



Company Contact: Chris Wickline

# Low-Volume Production Cell Design

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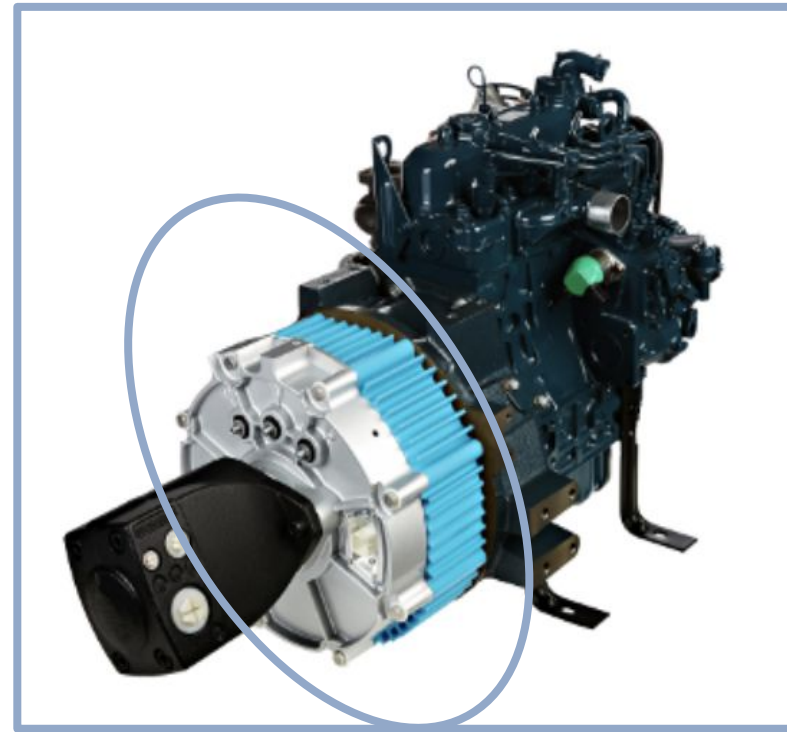


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## Company Background

- InMotion, Blacksburg
- specializes in motor and electronic controller assemblies for hybrid vehicles
  - has 100 employees
  - operates 6 product lines



Low-volume production of the GSM, the Generator Starter Motor, will begin in May 2020, and customer demand is expected to grow from 1,000 units per year to 10,000 in the next eight years.

## Problem

No dedicated production cell or line layout currently exists, and **InMotion will be unable to meet customer demand.**

## Goal

Design a scalable lean manufacturing cell capable of producing 1,000 - 10,000 units per year

