A Team

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AUTOMOTIVE MANUFACTURING AUTOMATION

EMGT5220:ENGINEERING PROJECT MANAGEMENT

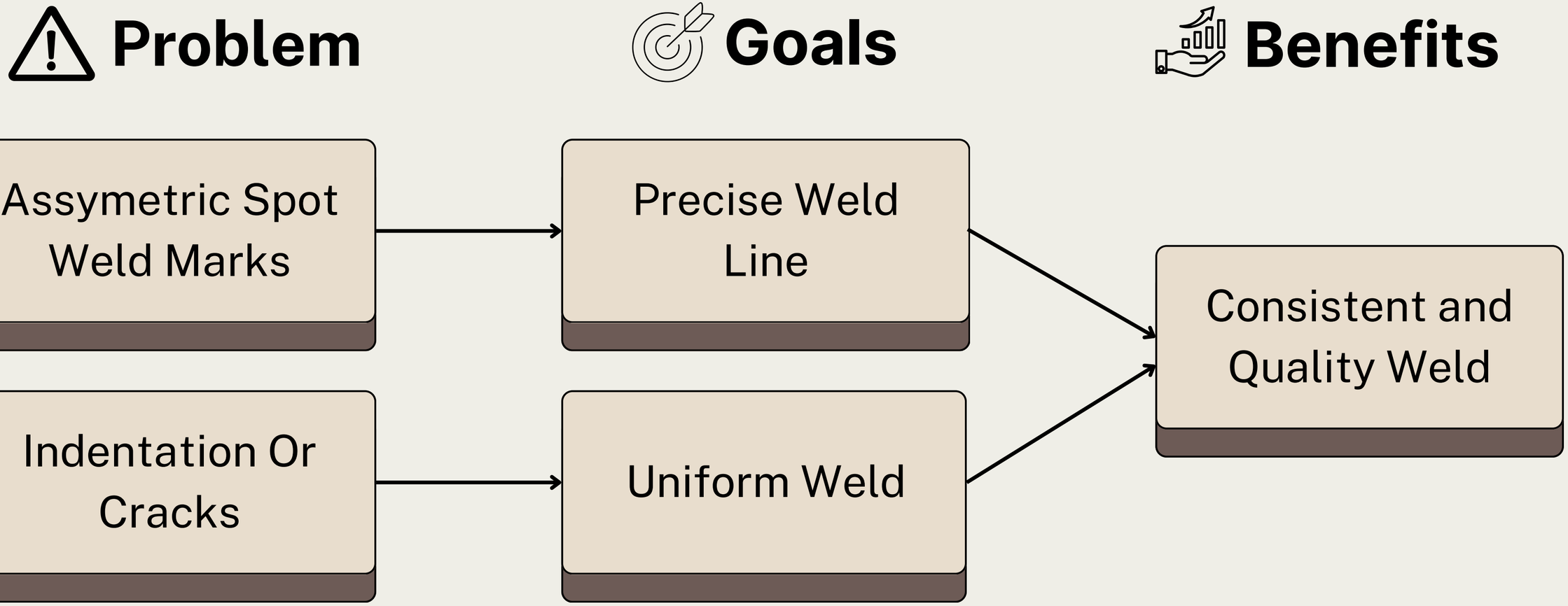
Spring 2024

CONTENTS

PURPOSE

Enhancing the production process by leveraging industry 4.0 for improving accuracy, reducing material wastage & optimizing production cycle through automated solutions in the Welding, Painting, Tire & Windshield assembly area allowing a decrease In operational cost and enhancing overall competitiveness.

WELDING WORKSTATION



BODYSHOP WORKSTATION

⚠ Problem

Paint Sagging Due To Uneven Coat

Colourgrade Mismatch Due to Inconsistent Mixing

🎯 Goals

Even Coat Finish

Homogenous Color Mixture

Benefits

Enhanced Colorgrade & Quality Across The Line

WINDSHIELD & TIRE INSTALLATION WORKSTATION

Problem	Goals	Benefits
Uneven Sealant Application	Uniform Glue Application For Superior Joints	Improved Acoustic Installation
Slow Tire Application	Faster Tire Installation Cycle	Faster Production Rate

WHAT ARE WE SOLVING

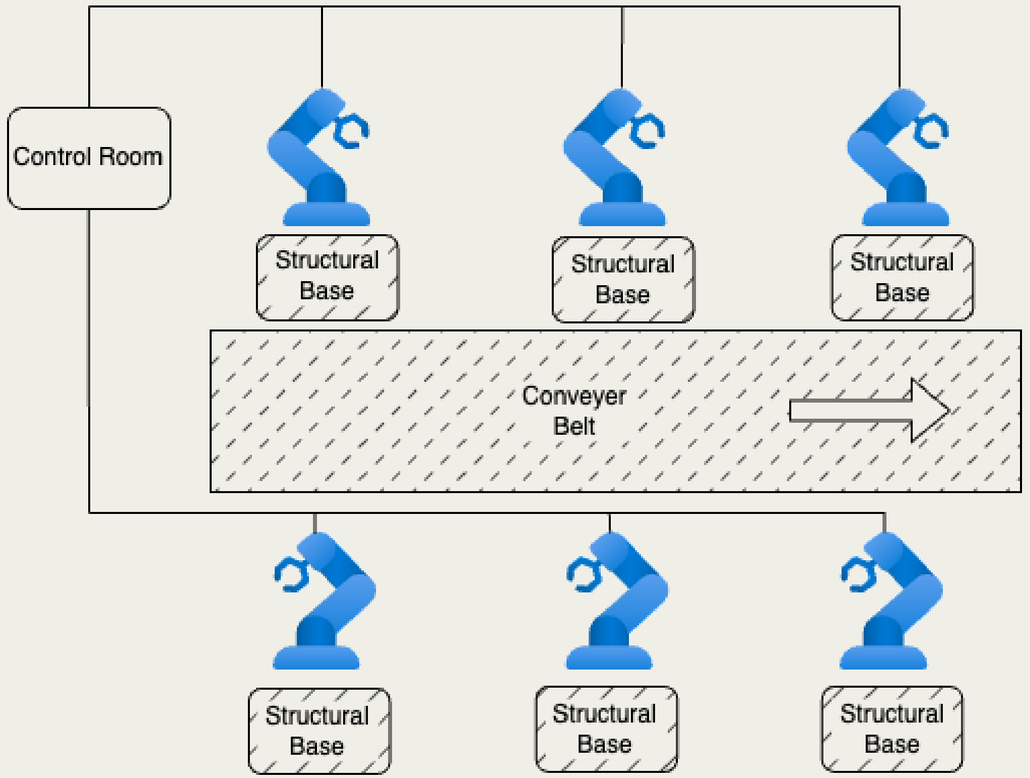
- Inefficiencies and errors in manual process
- Less accuracy
- Excessive wastage
- Sustainable practices
- Optimize production cycles
- High labour cost

