The Adaptive Position Chair

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Figure 1. The Adaptive Position Chair

INTRODUCTION

The Adaptive Position Chair (APC) was designed to add ease to the lives of a family with a child of limited motor and communication skills. In particular, our client is a three-year-old girl diagnosed with Rett Syndrome. Rett Syndrome is a chromosomal mutation characterized by poor motor skills and language reception and expression issues. Onset is usually between 6 and 18 months of age, when a developmental reversal is experienced. Perhaps the most functional piece of the APC is the tray table. It has three planes of motion to allow for many uses relevant to our client and her family’s daily life. The APC also includes support mechanisms to help compensate for her lacking motor control. These mechanisms include a pommel that fits between her legs and a butterfly chest harness. The chair is also adjustable in various ways to provide room for growth.

SUMMARY OF IMPACT

In order to communicate, our client uses a Tobii Eye-Gaze System to navigate a Pragmatic Organized Dynamic Display (PODD). She also uses the family laptop to read interactive children’s books online. We hope that the APC will provide a place that she can comfortably do these activities, as well as eat and do other things not necessarily specified. The most important feature of the APC in terms of its range of uses is the acrylic tray table. The adjustability of the angle of the tray contributes to its versatility. Also important are the various supports, which are customized to the client. They provide safety as well as vital trunk stability. The legs of the APC are adjustable, allowing the client to be at a normal chair height or at eye level with an adult. We
hope that the device will make the lives of our client and her family easier by providing a personalized space to perform day-to-day activities.

TECHNICAL DESCRIPTION

The frame of the chair is fabricated out of low carbon steel tubing that is primed, painted, and coated with rust-proof paint. There are sections of frame made out of square tubing and sections of frame made out of round tubing. The decision to use which tubing was based on functionality; for example, the seat back and bottom are square so that the components fit. The legs are telescoping to allow for height adjustability. This function was made possible by smaller tubes with a series of systematically drilled holes that fit snugly but smoothly into large diameter tubes. Clevis pins and cotter rings hold the legs at the desired height. Extra stability is made possible with leveling feet on the bottom of the legs. This compensates for any variability in ground that the chair is situated on, should this be an issue. By a similar telescoping mechanism, the platform for the client’s feet is also adjustable. The adjustability in this case allows for the client’s growth and will hopefully allow use of the chair for multiple years. The platform itself is sheet steel with a piece of acrylic on top. Chair back and bottom pads are mounted on plywood and consist of foam padding upholstered in vinyl. Another important component of the APC is the padded pommel that sits between the client’s legs to provide trunk support. This pommel is also upholstered in vinyl, and slides back and forth along a slotted track cut into the steel frame from the bottom of the chair seat. The pommel folds down from the upright position when a bottom is pressed. This allows for ease of placing the client in and out of the chair. The armrests are also padded; these again with foam covered in vinyl. They are detachable so that the steel frame can be easily cleaned if necessary.

The total cost of the Adaptive Position Chair was approximately $380.00.

In terms of design analysis, there are some improvements that could’ve been made had we had more time. Though functional, the tray table becomes a bit off-kilter in certain positions. Slight adjustments in the tubing structure would fix this problem, though after completing construction it was too late time-wise and money-wise to go back to redo this. Also, the steel frame means that portability of the chair is limited by weight and size. This is something that we might reconsider if we were to make another APC. That being said, the APC that we constructed is fully functional and we hope that it will be useful to our client’s family.