

# **Toy Manufacturing Handbook (Plastic, Silicone, Wooden, Rubber, Soft, Electronic, Magnetic, Metal / Die- Cast, Traditional Indian Toys Manufacturing Process, Quality controls and safety standards, Machinery Equipment details and Factory Layouts)**

**Author:-** Ajay Kumar Gupta

**Format:** paperback

**Code:** NI376

**Pages:** 456

**Price:** Rs.2295US\$ 200

**Publisher:** NIIR PROJECT CONSULTANCY SERVICES

Usually ships within 5 days

The toy industry represents one of the most dynamic and diverse domains within modern manufacturing, ranging from timeless wooden and plush creations to sophisticated electronic, magnetic, and STEM-oriented innovations. Beyond its recreational value, toys play a vital role in nurturing creativity, learning, and emotional development in children, while simultaneously contributing as a significant driver of global trade. In India, the sector is undergoing rapid transformation, powered by enhanced domestic manufacturing capabilities, evolving consumer preferences, and supportive government initiatives. These developments position toy manufacturing as a compelling business opportunity for both new entrepreneurs and established enterprises.

The contemporary toy market is characterized by innovation, rising consumer awareness, and greater cultural relevance. Today's parents increasingly demand products that integrate entertainment with education, while maintaining high standards of safety, durability, and environmental responsibility. At the same time, the growth of e-commerce, the expansion of organized retail formats, and the influence of international trends have reshaped accessibility and consumer expectations. Together, these factors present a wealth of opportunities for businesses to create competitive, sustainable, and future-ready ventures.

This book serves as a comprehensive roadmap for navigating this evolving landscape. It addresses key areas including industry outlook, business planning methodologies, manufacturing processes across diverse toy categories, and compliance with legal and regulatory requirements. In addition, the handbook provides in-depth insights into raw material selection, machinery and equipment, factory layout planning, quality assurance practices. The book equips readers with the practical knowledge required to transform business ideas into successful, scalable operations.

A distinctive feature of the book is its in-depth coverage of manufacturing processes across categories such as plastic, silicone, wooden, rubber, plush, electronic, magnetic, and die-cast toys. Each section describes raw materials, production methods, machinery requirements, and quality control protocols.

This handbook is highly recommended for entrepreneurs, business leaders, and professionals seeking to establish or expand a toy manufacturing venture. It is equally valuable for investors, consultants, and industry observers who wish to gain a holistic understanding of the sector. By combining forward-looking market insights with step-by-step operational guidance, the book stands as a definitive reference for anyone committed to building a profitable and enduring presence in the toy manufacturing industry.

## **1. Introduction**

- 1.1 Global Toys Industry Overview
- 1.2 Growth Drivers for the Toys Sector
- 1.3 Toys Industry Classification by Material and Function
  - 1.3.1 *By Material*
  - 1.3.2 *By Function*
- 1.4 Key characteristics of Educational Toys Include
- 1.5 Key Characteristics of Recreational Toys
- 1.6 Key Characteristics of Action Toys
- 1.7 Key Characteristics of Construction Toys
- 1.8 Key Characteristics of Role-play Toys
- 1.9 Key Characteristics of Digital/Tech Toys

## **2. Business Planning for ToyS Manufacturing**

- 2.1 Market Research
  - 2.1.1 *Steps for Conduct an Effective Market Research*
- 2.2 Target Audience Identification
  - 2.2.1 *Primary Target Segments Typically Include*
- 2.3 Competitive Analysis
- 2.4 Product Development and Innovation
  - 2.4.1 *Defining Your Product Line*
- 2.5 Innovation Strategies
- 2.6 Sustainability and Ethical Considerations

