

INITIAL EXPERIENCE FITTING THE OTTO BOCK ELBOW WITH AUTOMATIC FOREARM BALANCE

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The Automatic Forearm Balance elbow is a new non-electric elbow specifically designed to use with electric prehension devices. The balancing device can be finely adjusted in order to unweight the forearm allowing either, a) easy body-powered control or b) the use of ballistic motion for positioning. The locking mechanism is an outside locking hinge which leaves the elbow cap hollow. This space can be used for housing batteries and/or electronics. It also allows for the fitting of longer residuum's, especially if tapered. The added space inside the elbow may also be useful if a silicone suction suspension locking device is employed. The cosmetic appearance of the forearm is more appropriately sized for typical adult males than other standard production forearms. It has been common practice, for many prosthetists, to fit body-powered elbows on above-elbow amputees when more than 1/3rd of the humerus is remaining. This, of course, is dependent on the strength and range of motion of the particular individual but has served as a useful initial guideline. The hand can then be controlled myoelectrically. This control scheme has the advantages of, a) simultaneous control, b) lighter overall weight, c) lower cost, d) speed of movement, and e) improved feedback regarding elbow position. The new AFB elbow now allows amputees with either shorter residuum's or those with relatively poor range and/or force, to be fitted with such a hybrid control system. Of course, even those amputee's who could handle a standard body-powered elbow will benefit from the ease of this elbow operation.

Our first AFB elbow has been fit successfully on an amputee with an axilla level limb length. The elbow was harnessed using bicipital abduction as the control motion. The hand control was accomplished using middle deltoid and triceps for proportional control of the Otto Bock hand with Otto Bock electronics. The elbow lock is controlled by chest expansion. The patient operated the prosthesis with remarkable ease. Currently we have 5 elbows being used or planned to be used on a variety of patient types. I would also point out that with some modifications the balancing device may be adapted to elbow disarticulation prostheses or even other body-powered elbows.

This elbow is a welcome addition to the armamentarium of components useful in providing hybrid control for high level arm amputees. At this early stage of evaluation some important questions are yet unanswered, they are as follows: 1) how durable is the locking mechanism, 2) will the turntable friction maintain its setting, and 3) will the balancing mechanism hold up over time. These questions can only be answered after the test of time. Two other concerns we have are the force required to operate the lock, which seems greater than that of an E-400 and the black finish on the components is uncosmetic.