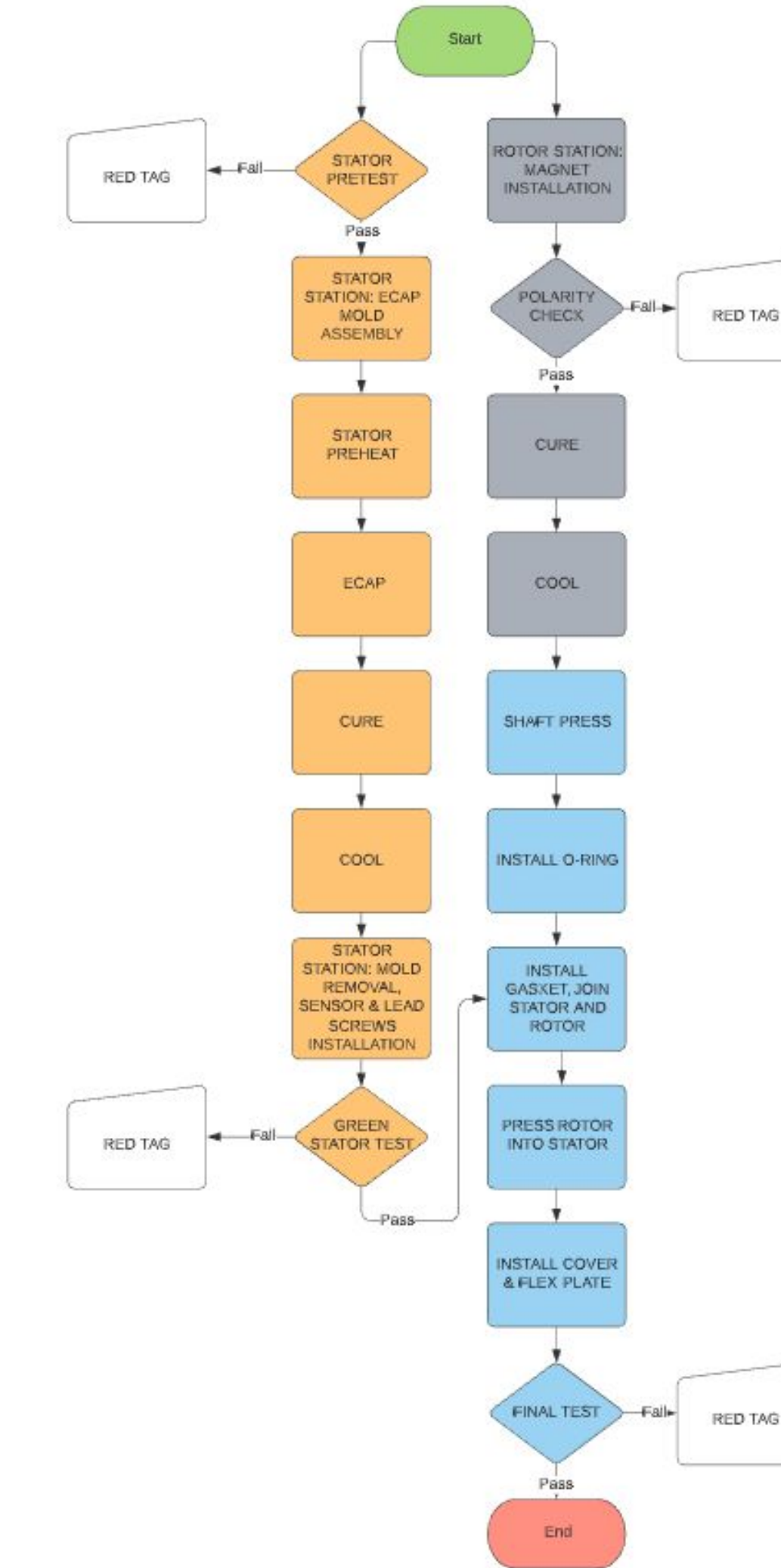
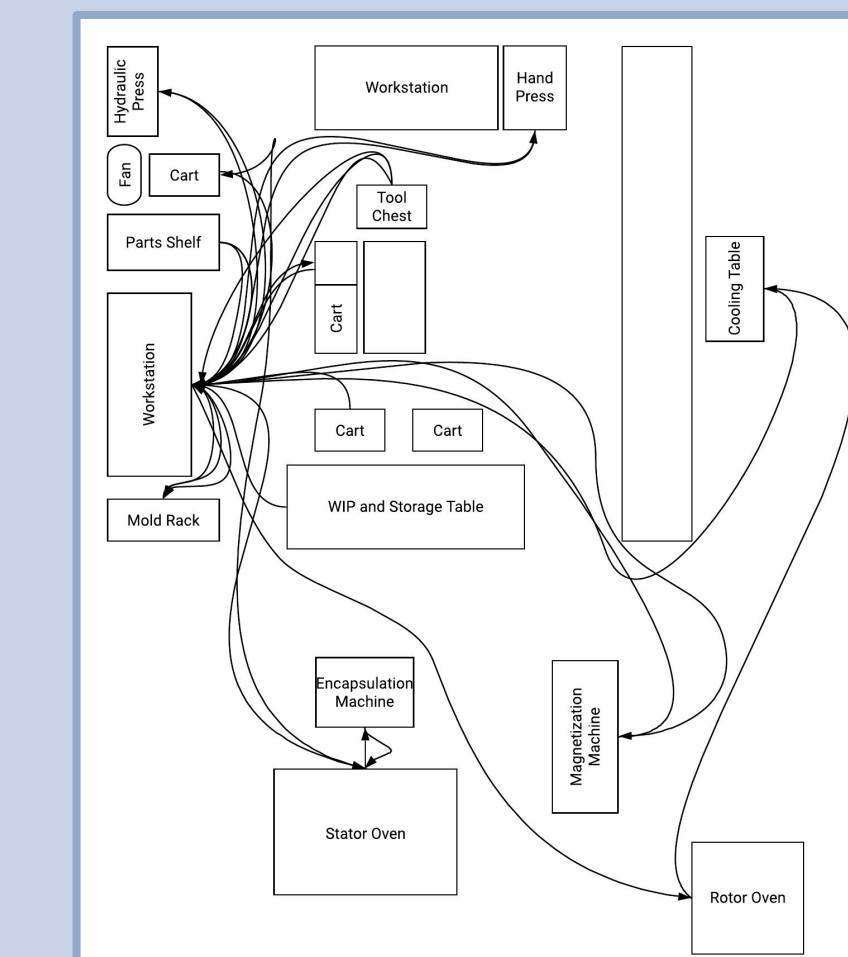
## Objectives