TECHNICAL SUMMARY

Motoman MA1400 robots

MIG welding

Horizontal arm reach 1434mm



Precision Welding

Payload Capacity 3kg

6 Axis DOF

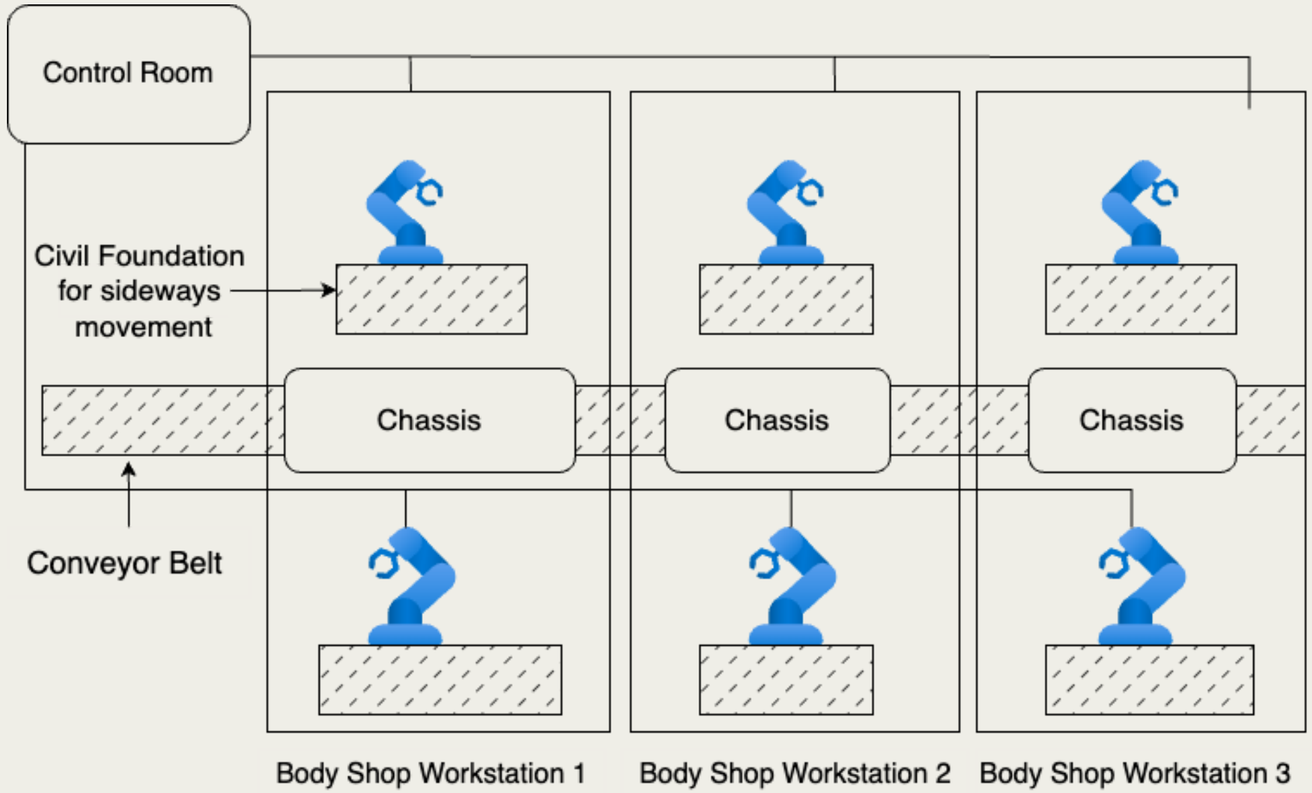
WELDING WORKSTATION

TECHNICAL SUMMARY

FANUC R-30iB robots

Rail-mounted robots

Horizontal arm reach 2800mm



Painting efficiency

Payload Capacity 100kg

6 Axis DOF

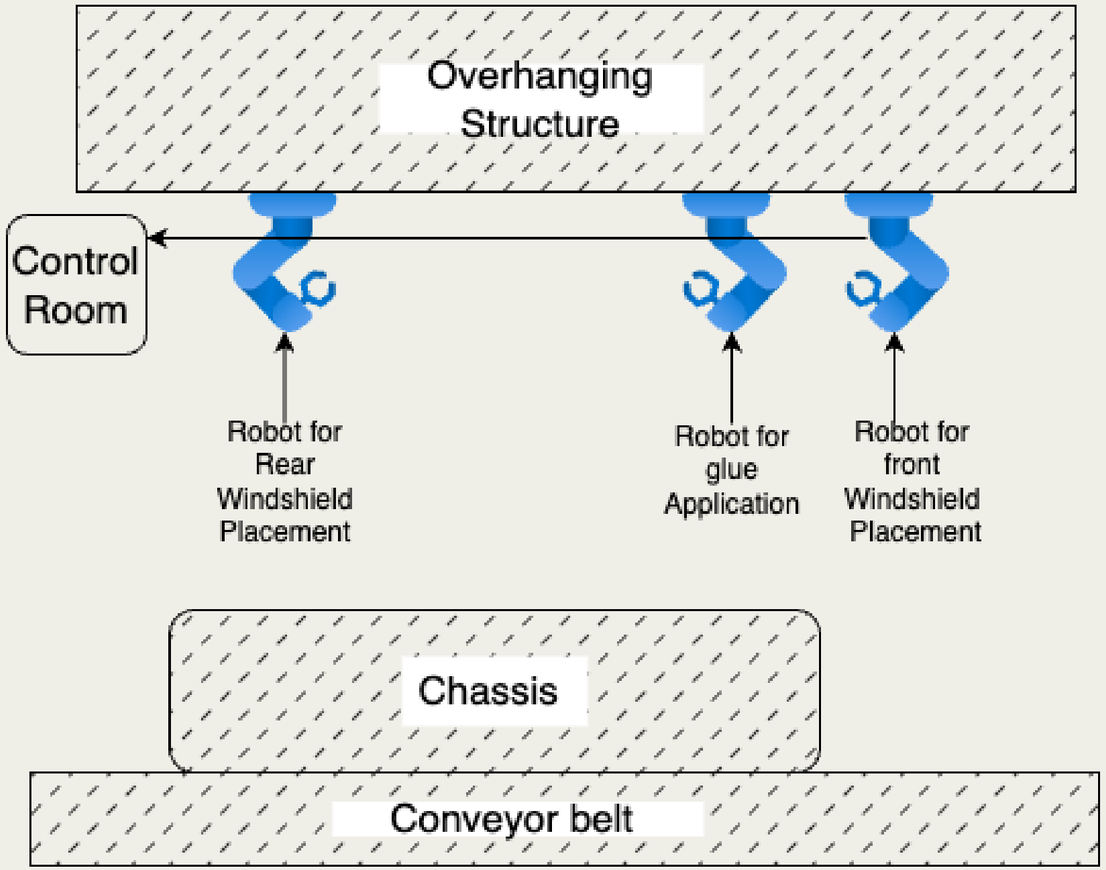
BODYSHOP WORKSTATION

TECHNICAL SUMMARY

FANUC R-2000iA/165F

FANUC R-30iB controller

Horizontal arm reach 2650mm