## 2.7 Operational Planning

### *2.7.1 Manufacturing Processes and Production Capacity*

## 2.8 Supply Chain Management

## 2.9 Technology and Automation

## 2.10 Financial Planning and Analysis

### *2.10.1 Startup Costs and Capital Requirements*

## 2.11 Profit Margin Analysis and Pricing Strategy

## 2.12 Financial Projections and Performance Metrics

## 2.13 Legal and Regulatory Considerations

### *2.13.1 Safety Standards and Compliance*

## 2.14 Intellectual Property Protection

## 2.15 Environmental Regulations

## 2.16 Marketing and Distribution Strategies

### *2.16.1 Brand Development*

## 2.17 Distribution Channels

## 2.18 Marketing and Promotion

## 2.19 Risk Assessment and Contingency Planning

### *2.19.1 Market Risks*

### *2.19.2 Operational Risks*

## 2.20 Sustainability and Social Responsibility

### *2.20.1 Environmental Sustainability*

## 2.21 Corporate Social Responsibility

## 2.22 Growth and Scaling Strategies

### *2.22.1 Product Line Expansion*

## 2.23 Geographic Expansion

2.24 Technology Integration

2.25 Conclusion

### **3. Legal and Regulatory Framework**

3.1 Quality Control and Safety Standards

3.2 Certifications and Licenses Required

3.2.1 *Documentation Required for BIS Certification*

3.3 Environmental and Labour Compliance

3.3.1 *Environmental Compliance*

3.3.2 *Labour Compliance*

3.4 BIS Standards for Toys in India

3.5 Export Regulations and Norms

3.5.1 *Domestic Export Requirements*

3.5.2 *International Compliance*

3.5.3 *Government Initiatives*

### **4. How to Start Toys Manufacturing Industry**

4.1 Introduction

4.2 Business Structure Registration

4.3 Udyam Registration (MSME)

4.4 BIS Certification for Toys (Compulsory)

4.5 Factory License and Registration under the Factories Act, 1948

4.6 Pollution Control License (CTE and CTO)

4.7 Import-Export Code (IEC)

4.8 Goods and Services Tax (GST) Registration

4.9 Trade License from Local Authorities

4.10 Shops and Establishments Act Registration

- 4.11 Labour Law Compliances
- 4.12 Intellectual Property Rights (IPR)
- 4.13 Fire and Safety Clearances
- 4.14 Legal Metrology Act (If Selling by Weight or Count)
- 4.15 Product Labelling Norms
- 4.16 Fire & Building Plan Approvals

## **5. Types of Toys**

- 5.1 Plastic Toys
- 5.2 Silicone Toys
- 5.3 Wooden Toys
- 5.4 Rubber Toys
- 5.5 Soft Toys
- 5.6 Electronic and Battery-Operated Toys
- 5.7 Magnetic Toys
- 5.8 Outdoor Toys
- 5.9 Puzzles and Board Games
- 5.10 Conclusion

## **6. Plastic Toys**

- 6.1 Different Types of Plastic Toys
  - 6.1.1 *Building Blocks & Construction Sets*
  - 6.1.2 *Characteristics*
- 6.2 Educational & Developmental Benefits
  - 6.2.1 *Action Figures & Dolls*
- 6.3 Action Figures
  - 6.3.1 *Features*