- 1 Create process map
- 2 Design lean production cell
- 3 Provide modifications for 1000, 2000, 3000, 4000, 5000, and 10,000 units/year

## Process Mapping

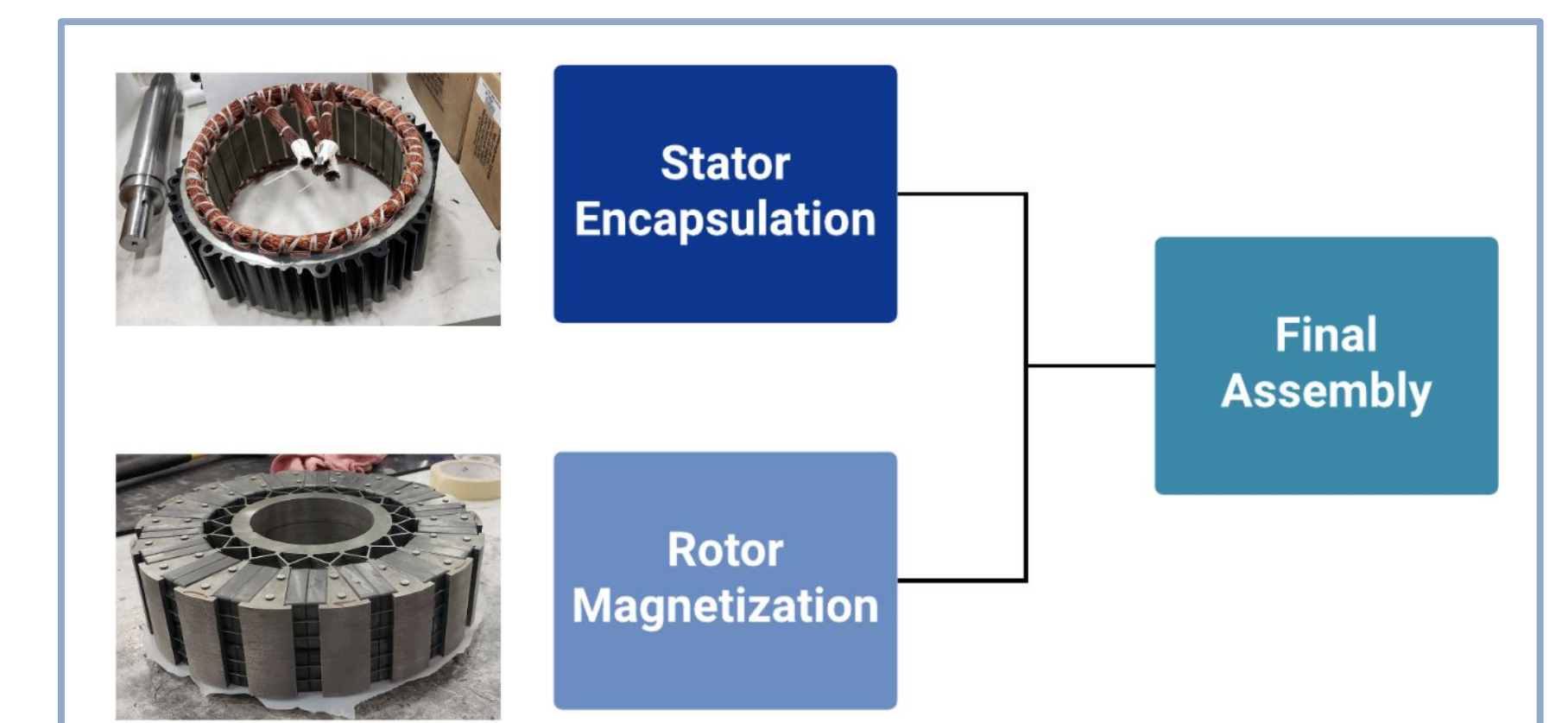
Process Name	Prototype Times - Minutes	Production Times - Minutes
Stator Green Test	--	10.0
Stator Mold Install	19.56	6.0
Stator Preheat	60.0	30.0
Stator Encapsulation	11.76	6.0
Stator Cure	120.0	120.0
Stator Cool	45.0	30.0
Stator Mold Removal	10.48	6.0
Rotor Assembly	36.0	8.0
Rotor Cool	45.0	30.0
Final Assembly	28.83	19.0
Final Test	--	10.0