Vacuum holder tip attachment

Payload Capacity 165kg

6 Axis DOF

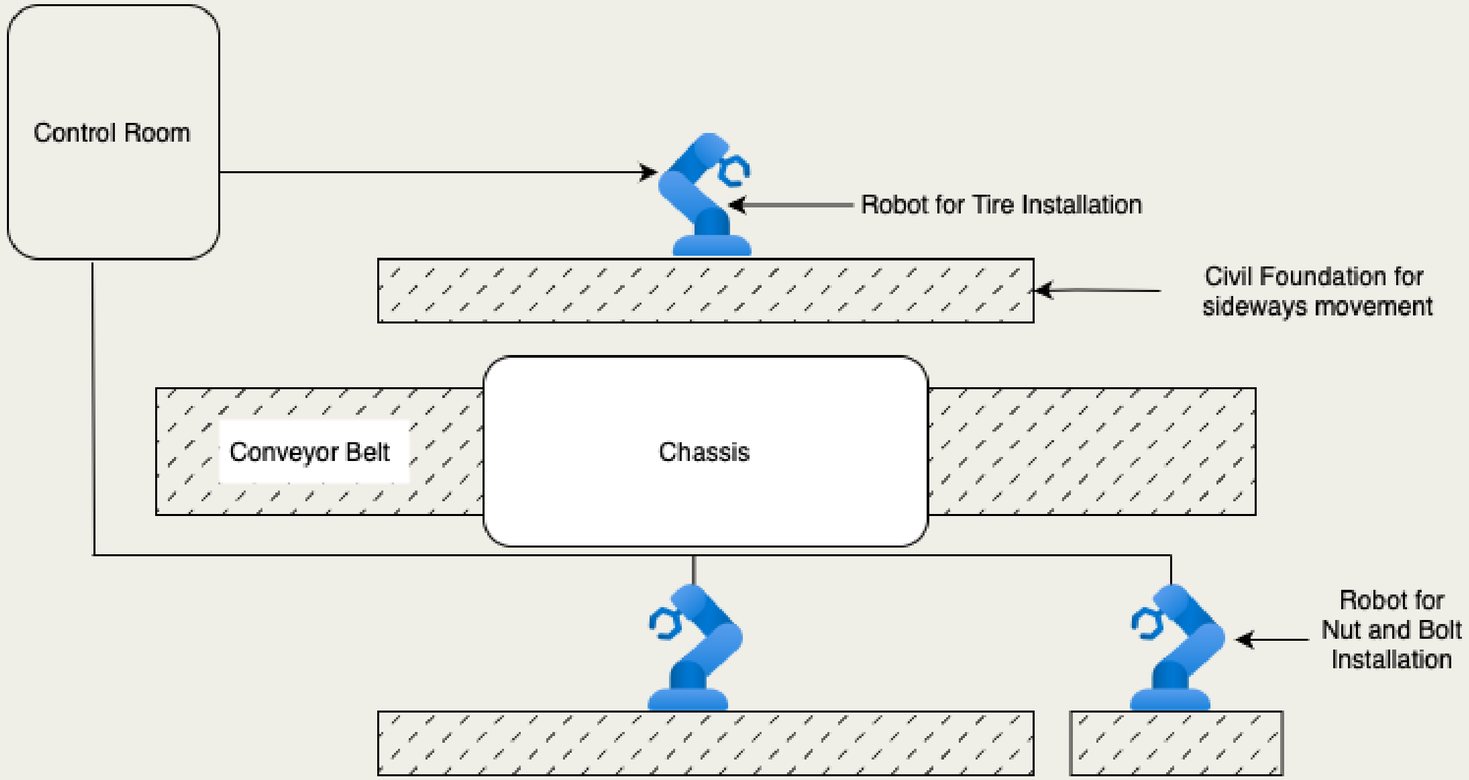
WINDSHIELD WORKSTATION

TECHNICAL SUMMARY

FANUC R-2000iC/210R

FANUC R-30iB controller

Horizontal arm reach 3095mm



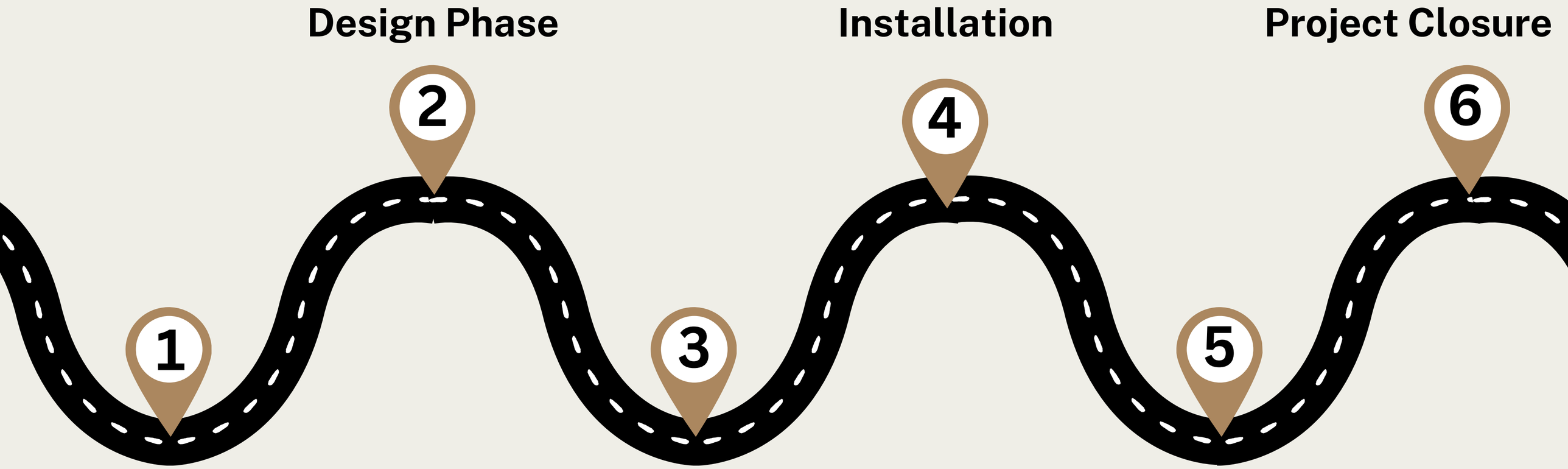
Interchangable tip attachment

Payload Capacity 210kg

6 Axis DOF

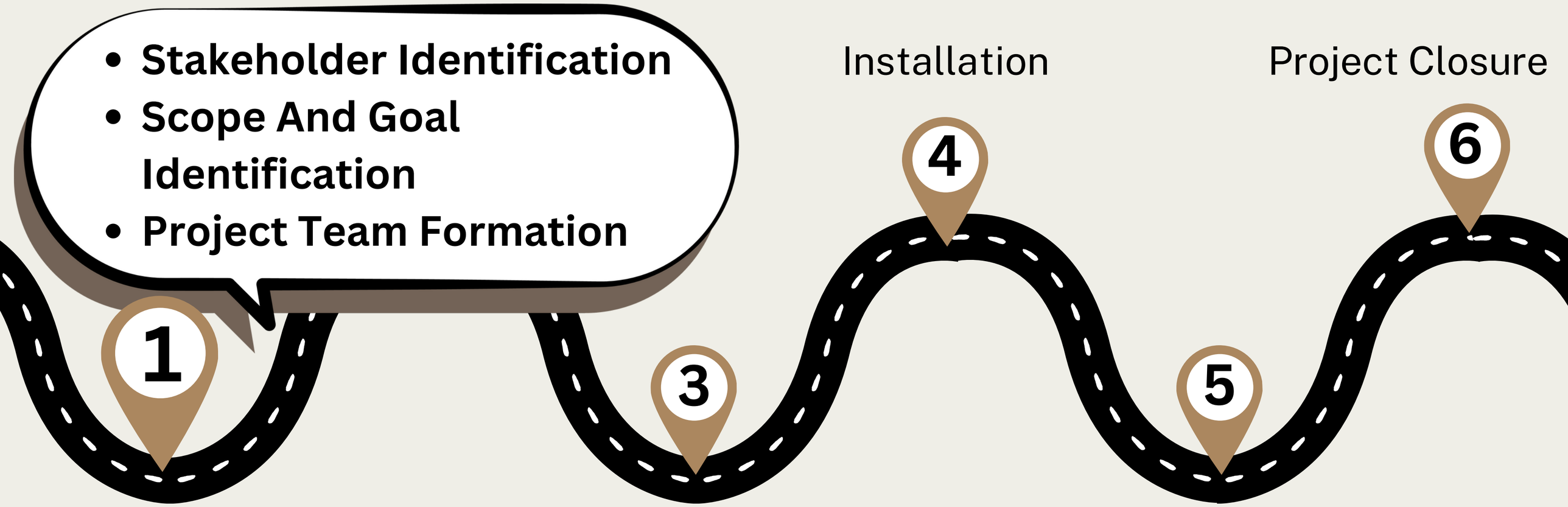
TIRE WORKSTATION

PROJECT ROADMAP



1. Project Initiation Phase
2. Design Phase
3. Procurement
4. Installation
5. Commissioning
6. Project Closure

