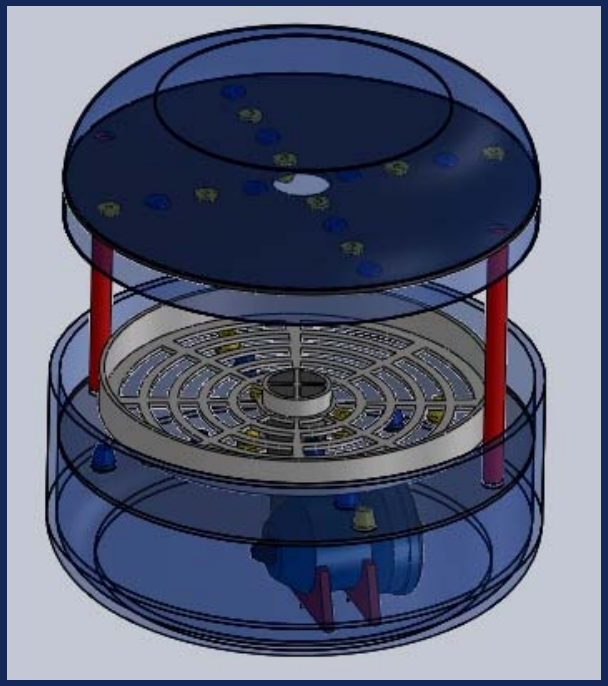
“Happy Egg” Washer



Introduction

Problem

- 400-900 soiled eggs must be cleaned daily
- Current method is to either machine wash or hand wash
  - Hand washing is inefficient and leads to broken eggs
  - High quality egg washers cost upwards of $15,000

Those Affected

- Small-medium scale farms that can't afford expensive industrial egg washers
  - 80,000 egg farms (<50 acres)

Customer Feedback

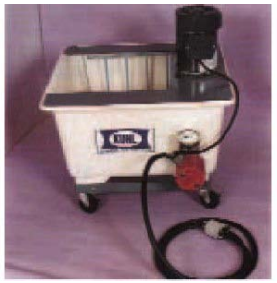
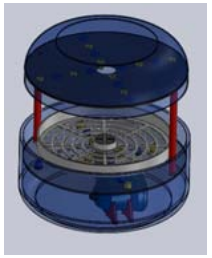
- 95% of small farms in greater Boston area hand wash their eggs
- Washer must cost between $2,000-4,000
- Concerns:
  - Egg must not be cooked
  - Never submerged in water
  - Washes 500-800 eggs/hour

*Data collected from communication with Pete and Jen's Backyard birds (small local farm)

Solution

- High throughput egg washer:
  - Target: 750-1,000 eggs/hour
  - Gentle on eggs
  - Compact size for countertop usage
  - Portable
  - Chemical-free
  - Less ruined eggs

