Review Article

# Treatment Effects of Forsus Fatigue Resistant Device - A Review

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## Abstract

Class II malocclusion is the most frequent sagittal problem in orthodontics. It can be because of mandibular retrognathism or maxillary prognathism. However the most common is mandibular retrognathism. The successful method of treating Class II malocclusion in growing patients is by functional jaw orthopedics through the primary mechanism of mandibular advancement. The functional appliance can either be fixed or removable. In patients who are not compliant fixed functional appliances are used for best results. The fixed functional appliance which has gained much popularity is Forsus Fatigue Resistant Device. This article will explain briefly about the appliance and its dental and skeletal effects.

## Keywords

Forsus fatigue resistant device, Class II malocclusion, orthodontics

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## Review

Class II malocclusion is the most commonly encountered type of malocclusion in the oral cavity. Class II malocclusion can be due to maxillary prognathism or mandibular retrognathism or combination of both. Among these patterns, the most common is retrognathic mandible. One of the recommended therapeutic approaches to Class II malocclusion in growing patients is functional jaw orthopedics through the primary mechanism of mandibular advancement [1]. The early functional appliances are removable in nature and dependent on patient compliance for effectiveness.

Removable appliances, such as the Frankel Regulator, Bionator, Activator, Twin Block and even class II elastics, often have inconsistent results due to the fact that these appliances require high levels of patient cooperation [2]. A major advantage of fixed functional devices such as the Herbst, Jasper Jumper (3M), MARA, and Forsus Fatigue Resistant Device (FRD; 3M Unitek, Monrovia, CA, USA) is that they are fixed and effective 24hr a day with minimal patient compliance.

### Forsus fatigue resistant device

The FRDTM (3M Unitek Corp, Monrovia, Calif) is a three-piece (L pin module) or two-piece (EZ2 module) telescoping spring that attaches at the upper first molar and a push rod linked to the lower archwire, distal to either the canine or first premolar bracket. The distal end of the FRD's push rod inserts into the telescoping cylinder, and a hook on the mesial end is crimped directly to the archwire near the canine or premolar brackets. The telescoping cylinder consists of inner and outer sliding tubes surrounded by an open-coil spring. An eyelet at the distal end of the cylinder is connected to the maxillary molar headgear tube with an L-pin. The push rod has a built-in stop that compresses the spring when the patient's mouth closes. The spring force is then transferred to the maxillary molars, using the mandibular arch as the anchorage unit (Fig 1).

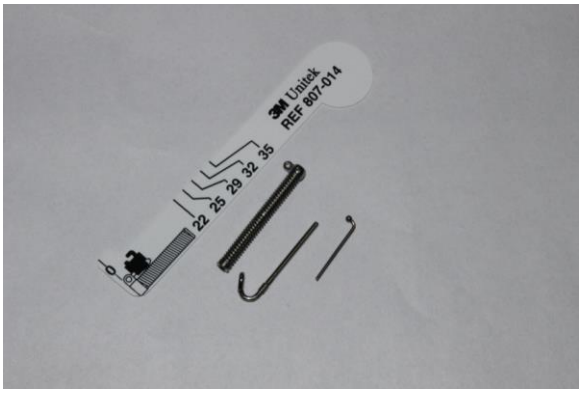


**Fig 1 – Components of Forsus Fatigue Resistant device**

### Method of insertion

The first step is to insert an L-pin into the eyelet of the telescoping spring, making sure the ball of the L-pin is facing buccally. The L-pin is then threaded through the molar headgear tube from distal to mesial and cinched, leaving about 2mm of slack (Fig 2). The push rods come in four sizes. Once the correct size is chosen, the push rod is inserted into the telescoping spring, and the mesial hook is looped over the mandibular archwire distal to canine and crimped shut (Fig 3).

A nearly full-size rectangular mandibular archwire should be used and it should be cinched or tied back to limit mandibular incisor flaring. Because the open-coil spring can be compressed about 10mm, the FRD is capable of moving the maxillary molars a substantial distance over a long period of time. To keep the force level around 200g, the device can easily be reactivated by adding a crimp able stop distal to the built-in stop on the push rod.