## 6.4 Dolls

### 6.4.1 *Key Features*

### 6.4.2 *Vehicles (Cars, Trains, Planes)*

### 6.4.3 *Key Features*

## 6.5 Manufacturing Aspects

## 6.6 Manufacturing Processes

### 6.6.1 *Hollow Toys (Balls, Bats, Hula Hoops)*

### 6.6.2 *Common Types of Hollow Toys*

### 6.6.3 *Features*

### 6.6.4 *Soft & Squeezable Toys*

### 6.6.5 *Characteristics*

## 6.7 Educational & Puzzle Toys

### 6.7.1 *Features*

# 7. Manufacturing Process of Plastic Toys

## 7.1 Introduction

## 7.2 Manufacturing Process

### 7.2.1 *Injection Moulding*

### 7.2.2 *Blow Moulding*

### 7.2.3 *Rotational Moulding (Rotomoulding)*

### 7.2.4 *Thermoforming*

## 7.3 Post-Production Processing

### 7.3.1 *Assembly*

### 7.3.2 *Surface Finishing and Decoration*

### 7.3.3 *Quality Control*

### 7.3.4 *Packaging*

## 7.4 Manufacturing Challenges and Considerations

### 7.4.1 *Mould Design*

### 7.4.2 *Wall Thickness*

### 7.4.3 *Safety Considerations*

### 7.4.4 *Sustainability Trends*

## 7.5 Advanced Manufacturing Technologies

### 7.5.1 *3D Printing*

### 7.5.2 *Automated Assembly*

## 7.6 Cost Factors in Plastic Toys Manufacturing

# 8. Injection Moulding

## 8.1 History of Plastic Injection Moulding

## 8.2 Features of Injection Moulding

# 9. Use of Injection Moulding in Plastic Toys Manufacturing

## 9.1 Step 1: Design the Toy

## 9.2 Step 2: Create the Mould

## 9.3 Step 3: Select the Plastic Material

## 9.4 Step 4: Prepare the Injection Moulding Machine

## 9.5 Step 5: Injection Moulding Process

## 9.6 Step 6: Ejecting the Toy

## 9.7 Step 7: Post-Processing

## 9.8 Injection Moulding Materials

### 9.8.1 *Acrylonitrile Butadiene Styrene (ABS)*

### 9.8.2 *Nylon*

### 9.8.3 *High-Density Polyethylene (HDPE)*

### 9.8.4 *Low-Density Polyethylene (LDPE)*

- 9.8.5    *Polycarbonate (PC)*
- 9.8.6    *Polyoxymethylene (POM)*
- 9.8.7    *Acrylic Poly (Methyl Methacrylate) (PMMA)*
- 9.8.8    *Thermoplastic Polyurethane (TPU)*
- 9.8.9    *Thermoplastic Rubber (TPR)*
- 9.8.10   *Polypropylene (PP)*

## 9.9      Properties of Injection Moulding Materials

# 10. Blow Moulding

- 10.1    History of Blow Moulding
- 10.2    How Does Blow Moulding Plastics Work?
- 10.3    Material used in Blow Molding
  - 10.3.1   *Thermoplastics*
  - 10.3.2   *Nylon (PA)*
  - 10.3.3   *Specialty Materials*
- 10.4    Advantages of Blow Moulding
  - 10.4.1   *Advanced Technology*
  - 10.4.2   *Variety of Products*
  - 10.4.3   *Cost Efficient*
  - 10.4.4   *Multiple Production Methods*
  - 10.4.5   *High Productivity*
  - 10.4.6   *Blow Molding Disadvantages*
  - 10.4.7   *Machinery and Equipment used in Blow Moulding*
  - 10.4.8   *Common Defects and Troubleshooting*