PROJECT ROADMAP



Project Initiation Phase

Q1 ‘24

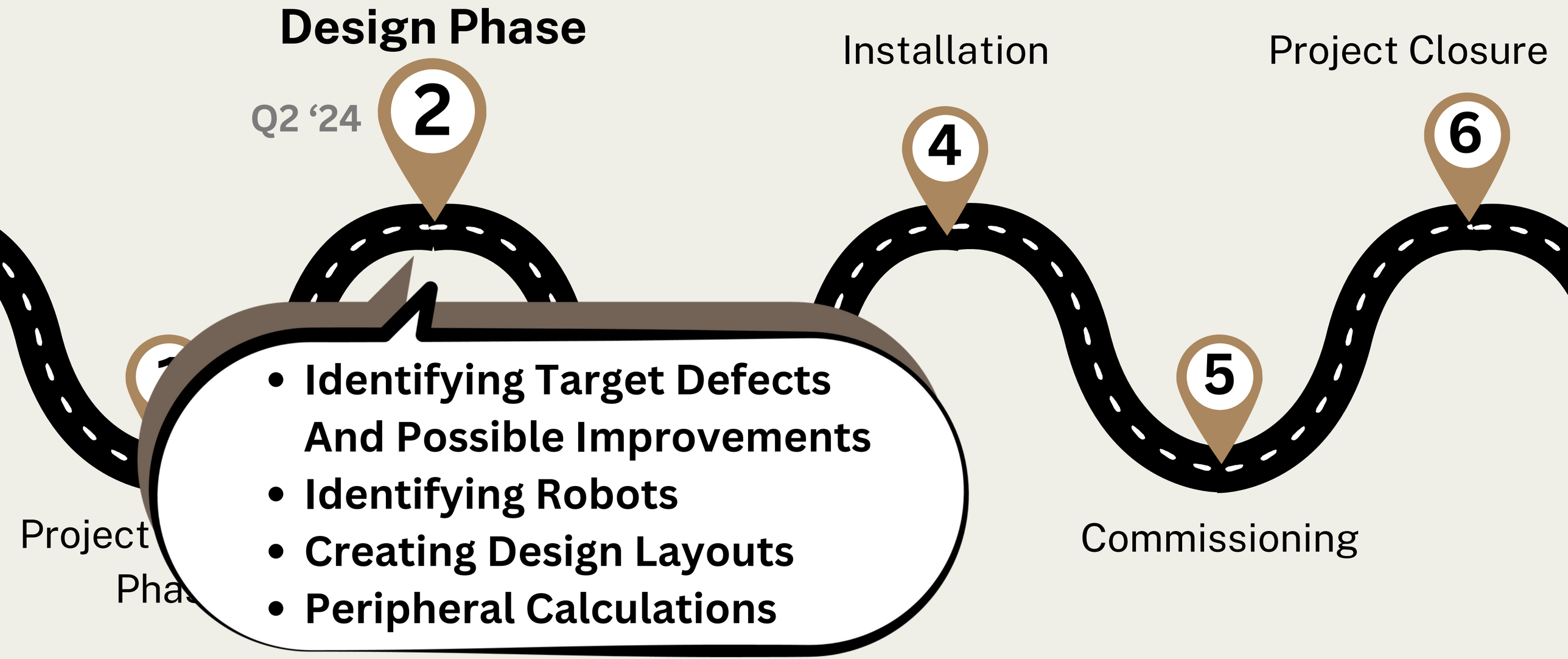
Procurement

Installation

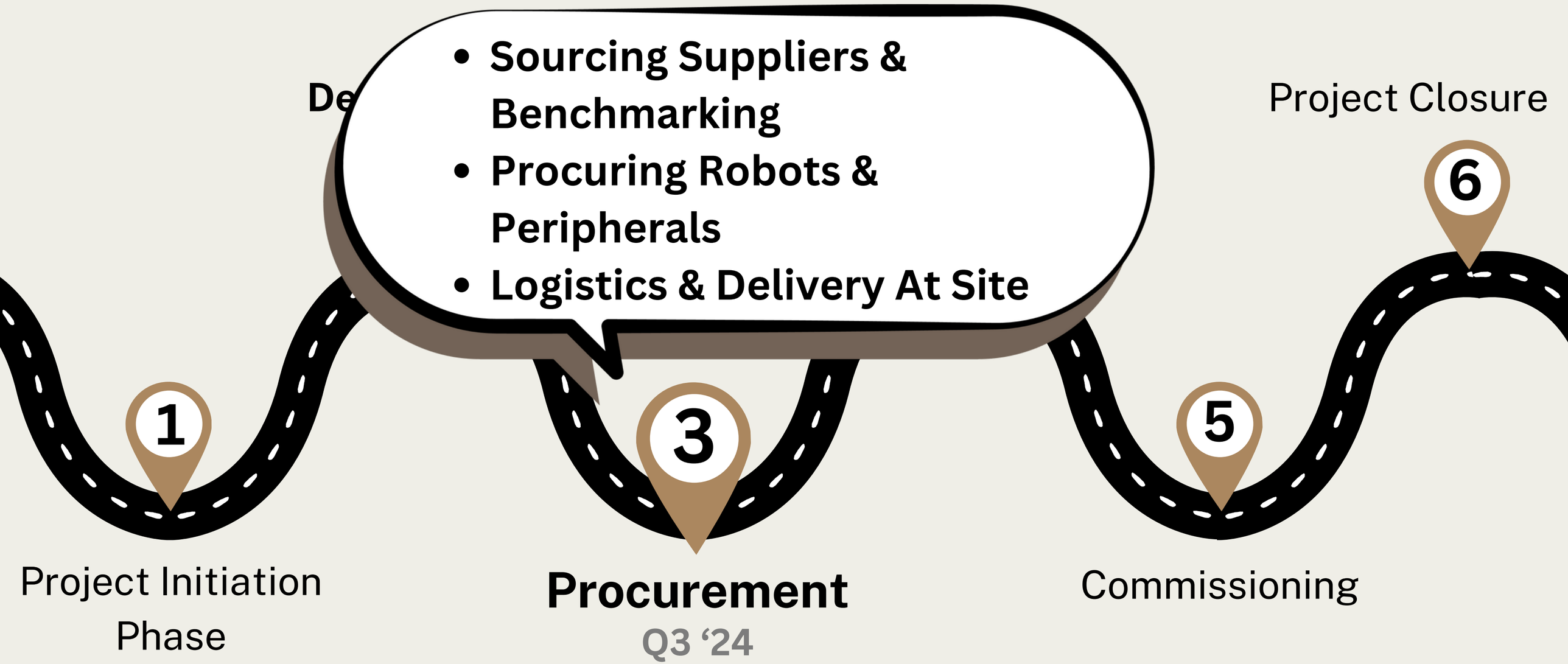
Commissioning

Project Closure

PROJECT ROADMAP



PROJECT ROADMAP



PROJECT ROADMAP

1

Project Initiation Phase

2

Design Phase

4

Q4 ‘24

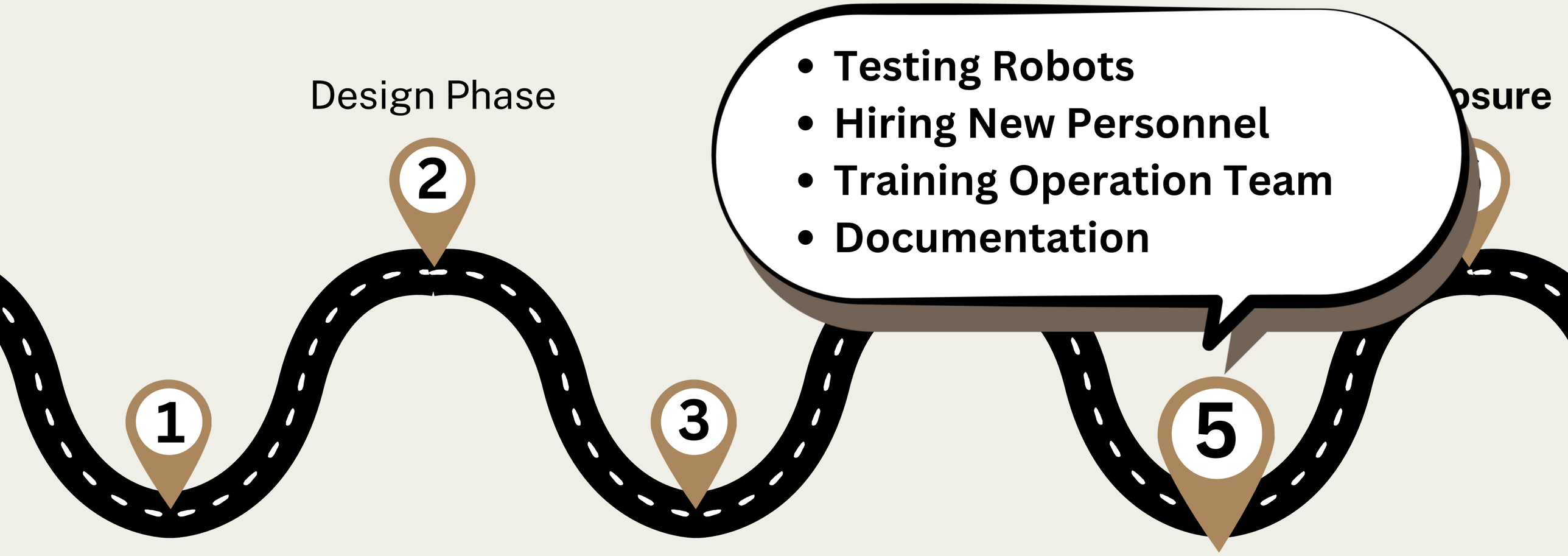
Installation

- **Civil Structure & Peripherals**
- **Installing Robots At Locations**
- **Mechanical & Electrical Connections**
- **Control Room Set-Up**