**Fig 2 – L pin inserted into molar headgear tube**

**Fig 3 – Insertion in the mandibular archwire**

## Skeletal effects

Skeletally one of the main outcomes of FRD is a significant restraint in the sagittal position of the maxilla [3,6,7]. There is also significant improvement in the sagittal position of the maxillary soft tissues. On the other hand, the skeletal outcomes of the FRD protocol with regard to the mandible appear to be rather limited. Although there is an enhancement in total mandibular length, this growth modification may not significantly affect the sagittal position of either the bony or soft tissue chin [3].

Some studies states that there were no sagittal or vertical skeletal changes in the maxilla and mandible and Forsus had mainly dentoalveolar effects [4,5].

A significant increase in the total mandibular length, which accounted for 27% of the overall increase in the total mandibular length may be correlated with the short duration of active treatment and early "burning" of the overjet due to significant proclination of the mandibular incisors Significant improvement in the Wits appraisal may be related primarily to the significant posterior rotation of the occlusal plane rather than to the sagittal effects in both the jaws [5].

## Dental effects

The FRD appears to be an effective tool in inducing a significant dentoalveolar correction of Class II malocclusions [6]. With regard to the interdental changes, the active treatment with Forsus reduces both the overjet and the overbite and improves the molar relationship [5]. The dentoalveolar changes were highly significant both at the maxillary and mandibular arches. The changes at the dentoalveolar level may show a reverse pattern with respect to the skeletal changes. The upper dentition may exhibit moderate changes, while the mandibular dentition may display highly significant modifications [3].

The upper incisors may demonstrate a significant amount of retrusion and extrusion. On the other hand, the lower incisors may exhibit a large amount of proclinations, forward movements, and intrusions. The mandibular first molars can show a significant amount of mesial movements and extrusions [3]. The vertical force vector of the appliance appears to tip and intrude the upper molars Due to the vertical control Forsus™ FRD can be used in high-angle cases. However, since retrusion of the upper incisors may cause an increase at the gingival display, high-angle patients without high smile line should be preferred. Retrusion and extrusion of the upper incisors and intrusion of upper molars and protrusion of the lower incisors can induce a

significant clockwise rotation of the occlusal plane [4].

## Conclusion

The FRD protocol appears to be effective in correcting Class II malocclusion mainly at the dentoalveolar level. Patients with mild to moderate class II malocclusion can be corrected with the Forsus FRD appliance in conjunction with comprehensive orthodontic treatment. The change in overjet and correction of molar relationship can be attributed to a headgear effect on the maxilla together with a retraction of the maxillary incisors and mesial movement of the mandibular incisors. Unlike treatment with class II elastics, there may not be excessive extrusion of the posterior molars and incisors.

## References


1. Proffit WR, Fields HW, Moray LJ. Prevalence of malocclusion and orthodontic treatment need in the United States:estimates from the NHANES-III survey. Int J Adult Orthodontics and Orthognathic Surgery 1998;13:97–106.
2. McNamara JA Jr. Components of Class II malocclusion in children 8–10 years of age. Angle Orthodontist. 1981;51:177–202
3. McNamara JA Jr, Brudon WL. Orthodontics and Dentofacial Orthopedics. Ann Arbor, Mich: Needham Press, Inc;2001:73.
4. Sahm G, Bartsch A, Witt E. Micro-electronic monitoring of functional appliance wear. Eur J Orthod. 1990; 12:297–301.
5. Lorenzo Franchi; Lisa Alvetro; Veronica Giuntini; Caterina Masucci; Efisio Defraia; Tiziano Baccetti, Effectiveness of comprehensive fixed appliance treatment used with the Forsus Fatigue Resistant Device in Class II patients
6. Gunay at al , Evaluation of the Immediate Dentofacial Changes in Late Adolescent Patients treated with the ForsusTM FRD , European journal of dentistry ,Oct 2011 , vol 5
7. Giorgio Cacciatore et al , Active-treatment effects of the Forsus fatigue resistant device during comprehensive Class II correction in growing patients , Korean J Orthodontics 2014;44(3):136-142]