Precor USA

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Problem

Precor has requested that the Washington State University ME 416 Design Clinic design and build a system to assemble a flywheel for the Consumer EFX (elliptical exercise machine). The flywheels currently require over two minutes to assemble, while Precor’s long-term production goal of 490 flywheels per day requires an average production rate of one flywheel every minute. Currently, overtime is spent producing these flywheels to keep up with the demand. The Washington State University senior design team was asked to produce a system that can keep up with this demand.

Specifications

- Be capable of producing 490 units per day.
- Be usable by individuals in the 5th – 95th percentile of North American heights (4’11” to 6’2”).
- Require only one person to operate.
- Fit within a 5’ x 12’ floor space.
- Contain waste material in allocated space.
- Comply with OSHA and Precor safety standards.
- Require no more than ten pounds of manual lifting.

Final Design

- One-stage hydraulic press assembly station
- Utilizes solid rivets for fastening eddy current ring
- Snap rings no longer used to locate bearings
- Both top and bottom bearings and rivets are installed at the same time
- ELC used to control hydraulic press
- Manual loaded components

Implications

- One step = decreased transfer time
- Smaller footprint
- Loading procedure more complex
- Taller assembly station
- Higher forces required for assembly
- Entire machine is very heavy
- Flywheel’s rotational orientation does not matter

Objectives

- Decrease assembly time to allow for 490 units to be made per day
- Decrease wasted material
- Decrease number of operators to one
- Implement new fastening technique for eddy current ring

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