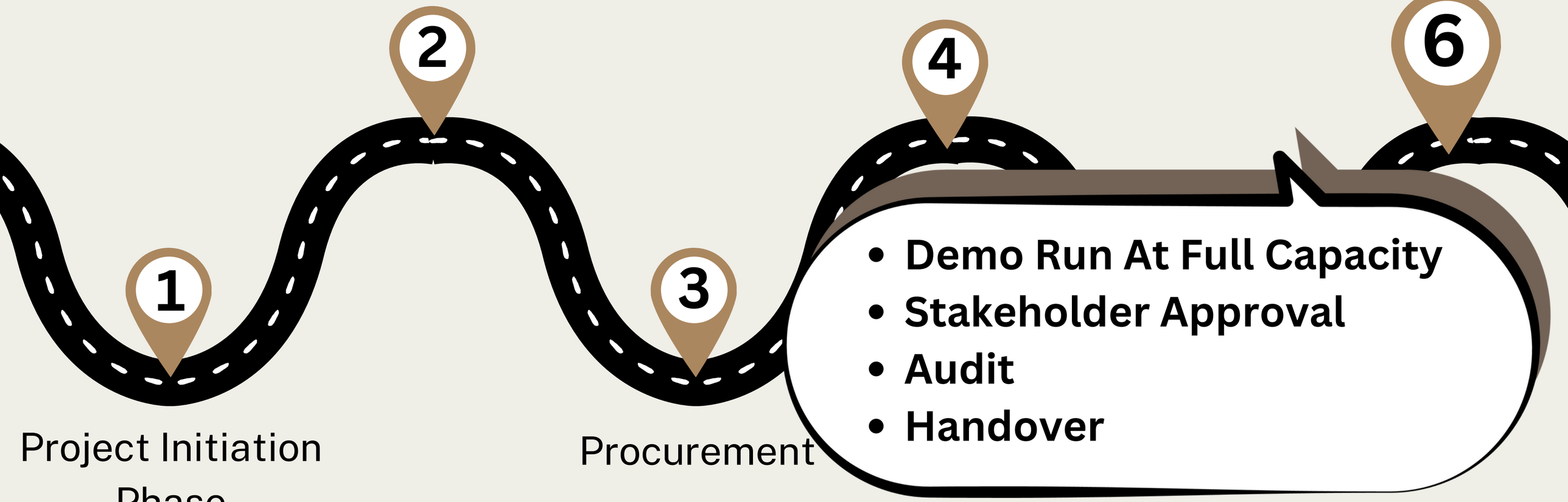
6

Project Closure

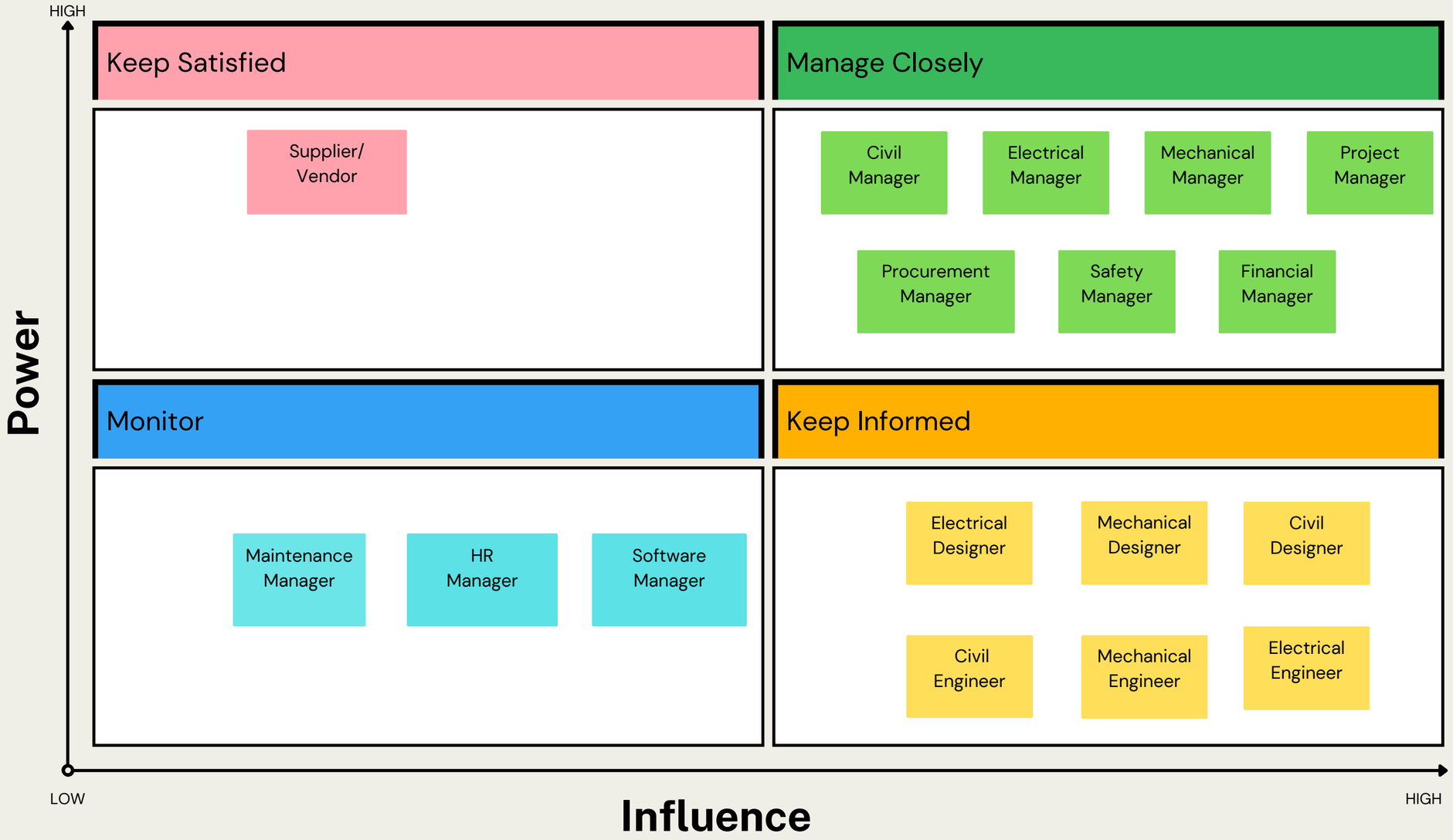
PROJECT ROADMAP



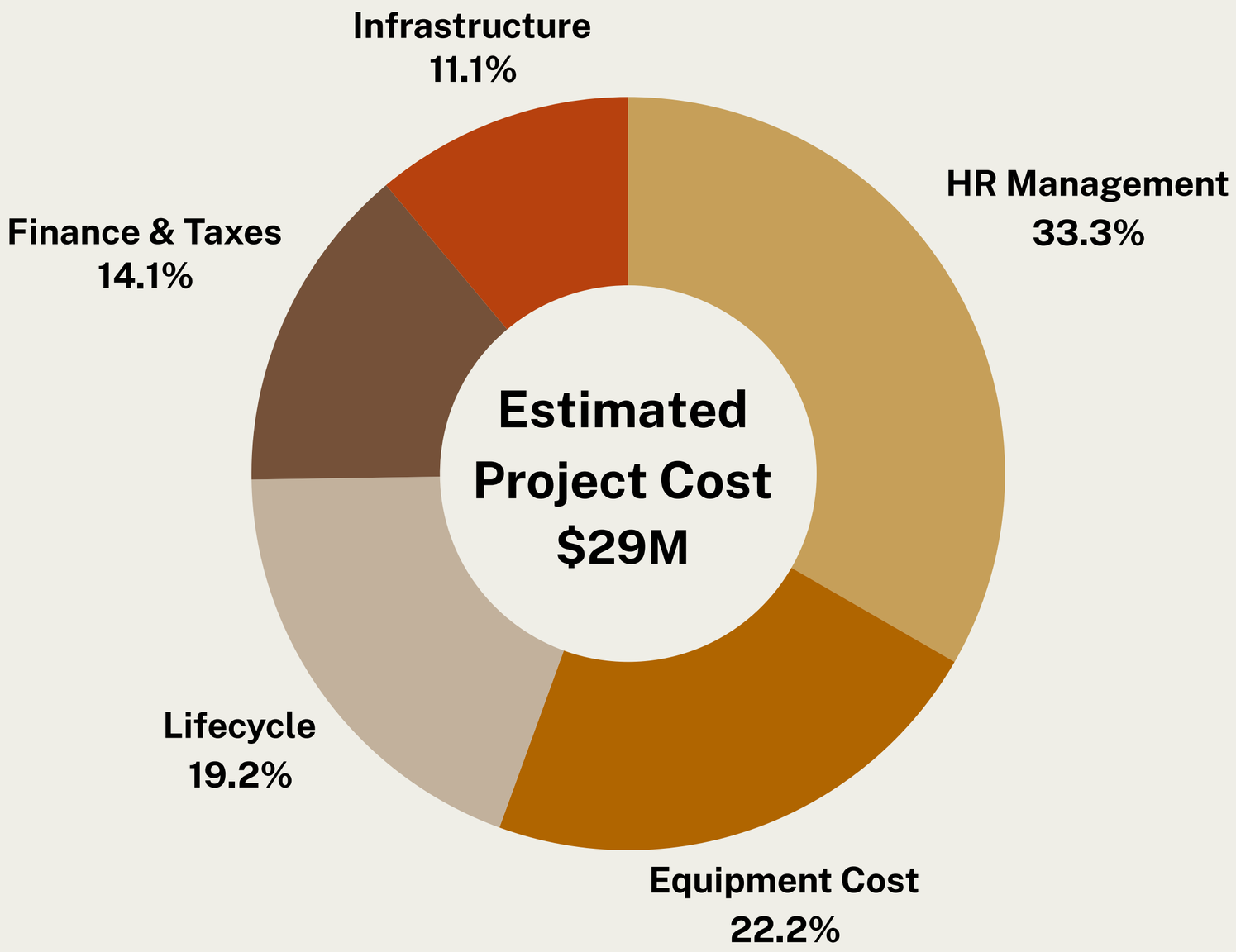