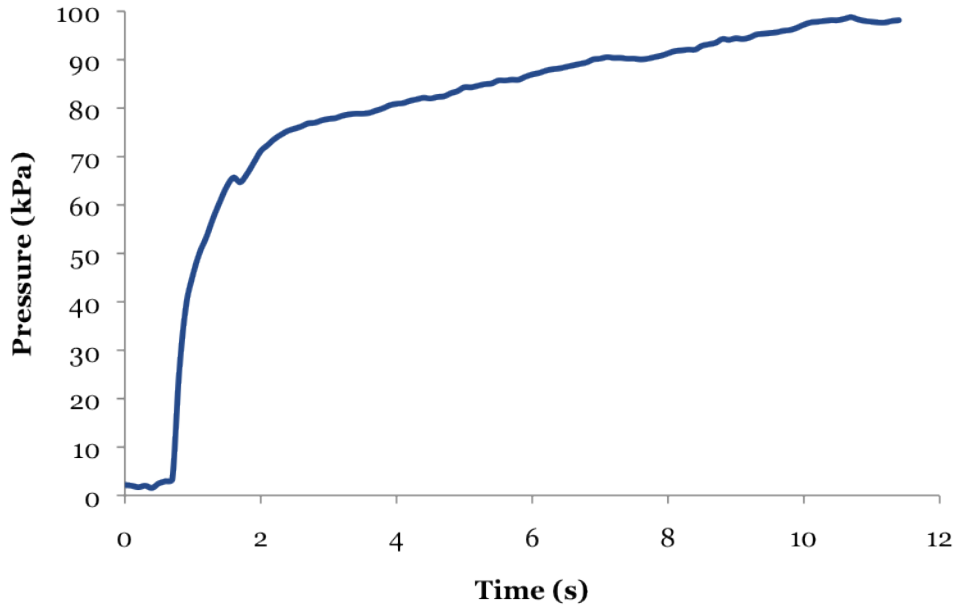
Benchmarking

	The Incredible Egg Washer	Kuhl Egg Washer	"Clean Egg" Washer	**Happy Egg**
				
Eggs / hr	400	1,200	1,890	750-1000
Eggs / batch	100	150	252	50-65
Mechanism	Bubbling Water (air compressor)	Water Circulation	Spray Nozzles	Spray Nozzles
Blow Drying	No	No	No	Yes
Power Requirement	12 Volts	220 Volts	230 Volts	120 Volts
Conveyor Belt	No	No	No	No
Chemicals Required	Egg Wash Powder	Soap	Soap	None
Size	Small / Portable	Large/bulky	Large/bulky	Tabletop
Temperature	Variable	45-49°C	45°C	Variable
Retail Cost	$230	$1,495	$7,250	$1,000 - $2,000

Feasibility Issues

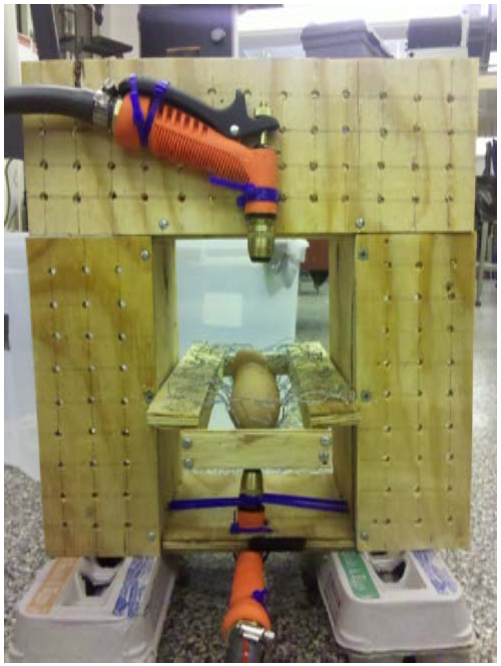
- Pressure required for adequate cleaning
- Location of spray nozzles
- How many eggs per cycle => Time
- Sanitization method (hot water vs. UV light)

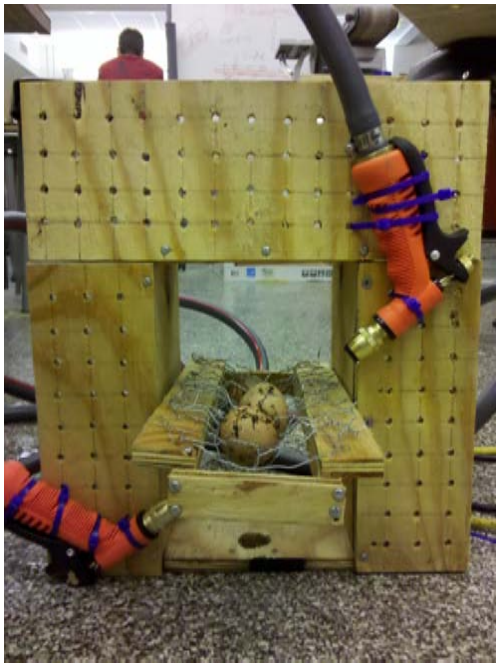
Pressure Testing



- Tested dynamic range of forces exerted by nozzle
- Egg remained intact

Location of Nozzle





Testing

Sanitization

- 110°F water or UV irradiation required to sanitize eggs
- Irradiation uses less energy
  - Typical UV lamp: 100W
  - Heating element: 1500W
- Warm water test: no added benefit
  - Cold water cleans just as well as warm water

Acknowledgements

- Dr. Barbara Hughey
- Pete and Jen's Backyard Birds
- Middlesex Lounge
- Miracle of Science
- Rumor
- Estate