

H.A.T.S.[™]

The Hamilton Arch Tooth System

Version: 3.2

I. Installation

1. Insert CD ROM
2. Click "Start"
3. Click "Run ... "
4. Type d:\setup.exe and hit Enter. If your CD ROM drive uses a letter other than d, substitute that letter for d.

II. Startup

1. Click "Start"
2. Click "Programs"
3. Click the "HATS" program group
4. Click the "HATS" program icon
5. If using a Pro-Max digital caliper, make sure it is connected to an available serial port on the back of the computer. Click on the "Caliper" menu and select to which port the caliper is connected. If you would like to adjust the background, text, and highlight colors, you may do so by clicking on the "Color" menu and selecting the item whose color you wish to change.

III. Usage

1. On the opening screen, you may enter patient and doctor information.
At any time, you may click on the "Reset" menu to clear all the fields on this form. When you are finished, click "Next."
2. For "Analysis Type," choose 6- Tooth or 12- Tooth. The default is 6Tooth
3. Choose whether you will be entering individual tooth sizes or the sums of the tooth sizes. If you will be using a Pro-Max digital caliper, choose individual tooth sizes.
4. Begin entering the appropriate information. If using a Pro-Max digital caliper, ensure it is set to measure millimeters. Measure the tooth, and hit the button on the lower right of the caliper display to input the measurement. You may click on the "Reset" menu at any time to clear all measurements and begin anew.
5. When all the information has been entered, click "Calculate" to display the analysis along with recommendations, or click "Print" to send all information to a printer.

If you have any problems installing or using the H.A.T.S. program, please feel free to contact our TechnoCenter Support at (888) 422-2376

TechnoCenter[®]
GAC orthodontic software solutions

DENTSPLY
GAC

H.A.T.S.

An orthodontist using only a single arch size who is finishing cases in nickeltitanium wires or unadjusted stainless steel wires may be introducing significant arch size errors in as high as 35% of the patients treated. The use of inappropriate sized arch wires increases the risk of relapse, the incidence of dehiscence and the “roundtripping” of teeth during treatment. Esthetics are adversely compromised.

Now, in the few minutes it takes to measure twelve teeth, you can significantly reduce the incidence of treatment failure and improve the esthetics of your treatment results.

INTRODUCTION

Every orthodontist has, perhaps, experiences the anxiety when, six months or a year after what he or she believed to be the highly successful treatment of a complex and difficult orthodontic problem, a somewhat irate mother confronts them and demands an explanation and the correction of a one and a half or two millimeter space between her favorite daughter's central incisors.

Dr. Jack Hickman, in a lecture delivered some years ago, stated: “**If you have a lot of failures in your practice it's not fun.**” This mother, in her limited understanding of the orthodontist’s accomplishments, considers a diastema between the central incisors to be a treatment **failure**. She blames the orthodontist. Such spacing, often recognized as relapse, suggests the strong possibility of a preexisting tooth size discrepancy. The problem should, perhaps, have been detected by the orthodontist during the initial diagnostic studies and addressed early in treatment.

The Hamilton Arch Tooth System

Proper use of H.A.T.S., a computerized and expanded program based on Dr. Wayne Bolton’s original tooth size analysis, provides a simple, quick and delegable diagnostic tool that accurately identifies **four** factors critical to a precision functional and stable esthetic result:

1. The presence or absence of an existing tooth size discrepancy, indicated by any deviation from a 0.0 ratio.
2. The precise amount of correction, addition or reduction of the **upper teeth** to eliminate the discrepancy.
3. The precise amount of correction, addition or reduction of the **lower teeth** to eliminate the discrepancy.

Important: Please note that the figures in **2 & 3**, above, are never identical. The Bolton analysis is based on a tooth size “**ratio**.” A mathematical axiom and idiosyncrasy exists. As soon as any correction is made, the “**ratio**” changes, and the amount of necessary tooth size correction changes. H.A.T.S. takes this mathematical axiom into consideration. The software provides the exact measurement necessary for ideal correction in either arch. While this difference may be insignificant when the discrepancy is minor, it is highly important where there are major discrepancies (e.g., peg shaped or missing teeth, etc.)