PROJECT ROADMAP



Stakeholder matrix

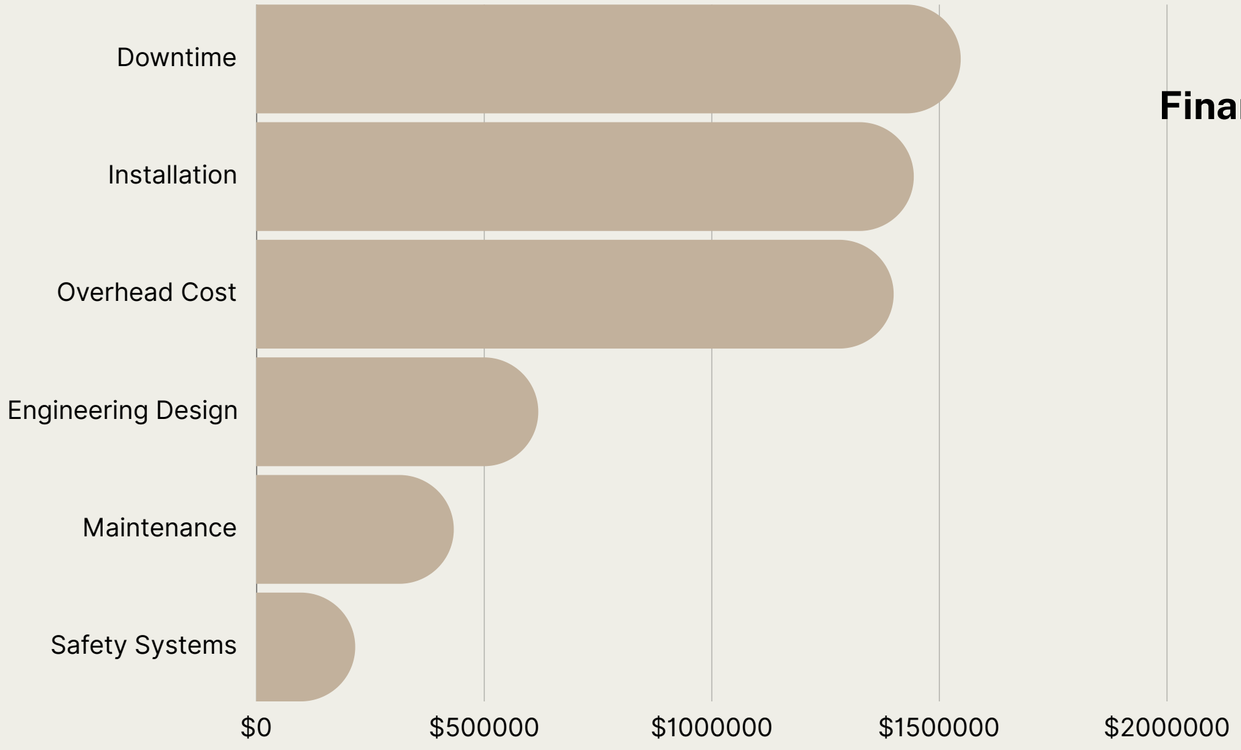


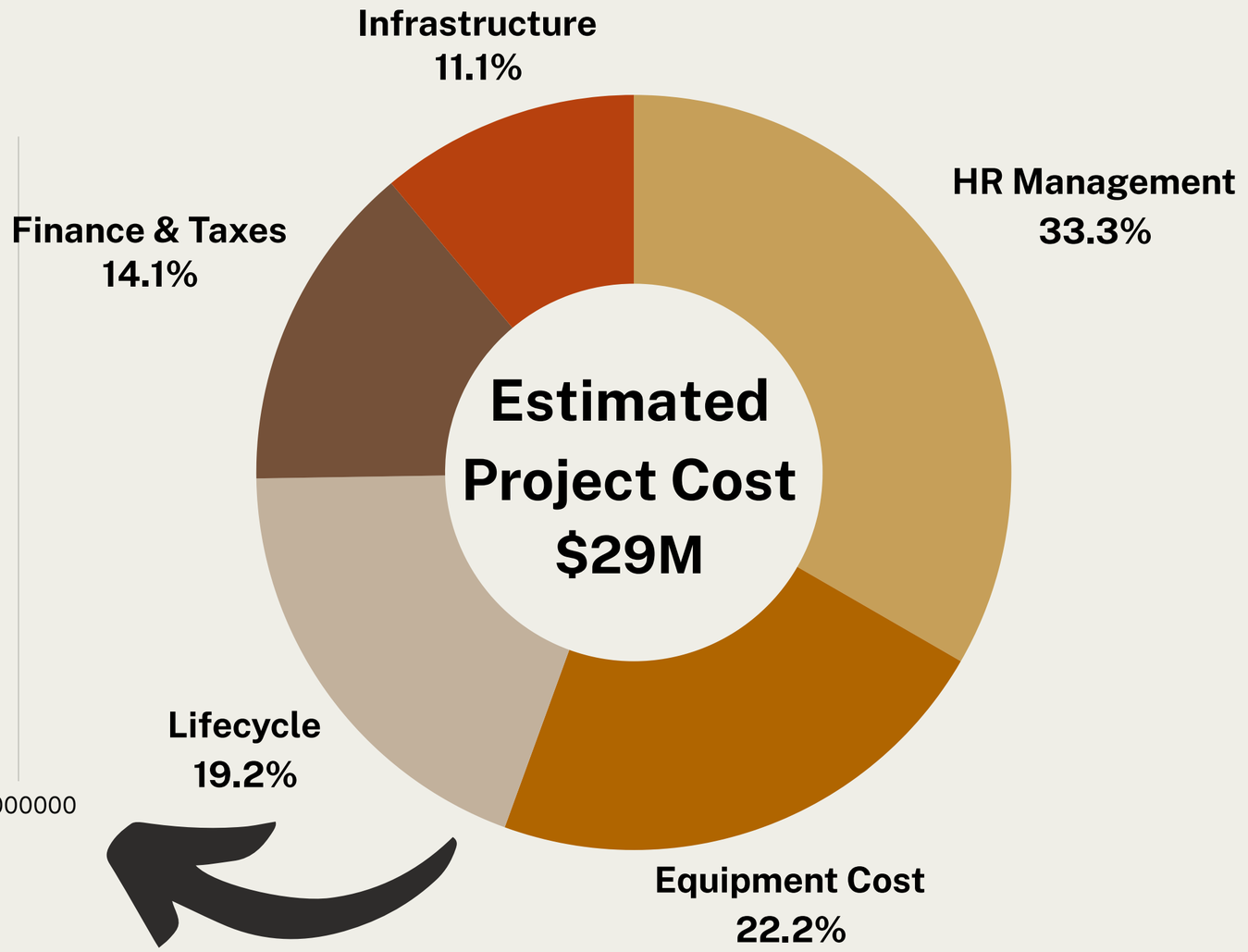
FINANCIAL SUMMARY



FINANCIAL SUMMARY