### Process Flow Map for Prototype Production Cell



## Design Constraints

- Stator Encapsulation and Rotor Magnetization currently have 60-120 minute curing processes
- Final Assembly process times range from 3-10 minutes
- Products require crane, cart, or roller conveyance
- Lean Cell must fit within existing 10 x 10 meter space



## Takt Times

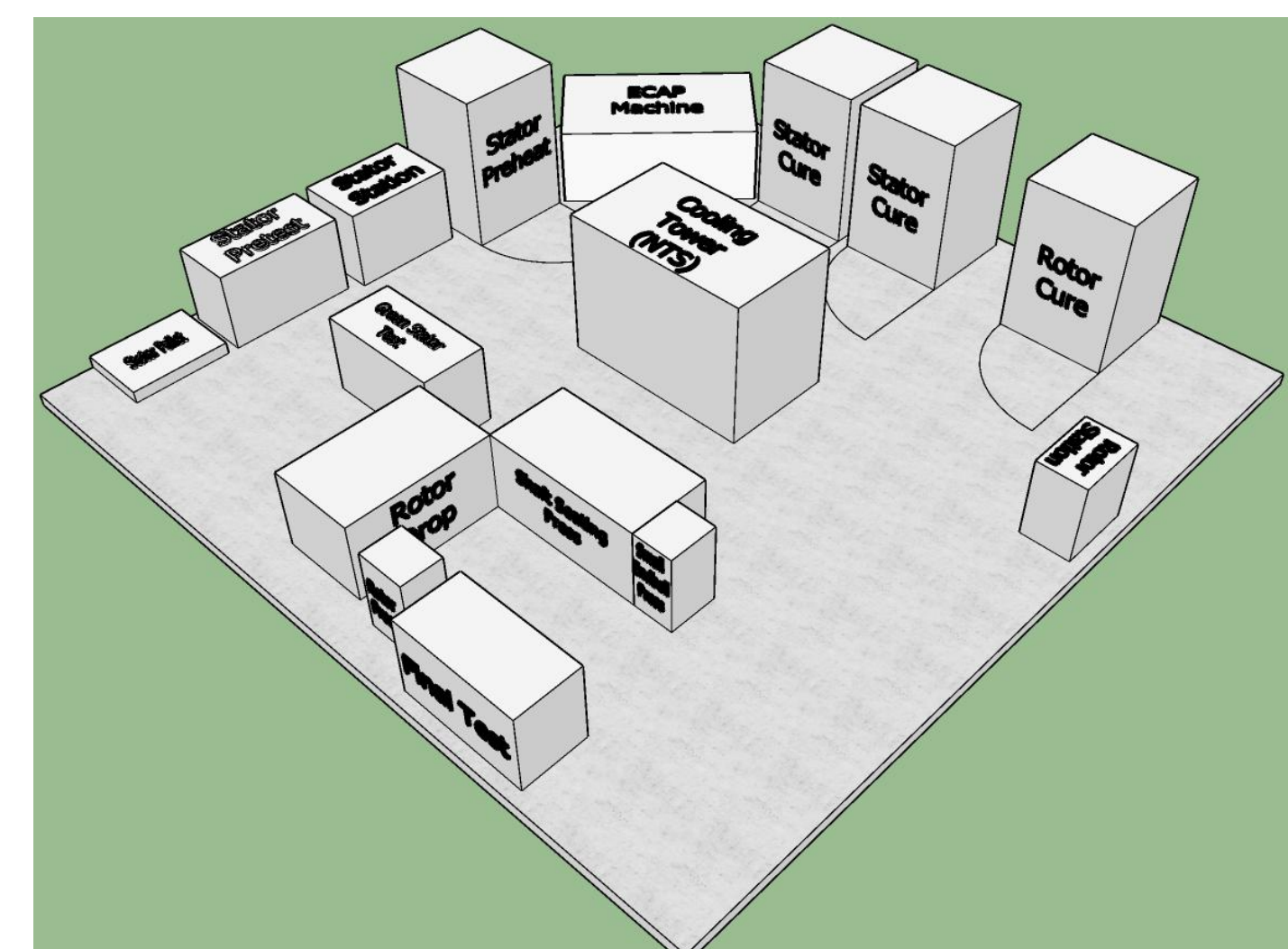
Year	Yearly Demand	Daily Demand	Takt Time - Minutes
Year 1	1,000	4	89.25
Year 2	2,000	8	44.62
Year 3	3,000	12	29.75
Year 4	4,000	16	22.31
Year 5	5,000	20	17.85
Year 6+	10,000	40	8.92