4. The appropriate **small, medium, or large** GAC arch wire size for optimal treatment of the patient.
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How to Use H.A. T .S.

Once H.A.T.S. has been properly installed it is a simple procedure to access and to print out the above listed data specific to the patient being diagnosed. Please follow the instructions carefully.

1. Enter the patient's name, age and gender.
 2. Note any seriously malformed (e.g., peg shaped laterals) or missing teeth.
 3. Enter name or designation of staff person or doctor performing analysis.
 4. Select either the **“Six tooth”** or **“Twelve tooth”** analysis. At the present time, routine use of the **“Six tooth”** analysis is recommended. Use of the **“Twelve tooth”** analysis, while highly useful for clinical or research studies, introduces greater risk of error. Treatment decisions based on the twelve-tooth concept are more complex.
 5. Select **“Input Tooth Size”** or **“Input Sums.”** If **“Input Sums”** is selected, omit step 6.
 6. Using the GAC modified Fowler NSK Pro-Max[®] digital caliper, carefully and accurately measure each tooth, at its greatest mesial-distal width, as prompted by the cursor. Simply pressing **Button 1** (ON/OFF 0 HOLD) on the caliper enters the tooth size into the program. **Note:** Use of the GAC modified Fowler NSK Pro-Max[®] digital caliper interfaced with the computer maximizes the accuracy of the measurements, enhances the efficiency of HA T. S. and greatly reduces the time required to enter the measurements. The caliper has been engineered and the points sharpened to provide maximum accuracy. **Note:** *The GAC modified Fowler NSK Pro-Max[®] digital caliper has multiple additional daily uses in the practice including: cephalometric measurements, accurate measurement of intraoral spacing and temporary pontics for maintenance of space, patient and parent demonstration of arch width changes, etc.*
 7. When it has been confirmed that the measurements entered are correct, click on
 8. **“Calculate.”** The program will instantaneously display:
 - (1) **The Upper Sum**
 - (2) **The Lower Sum**
 - (3) **The tooth size correction indicated in the upper tooth structure**
 - (4) **The tooth size correction indicated in the lower tooth structure**
 - (5) **The GAC Patient Specific Arch Size - Small, Medium or Large**
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Diagnostic Decisions and the Proper Use of the H.A.T.S. Program

Resolution of tooth size discrepancy may be accomplished in a number of ways including (1) prosthetic replacement or missing teeth, (2) prosthetic addition to undersized teeth, (3) stripping or reproximation or teeth or (4) extraction.

Whereas esthetics must be a primary factor in the orthodontist's decisions on the correction of a tooth size discrepancy, it is critical that proper function and the stability of the final result remain paramount considerations.

Comparison of “Average Size” to “Measured Size”

The Bolton established “Average” sizes are included in the display and printout to facilitate the orthodontist's ability to compare and to differentially pinpoint the specific tooth or teeth perhaps most responsible for any tooth size discrepancy. This knowledge contributes to responsible treatment

planning and competent resolution of the problem.

It is important that the orthodontist consider the possibility that all teeth may be larger or smaller than average prior to determining that a single tooth or several teeth might be responsible for a discrepancy.

Determining: whether tooth size correction is to be adjusted in the upper arch only the lower arch only or in both the upper and lower arches

The orthodontist must make a decision on the esthetic and functionally best method of compensating for any tooth size discrepancy. The options are multiple and complex. It is impractical for any computer program to accommodate or illustrate all of the possible combinations of tooth size adjustment.

If the treatment plan entails correction in a **single arch** the adjustments may be made specific to the recommended upper **OR** lower tooth structure displays or printouts. If, however, alterations in tooth sizes are to be made in **both** arches, it is necessary to determine the amount of adjustment to be made in each arch to achieve the ideal. This may entail reentering the amended figures several times until it is confirmed that the resulting changes will eliminate the tooth size discrepancy that exists.