Lifecycle Cost Breakdown





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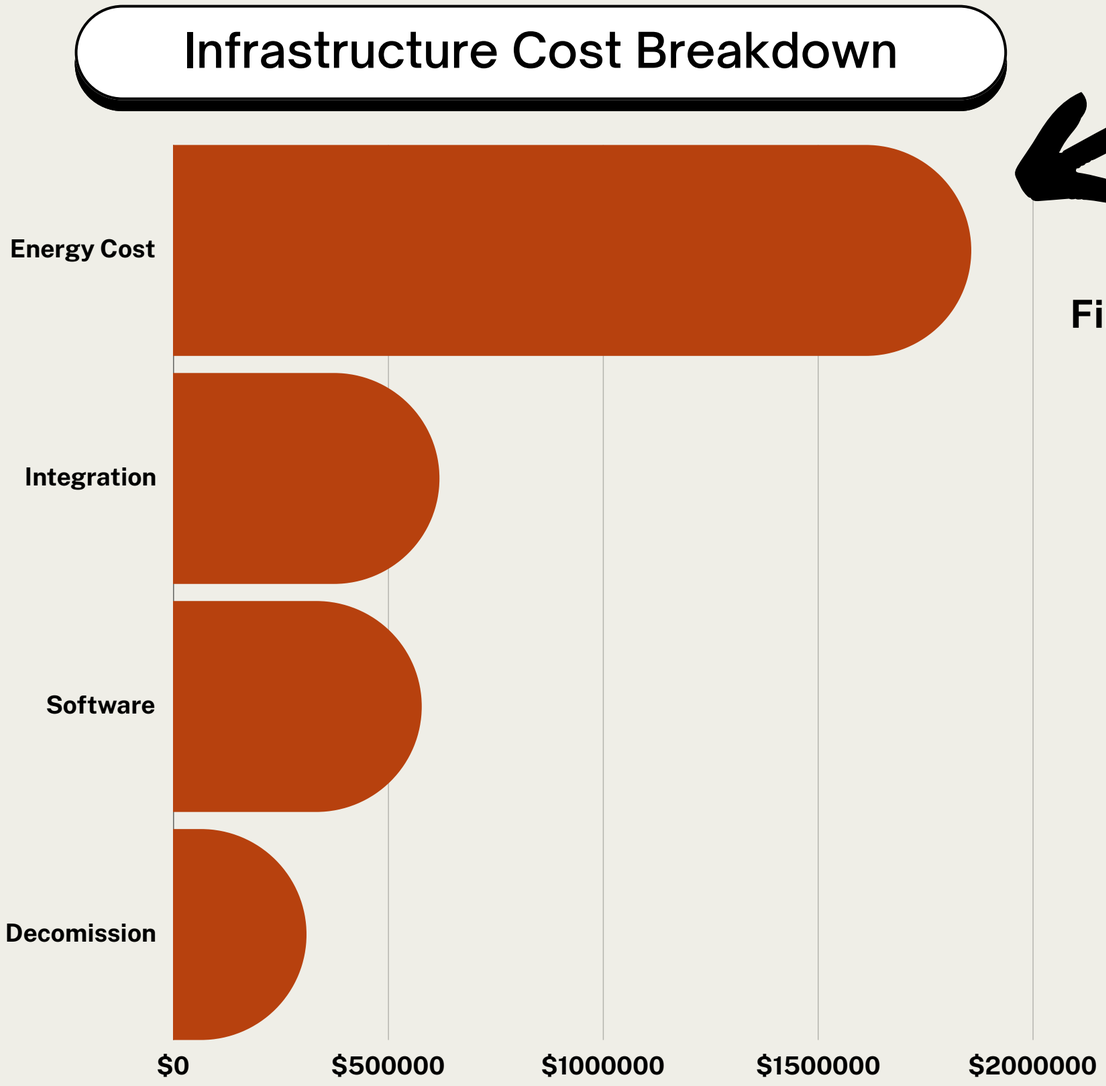
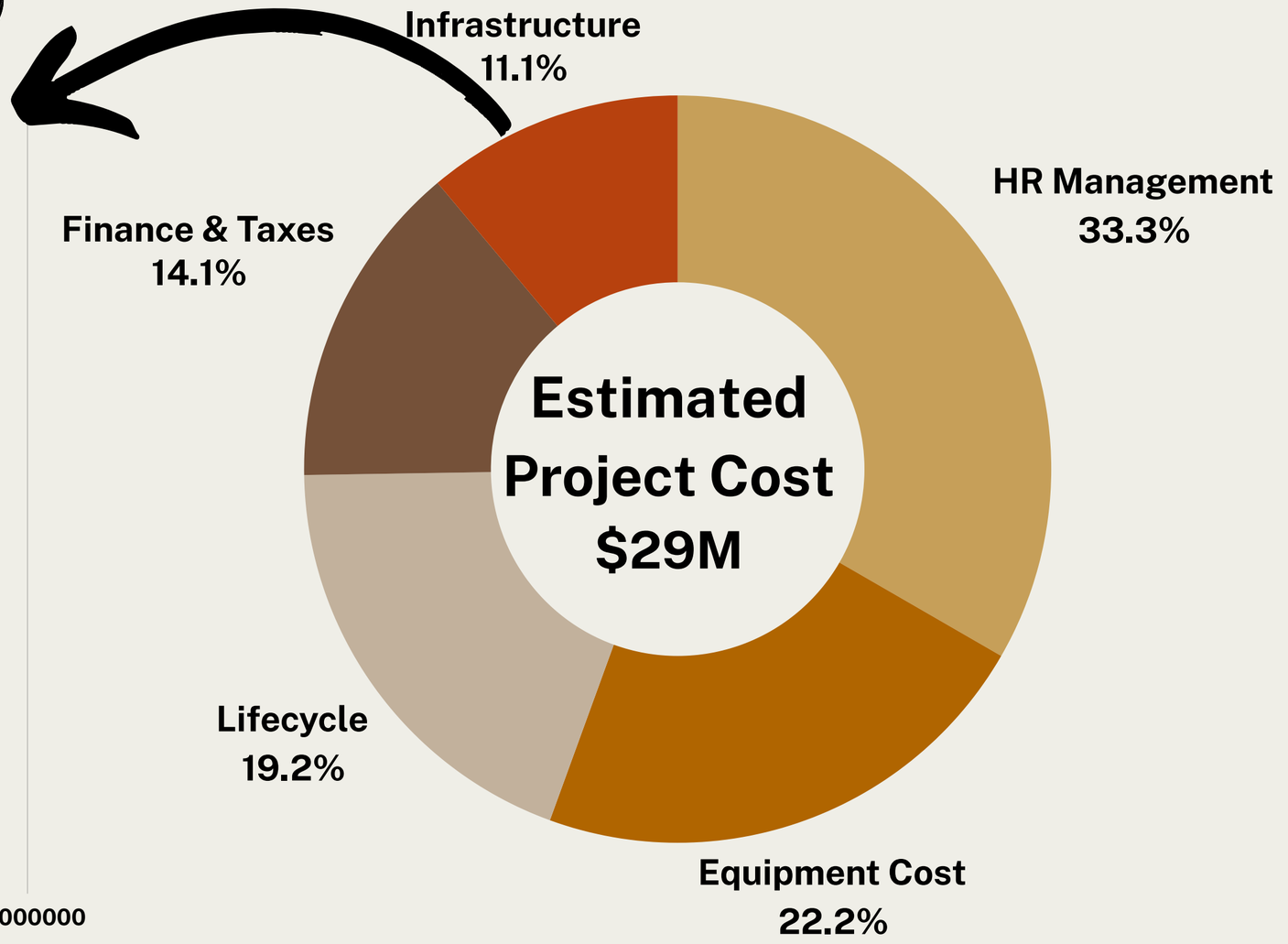




