning and maintaining different types of equipment and your role in this
59. the reasons for maintaining records throughout the process and of clearly identifying the products during the manufacturing process
60. organisational procedures and requirements for the recording of information about incoming work, work in progress and work delivered to clients, and the purpose of this
61. principles of quality assurance including effective recording and sampling; processes and procedures for quality assurance in your workplace
62. methods of setting and calibrating equipment and of testing that this is correct
63. the effects of modifying manufacturers' products to meet laboratory requirements on the physical properties of products and on quality assured products, and the legal implications of poor manufacturing
64. legal requirements of the contract of employment, confidentiality and employers' regulations
65. health and safety at work legislation and related procedures and liability; principles of and how to apply, legislation and regulations relating to the manufacturing of devices
66. the role and obligations of members of the dental team and the regulatory functions of the General Dental Council

PERFORMANCE CRITERIA

You must be able to do the following:

1. analyse the cast and identify:
    1. the malocclusion and development problem that are to be corrected
    2. the tooth movement and retention that is required to correct the malocclusion
    3. the components that are required to achieve the required function
2. design an appliance which:
    1. has the potential to achieve the required function within the patient's mouth
    2. incorporates sufficient anchorage and fixation
    3. achieves the best balance between function, aesthetics and cost
3. contact the client without delay if it is not feasible to meet the requirements of the

prescription and propose options for the appliance design
4. evaluate whether the cast needs to be modified to design and manufacture the required removable orthodontic appliance
5. evaluate the cast and design and decide on the basis of cost, time and function:
    1. where pre-formed components can be used within the appliance
    2. which components will need to be custom-made
    3. any necessary adjustments to component design
6. identify and select the pre-formed components which are required, make any modifications to them that are necessary to ensure that they will perform the correct function, and confirm that they are fit for purpose
7. locate casts correctly with the jaw relationship provided by the client
8. select wire of the correct gauge and material for the required custom-made components, cut it accurately to the required length and straighten it in a manner which avoids unwanted material stress
9. form components to the required design and size in a manner which minimises the risks of over-work of the material
10. check components during manufacture to confirm that:
    1. they fit to the cast
    2. they will not damage surrounding tissues in the mouth
    3. the developing appliance is complying with the prescription and design and make any adjustments which are required
11. position on the cast those components that apply fixation so that they:
    1. accurately engage appropriate undercuts
    2. provide a firm and stable base for the appliance
12. accurately position the active and passive components of the appliance in the specified location on the cast and confirm their:
    1. fit
    2. security
    3. compliance with the functional and aesthetic requirements of the prescription
13. accurately identify active components and areas surrounding teeth and tissue and block them out correctly with the appropriate material
14. fix components:
    1. securely in the required position to the cast to prevent their movement during processing
    2. in a manner which is appropriate to the processing method to be used
15. identify from an examination of the prescription and casts any artificial teeth which are required
16. select the appropriate type of artificial teeth and modify them to accurately match the patient's:
    1. tooth shade
    2. tooth size
    3. cuspal forms
    4. natural dentition
17. securely attach artificial teeth in the correct position in the baseplate using an appropriate material and produce:
    1. an occlusion appropriate to the prescription and natural dentition
    2. the required aesthetic appearance
    3. balanced articulation whenever this is possible
18. prepare the cast in a manner appropriate to:
    1. the type of baseplate and biteplane material to be applied
    2. the processing method to be used
19. apply appropriate material to the cast to form a baseplate of the required thickness

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and extension

20. incorporate within the baseplate any required motivational and decorative material in a position which:
    1. allows for maximum visibility
    2. will not interfere with the function of the appliance
21. identify from the cast and design the type, height and extension of biteplane which is necessary for the appliance and articulate casts in a manner appropriate for the construction of this biteplane
22. form a biteplane of a sufficient thickness of polymeric:
    1. to produce the desired movement
    2. which are accurate to the degree required in the design
23. correctly manufacture any two part moulds which are required for prosthetic packing
24. process appliances using equipment and techniques which are appropriate to:
    1. the baseplate material
    2. the required strength of finish
25. remove the appliance from the cast in a manner that minimises the likelihood of damage and remove any excess cast material from the appliances
26. confirm that processing has been effective in producing a baseplate and biteplane which are:
    1. sufficiently hard
    2. sufficiently dense
    3. free of porosity
27. confirm that the components are secure within the baseplate and the active components are free to move in the required manner
28. select methods, materials and equipment for joining components that are appropriate to:
    1. the type and materials of the components to be joined
    2. the strength and type of join required
29. identify accurately areas where a soldered joint would not interfere with the function and performance of the component being joined
30. position components:
    1. accurately for the design
    2. in a manner that enables the optimum join to be made
31. calibrate the level and duration of current in spot-welding equipment so that it is correct for the size, thickness and type of material to be joined
32. confirm that electrodes are free from erosion and take the appropriate action to remedy those that display levels of erosion which are likely to adversely affect the quality of the join
33. identify accurately areas where a spot-welded join would not interfere with the function and performance of the component, correctly position components and accurately spot-weld them at the correct points to form secure, strong and viable joins
34. accurately apply flux to those areas where solder is required and block out with anti-flux those where solder is not required so that:
    1. there is no incursion of solder
    2. the required range of movement is allowed
35. apply an appropriate heat-protective material to minimise damage to surrounding areas
36. accurately solder components parts
37. evaluate each finished join for its:
    1. position
    2. strength
    3. integrity

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4. function
5. fitness for purpose

38. place the appliance on the cast after joining and check that the appliance:
    1. fits the cast
    2. complies with the prescription
    3. will not damage surrounding tissues in the patient's mouth and make any necessary adjustments
39. remove flux, anti-flux and excess solder once welding and soldering is complete, replace the appliance on the cast and confirm the fit
40. select methods, materials and equipment for trimming, finishing and polishing conventional removable orthodontic appliances that are appropriate to the type and materials of the components in the appliance
41. confirm that:
    1. the edges of the biteplanes are recognisable against the opposing working cast
    2. the active components have the full range of movement required in the prescription
42. trim and finish the baseplate to the thickness and coverage required
43. finish and polish metal components to leave smooth surfaces that are free of sharp edges and irregularities and which do not cause damage to the patient's tissues
44. evaluate the finished appliance and confirm that it:
    1. is effective
    2. fits the cast
    3. is free of defects
    4. meets the requirements of the planned design
    5. complies with the prescription
    6. is fit for purpose
45. correctly identify the finished appliance with the patient's unique reference and date of production
46. effectively clean the finished appliance, prepare and package it safely for despatch together with instructions for the patient and client
47. make complete, accurate and up-to-date records relating to the identification, components and manufacture of the appliance and store the records in the correct location consistent with relevant legislation
48. provide Statement of Manufacture for the appliance as required under current regulation

ADDITIONAL INFORMATION

This National Occupational Standard was developed by Skills for Health. It replaces DT20 and DT21.This standard links with the following dimension within the NHS Knowledge and Skills Framework (October 2004):Dimension: HWB9 Equipment and devices to meet health and wellbeing needs

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