Management of missing: or malformed teeth

Missing or malformed teeth introduce unique problems that must be properly addressed. Assuming that all other teeth are well formed, if a tooth or multiple teeth are peg shaped or missing, a zero (0.0) should be entered at the appropriate designated tooth position(s). If, for example, an upper lateral is peg shaped and the zero is entered, the program might calculate that a maxillary deficiency of 7.2mm exists. This indicates that the proper size for its prosthetic restoration and the exact amount of space that should be incorporated in the final finished result is 7.2mm.

If both upper lateral incisors are congenitally missing, a zero should be entered for each missing tooth. The upper tooth size discrepancy might then read out, for example, 14.6mm. Dividing this figure by two indicates that the size of the prosthetic replacement laterals should measure precisely 7.3mm each. The dentist responsible for the final restoration of the teeth greatly appreciates the precision of these orthodontic outcomes.

Arch Size Designation

Arch size and tooth size are intimately related. For the first time in the orthodontic field, H.A.T.S. mathematically identifies the “small,” “medium” or large arch size most appropriate for the patient's treatment. The system is based on the Bolton standards and the standard deviations of maxillary anterior (central and lateral incisors and canines) tooth sizes. The use of H.A.T.S. to determine proper arch wire size greatly enhances the esthetics of the final result, reduces roundtrip ping of teeth during treatment and limits the incidence of relapse.

An individual with smaller than average (mesio-distal) sized teeth should not be treated with the same sized arch wire as that of a patient with larger than average teeth. Prior to the development of preformed arch wires, orthodontists were trained to take into consideration the physical size of the patient and the size of their teeth. They either intuitively or using disciplines such as the Hawley-Bonwill concept (based on the measured size of the lower anterior teeth) or Howe's technique, adjusted arch wire size to conform with their assessment of the patient's skeletal size or possible variations. Today, the common use of preformed arches, in particular Sentalloy™ or similar nickel-titanium wires, and the expanded use of

auxiliary personnel increases the risk that less attention be given to balancing arch size and form to the patient's face.

Zachrisson, McNamara, Sarver et al have discussed the importance of a full smile and filling the “dark areas” of the “buccal corridors.” Use of the appropriate arch wire size contributes to this important outcome and an enhanced final esthetic result.

Re-evaluation and recalculation of arch size

In the presence of any significant deviation of the size of the maxillary canine, central or lateral incisor teeth, either deficiency (missing or significantly smaller than average teeth) or excess (anomalously large teeth), the determination of the appropriate arch size for that patient must be reevaluated and recalculated. **The displayed “GAC Patient Specific Arch Size” is not accurate and must be amended. Reconsideration is imperative.**

Mathematical recalculations are necessary to assure proper selection of appropriate arch wire size in the presence of missing: or malformed teeth or other significant maxillary tooth size discrepancies.

Important: H.A.T.S. necessarily identifies the appropriate “GAC Patient Specific Arch Size” as calculated from the sum of the maxillary tooth sizes entered by the orthodontist. **In the incidence where a tooth or teeth are deformed or missing**, or there are other pathological or anatomical reasons for a significant decrease or increase in the measurements entered as maxillary tooth sizes, **reconsideration of the arch size is imperative.**

To make the correction, first calculate the discrepancy routinely. If the correction is to be achieved solely by prosthetic addition or restoration of maxillary tooth structure, the calculated (displayed) figure “**Increase upper tooth structure**” must then be added to the “**Upper Sum**” that appears on the screen. The new “GAC Patient Specific Arch Size” will accurately designate the proper arch size for the patient.

If the treatment plan dictates extraction or stripping of the upper anterior teeth, the displayed “**Reduce upper tooth structure**” measurement must be subtracted from the “**Upper Sum.**” The H.A.T.S. software will then identify the adjusted and proper arch size.

Further differential diagnostic consideration, recalculations and/or interpolations may be necessary if the existing discrepancy is to be accommodated by an increase or decrease in lower tooth sizes or modification in both arches. These modifications are doctor specific resolutions and are too complex and too numerous to be adequately addressed in these instructions.

We are confident that use of H.A.T.S. will improve your treatment outcomes and your practice efficiency. GAC wishes you success in its use. If you have questions, need additional information or wish to discuss the use of the program, please call GAC at (888) 422-2376.