PROFITS

Savings in direct costs (operational) after automation

Direct	Old Operating Spend	New Operating Spend	$ Savings	%Savings
Labor	$ 10,000,000	$ 8,500,000.0	$ 1,500,000.0	15%
Material Cost	$ 20,000,000	$ 19,600,000	$ 400,000.0	2%
Energy Usage	$ 2,000,000	$ 2,600,000.0	$ (600,000.0)	-30%
Procurement & Logistics	$ 4,000,000	$ 4,000,000	$ -	
Consumables	$ 1,600,000	$ 1,760,000	$ (160,000.0)	-10%
Maintenance & Repairs	$ 2,000,000	$ 2,200,000.0	$ (200,000.0)	9%
Inspection & Testing	$ 1,200,000	$ 960,000.0	$ 240,000.0	20%
		Total Cost Saving in Direct Operational Costs	**$ 1,180,000**	2%

Payback Period Calculations

FISCAL YEAR	Revenue (A)	Operating Costs (B)	Profit (A-B)	%Profit
FY23	$63,000,000	$60,000,000	$3,000,000	5.0%
FY24	$62,827,225	$60,000,000	$2,827,225	4.5%
FY25	$62,827,225	$60,000,000	$2,827,225	4.5%
FY26	$62,827,225	$60,000,000	$2,827,225	4.5%
FY27	$63,000,000	$58,800,000	$4,200,000	6.7%
FY28	$63,567,568	$58,800,000	$4,767,568	7.5%
FY29	$63,913,043	$58,800,000	$5,113,043	8.0%
FY30	$64,262,295	$58,800,000	$5,462,295	8.5%
FY31	$64,262,295	$58,800,000	$5,462,295	8.5%
FY32	$64,262,295	$58,800,000	$5,462,295	8.5%
			Total	**$36,486,877**

Principle Amount Adjusted YOY	Principle Amount
$ 30,000,000	$ 27,000,000
$ 28,890,000	$ 26,062,775
$ 27,887,169	$ 25,059,944
$ 26,814,140	$ 23,986,915
$ 25,665,999	$ 21,465,999
$ 22,968,619	$ 18,201,051
$ 19,475,125	$ 14,362,081
$ 15,367,427	$ 9,905,132
$ 10,598,491	$ 5,136,196
$ 5,495,730	

Achieving 8.5% from 5% in 7 Years through Automation

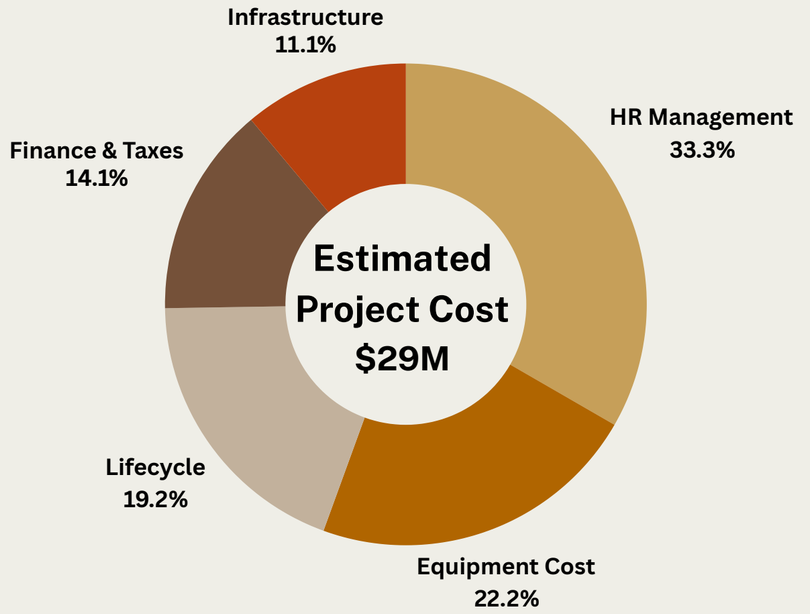
SUMMARY

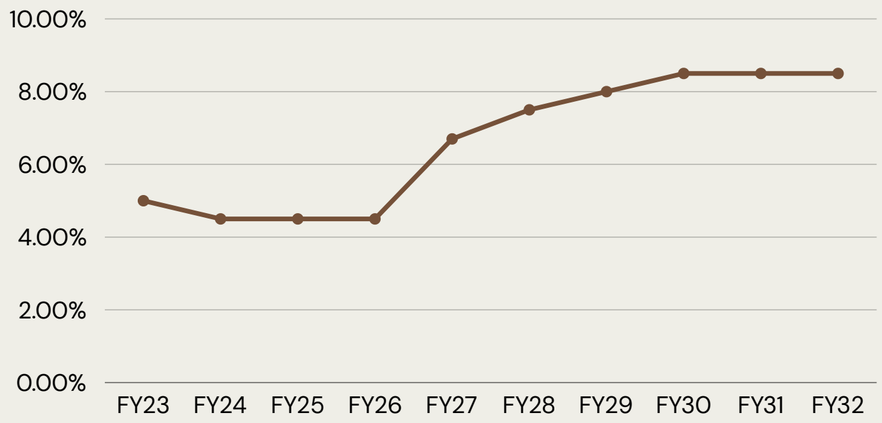
Plan of Project

- Designing Automation Layout
- Appropriate Robot Selection per workstation
- Infrastructure Considerations for Civil, Electrical, HVAC
- Control Room Development and setting safety standards
- Procurement
- Infrastructure Construction
- Installation
- Software Installation & Operation
- Capacity Testing
- Production Line Commissioning

To Achieve

- Process Efficiency
- Less Wastage
- Sustainability
- Optimized Production Cycle
- Reduced Labour Cost





Achieving 8.5% from 5% in 7 Years through Automation

THANK YOU