Assume 7 hour day, single full time shift, 85% efficiency

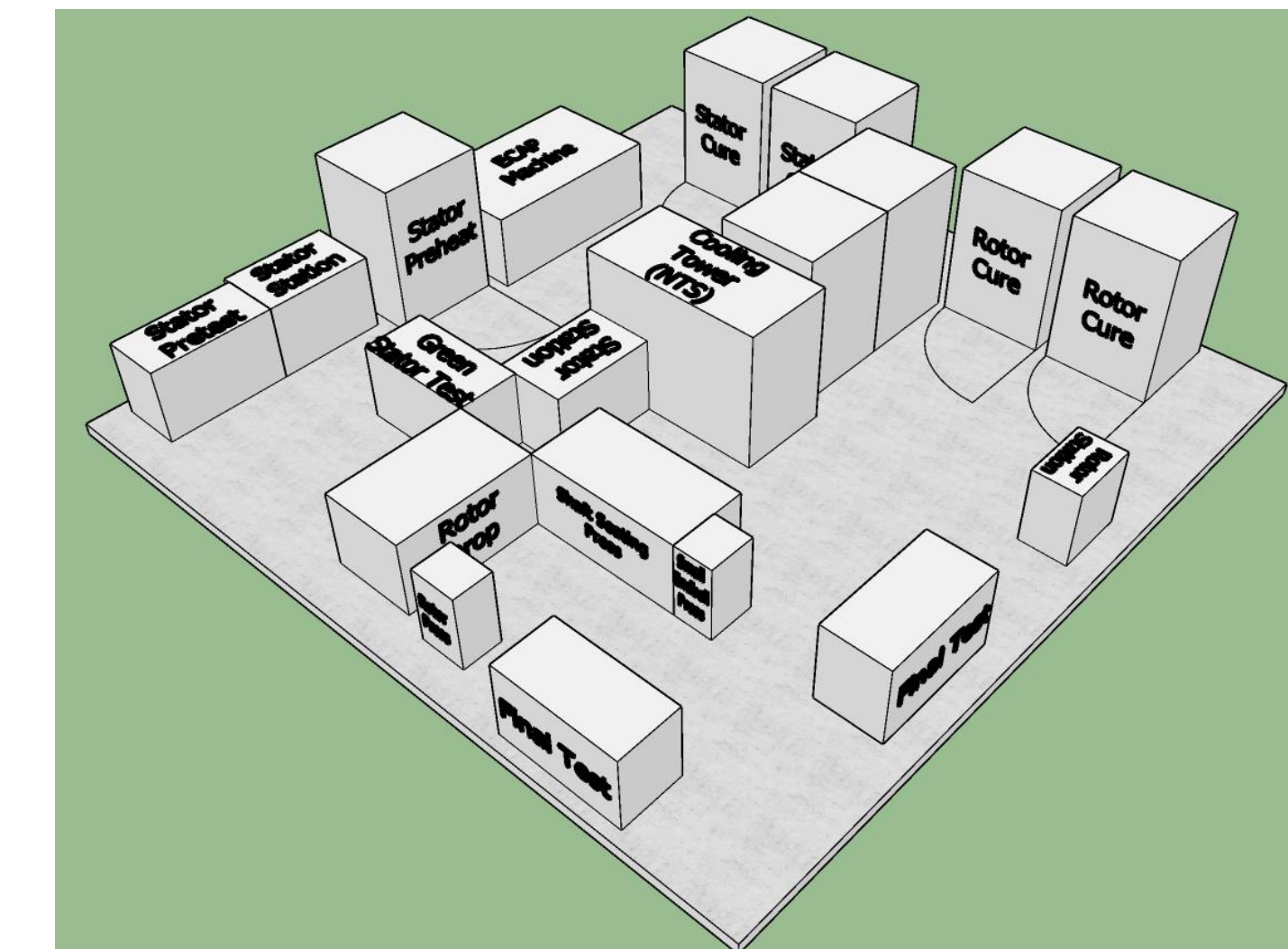
## Projected Impact

This project will allow InMotion to capture **\$7,200,000** in additional revenue over the next 3 years

## Recommendations



5,000 units/year



10,000 units/year

Yearly Demand	Final Assembly Workers	Full Work %	Batch Process Workers
1,000	1	21.6%	N/A
2,000	1	43.3%	N/A
3,000	1	65.0%	1
4,000	1	86.7%	1
5,000	2	54.2%	1
10,000	4	77.1%	2

### Process Flow Map for Proposed Lean Cell

