Abstract

How many times have you grabbed four different sized wrenches just to find out that none of them fit? Finally, there is a solution. The Dog Claw Universal Wrench lets you get it right the first time, automatically adjusting to all metric and standard bolt heads from 4 mm to 12 mm (1/8" to 1/2"). Feel the freedom of your entire wrench-set in the palm of your hand with The Dog Claw Universal Wrench. Weighing in at just over 0.25 kg (0.47 lbs), it fits in your pocket and is tough enough to handle torque in excess of 130 N-m (95 ft-lbs).

Project Objectives

Our team's goal was to develop a self-adjusting crescent style wrench intended to save time and money by combining the versatility of a multitude of different wrenches into one. This self-adjusting feature also takes the guess work out any job, creating a tool that everyone can easily use (Fig. 2).

Results

Upon completion of our stress analysis, we concluded that The Dog Claw Universal Wrench is capable of withstanding torques exceeding 130 N-m (95 ft-lb), meeting the design criterion for strength. The corner where the lower bearing surface meets the slots is the weakest point (Fig. 4). The stresses at this point can be mitigated by replacing the corner with a fillet edge.

Market Analysis

By focusing our attention on consumers with missing pieces from their wrench set, The Dog Claw Universal Wrench fills a niche with few players in the market. From our initial surveys (Fig. 3), over half of all tool owners are missing pieces from their wrench set. The customers' top priorities of durability, ease of use, and cost effectiveness are all uniquely met by The Dog Claw.

Engineering Challenges

During the evolution of The Dog Claw Universal Wrench, the following engineering challenges were faced:

- Manufacturing Proof of Concept
- ABAQUS Stress Analysis

Our design concluded that The Dog Claw Universal Wrench is a feasible and marketable product.

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