



International plastics design competition



Rotomolded Plastic School Desk

Molder: Industrias Q'Productos C.A.

Moldmaker: Lakelandmold Co.

Material Supplier: Polinter C.A.

Designer: Investigación y Desarrollo C.A.

Product Description The QDesk is an eco-friendly one-piece school desk designed with soft contoured lines to provide the necessary ergonomic sitting and writing support for children during their most physically important growing years. The QDesk is durable yet practical and attractive. Its modern design gives school classrooms the fun look that children love. In addition the QDesk is made out of 100% recyclable polyethylene so it is extremely durable and light, making classrooms more flexible and environmentally friendly. The QDesk is available right or left-handed in five bright colors and three convenient sizes to comfortably fit children from kindergarten to 8th grade.

Why is the product innovative? The traditional school desk in Venezuela, and in many parts of the world, is an old-fashioned combination of chair and desk, attached by nails and/or screws and bolts, that in many cases hardly complies with the strict ergonomic standards set by various countries. Our client's requirements were to have a design that could be rotomolded in a single-pieced, fully plastic part, to comply with Venezuelan standards for this application. Those standards basically regulate dimensions of the school desk according to students' heights. The client also wanted the product to have a stiffness that could be similar to that of non-plastic school desks and to transmit an idea of a new, modern, comfortable and fresh product to a final user. A fully plastic, one-piece school desk is not available in the Venezuelan market, and probably is not available in many other countries, which is the first innovative aspect of this design. It is probably one of the few models that comply with all of the ergonomic regulations imposed by many international standards. It is also 100% recyclable and, because of the substitution of wood by polyethylene, it helps to reduce tree logging and therefore contributes to forest preservation. Thus our motto: "Qdesk: a student sits, a tree stands." Another challenge was to use a rotomolding process to produce a school desk that is as stiff as a traditional non-plastic school desk. This is because rotomolding poses more limitations in the reinforcing features that could be added to the part as compared to other polymer molding methods, such as injection molding, in which it is easier to add ribs and other structural features in the final part to increase its stiffness. On the other hand, several restrictions were imposed by the standards that the client wanted to meet. Almost every dimension has a lower and upper bound restriction that limits design process to a very narrow margin of operation. School desk ergonomics was ensured by complying with all of the relevant standards and checked through tests with students using prototypes. Rotomoldability was ensured by maintaining smooth surfaces and large rounded features. Contrary to what might be inferred by looking at the final part, the final geometry was produced using a mold with only 4 pieces that minimize part demolding time, which is another innovative feature. The final cycle time for this part is similar to those of simple parts such as round water tanks, based mainly in a conscious design-for-manufacturing intent. Client's desired stiffness was achieved by means of an optimization process that involved an iterative procedure of mechanical simulations and successive geometry modifications using concurrent engineering. At the end, an innovative product with superior performance, superior user safety (compared with traditional wood/metal desks), that is virtually maintenance-free (only occasional soap and water washing is required), all at a lower cost, was obtained.

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