

Cost Analysis

Description of Purchase	Retailer	Purchase Price
NordicTrack SL710	Sears Madison West	499.99
100 lb gas spring	MSC Industrial Supply	16.82
12" Stroke Linear Actuator	ebay.com	106.85
Rollerblade wheels, 55mm diameter, 8 pk	Dick's Madison East	36.91
Momentary three way switch	RadioShack East Madison	4.74
Bolts, nuts, washers, casters, 6' angle steel	Menards East Madison	16.93
1.5" x 2.5" rect. tube, 1" x 2" rect. tube	AA Quality Welding & Mfg Madison	42.20
4 Butterfly cylinders	HealthFX America	97.80
1.25" x 48" L-steel	True Value Whitewater	8.43
U-bolts x 4	Home Depot FDL	4.16
Washers, nuts, thread rod	Menards East Madison	3.76
Wireless doorbell chimer	Stoughton Lumber (ACE)	18.98
1.5" x 1.5" x 3/16" tube, 1" tube	AA Quality Welding & Mfg Madison	73.85
Misc. nuts, bolts, and washers	True Value Whitewater	30.95
Leveling feet and nuts	Home Depot East Madison	5.68
Paint, battery terminals, cable ties, wire, batteries	Fleet Farm, Beaver Dam	33.73
Electrical tape, heat shrink, terminal kit	RadioShack West Madison	12.84
Bronze bearings, chain, steel spacers	True Value Whitewater	8.59
Wireless chime doorbell, digital multimeter, misc. nuts & bolts	Wolff Kubly Madison	29.77
Compression spring	McMaster-Carr	14.26
Misc. nuts & bolts	Ace Hardware	3.80
Drill, misc. nuts & bolts	True Value Whitewater	11.90
24"x24" tread plate	Menards West Madison	51.67
Circuit components	RadioShack Oshkosh	16.08
Computer	UW Madison SWAP	131.88
Misc. nuts, bolts, washers; ½" x 10' pipe	True Value Whitewater	28.46
Misc. nuts, bolts, washers	True Value Whitewater	3.71
Circuit components	RadioShack Oshkosh	6.78
LED lights, holders	RadioShack West Madison	6.29
Paint, duct tape	Fleet Farm Oshkosh	8.58

Touch Screen Monitor	TigerDirect.com	448.24
LabView data acquisition card	National Instruments	151.03
Decals, aesthetic enhancement	University Book Store	16.72

<i>Total Expenses</i>	\$1952.38
<i>Budget Remaining</i>	\$47.62

Though we spent \$1952.38 developing the design, the ergometer must retail for less than \$1,000. This is shown to be a feasible task after analyzing the purchases made and deciding what was bought that wasn't necessary and what can be substituted with a less expensive alternative. First, we started this project by purchasing an already existing exercise device for \$499.99, but we ended up not using most of the material purchased. The materials we did use have an estimated value of \$150. By purchasing only these materials, a savings of \$349.99 is assumed. Second, a smaller touch screen or non-flat panel touch screen could be used instead of the 15" flat panel touch screen that we purchased. Instead of costing \$448.24, this substitution would cost only \$398.95, saving \$49.29. Also, the computer has more features than we require. Instead of purchasing both the computer and LabVIEW™ Data Acquisition Card, it would be more cost effective to build a separate operating device. This operating device would require a Pentium III processor, 2D video card, 384 Mb RAM, 1 Gb hard drive, 2 USB outputs, a data acquisition card, and a Linux operating system. The Linux operating system should be chosen since it is a free system, rather than paying to use the Microsoft operating system. Making these changes results in a \$282.91 savings from not purchasing the computer and LabVIEW™ Data Acquisition Card, but an added cost of \$150 to build our own system. This results in a net savings of \$132.91. Third, we only used approximately two thirds of the material that we purchased to construct the seat frame and track. By purchasing only this amount of material, a savings of \$94.02 can be tabulated. Fourth, instead of using four, one way resistance pistons each costing \$24.45, two dual resistance pistons could be used, each costing \$29.45, producing a savings of \$38.90. Fifth, the LabVIEW™ Professional computer program that would be required to be purchased to run our user interface program costs \$4095. However, since the license to use this program only needs to be purchased once, if our device were to be mass marketed this cost could be spread over the number of ergometers manufactured. With the \$4095 set as a fixed cost, the average cost will decrease with the number of products manufactured due to the economy of scale. Assuming at least 5000 of these devices are produced, the cost per product for the LabVIEW™ program is only \$0.82. Sixth, upon construction of the LED foot pedals the first wireless doorbell chime was damaged, requiring the purchase of another \$17.93 chime that would not be necessary under normal circumstances. Seventh, the original U-bolts purchased were of insufficient strength and had to be replaced, producing another \$4.16 that would not be included in a normal manufacturing expense. With these adjustments and substitutions, the price to build one model is \$1266. If this product were to be mass marketed, these materials could be bought in bulk

and would therefore be less expensive. For the ergometer to retail for \$950 a discount of 25% would be required for bulk purchase, which is not an unreasonable assumption based on preliminary inquiries. It should also be noted that this price includes all engineering research and design costs, so that any price the machine is sold at over \$950 would be considered profit.