# 11. Different Types of Blow Moulding

- 11.1    Continuous Extrusion Blow Moulding

11.2 Intermittent Extrusion Blow Moulding

11.3 Injection Blow Moulding

11.4 Injection Stretch Blow Moulding

11.5 Extrusion Stretch Blow Moulding

## **12. Quality Control and Safety Concerns in Plastic Toys Manufacturing**

12.1 Introduction

12.2 Understanding the Importance of Quality Control in Toys Manufacturing

12.3 Regulatory and Safety Standards

*12.3.1 International Standards*

*12.3.2 Indian Standards*

*12.3.3 Other Notable Certifications*

12.4 Material Selection and Control

*12.4.1 Types of Plastics Used*

*12.4.2 Hazardous Chemicals and Additives*

*12.4.3 Material Testing Protocols*

12.5 In-Process Quality Control

*12.5.1 Moulding and Shaping*

*12.5.2 Trimming and Finishing*

*12.5.3 Painting and Decoration*

*12.5.4 Assembly and Welding*

*12.5.5 Automated Inspection Systems*

12.6 Physical and Mechanical Testing

*12.6.1 Drop Test*

*12.6.2 Torque and Tension Test*

*12.6.3 Compression Test*

12.6.4 *Small Parts Cylinder Test*

12.6.5 *Bite and Impact Resistance*

## 12.7 Chemical and Toxicology Testing

12.7.1 *Heavy Metal Testing*

12.7.2 *Phthalate Testing*

12.7.3 *Dye and Pigment Testing*

12.7.4 *Saliva and Sweat Resistance*

## 12.8 Microbial and Hygiene Control

## 12.9 Electrical Safety for Plastic Toys

## 12.10 Packaging and Labelling Requirements

12.10.1 *Child-Safe Packaging*

12.10.2 *Mandatory Labels*

## 12.11 Traceability and Batch Control

12.11.1 *Barcode and QR-Based Tracking*

12.11.2 *Batch Testing Records*

12.11.3 *Recall Readiness*

## 12.12 Common Defects and Preventive Measures

## 12.13 Safety Audits and Compliance Checklists

12.13.1 *Internal QC Audits*

12.13.2 *Third-Party Certifications*

12.13.3 *Government Inspection*

## 12.14 Safety in Manufacturing Environment

12.14.1 *Worker Safety*

12.14.2 *Machine Safety*

## 12.15 Technological Advances in QC and Safety

*12.15.1 AI and Machine Learning*

*12.15.2 Internet of Things (IoT)*

*12.15.3 Blockchain for Traceability*

## 12.16 Environmental and Ethical Considerations

*12.16.1 Sustainable Materials*

*12.16.2 Ethical Sourcing*

## 13. Silicone Toys

13.1 Introduction

13.2 What is Silicone?

13.3 How Silicone Rubber is Made?

13.4 Isolating Silicon from Silica

13.5 Compounding

13.6 Final Form

13.7 Common Silicone Rubber Additives and Their Roles

13.8 Vulcanization

13.9 Properties of Silicone

*13.9.1 Non-Toxic and Safe*

*13.9.2 Durable and Long-Lasting*

*13.9.3 Flexible and Lightweight*

*13.9.4 Resistant to Heat and Cold*

*13.9.5 Easy to Clean*

*13.9.6 Environmentally Friendly*

*13.9.7 Hypoallergenic*

13.10 Type of Silicone Toys

*13.10.1 Teething Toys*

13.10.2 *Stacking and Puzzle Toys*

13.10.3 *Bath and Water Play Toys*

13.10.4 *Fidget and Stress-Relief Toys*

## **14. Manufacturing Process of Silicone Toys**

14.1 Introduction

14.2 Understanding Silicone as a Revolutionary Material

14.3 Material Selection and Procurement

14.4 Manufacturing Formula for Silicone Toys (Platinum-Cured LSR Type)

14.4.1 *Base Composition (Two-Part Silicone System)*

14.4.2 *Optional Additives (Depending on Application & Flexibility Needed)*

14.3 Basic Processing Steps

14.4 Silicone Mixing and Pigmenting

14.5 Mould Preparation

14.6 Injection Moulding and Compression Moulding

14.7 Vulcanization (Curing)

14.8 Demoulding

14.9 Surface Finishing and Quality Control

14.10 Cleaning and Sterilization

14.11 Packaging and Labelling

14.12 Environmental Considerations and Sustainability

14.13 Future Trends and Innovations

## **15. Machinery Used in Silicone Toys Manufacturing**

15.1 Injection Moulding Machines

15.2 Advantages of Silicone Injection Moulding

15.2.1 *Design Flexibility*

15.2.2 *High Quality and Consistency*

15.2.3 *Material Characteristics*

15.2.4 *High Production Efficiency*

15.2.5 *Flexibility and Design Freedom*

### 15.3 3D Printing Machines

### 15.4 Advantages of Using 3D Printing Machines

15.4.1 *Rapid Prototyping*

15.4.2 *Cost Efficiency*

15.4.3 *Design Flexibility*

15.4.4 *High Precision Master Patterns*

15.4.5 *Faster Mould Fabrication*

15.4.6 *Design Validation and Testing*

15.4.7 *Innovation and R&D Support*

15.4.8 *Integration with Digital Workflow*

15.4.9 *Eco-Friendly and Sustainable*

### 15.5 Mixing and Pumping Machines

### 15.6 Advantages of Using Mixing and Pumping Machines

15.6.1 *Accurate Material Ratio Control*

15.6.2 *Homogeneous and Bubble-Free Mixing*

15.6.3 *Consistent Product Quality*

15.6.4 *Enhanced Production Efficiency*

15.6.5 *Waste Minimization*

15.6.6 *Cleaner and Safer Work Environment*

15.6.7 *Seamless Mold Integration*

15.6.8 *Customization and Scalability*

15.6.9 *Reduced Labor Dependency*

15.6.10 *Long-Term Cost Savings*

## **16. Quality Control and Safety Concerns in Silicone Toys Manufacturing**

16.1 Introduction

16.2 Why Silicone Toys Require Special Attention

16.3 Types of Silicone Used in Toys

16.3.1 *Food-Grade Silicone*

16.3.2 *Medical-Grade Silicone*

16.3.3 *Platinum-Cured vs. Peroxide-Cured Silicone*

16.4 Regulatory and Safety Standards

16.4.1 *Global Toys Safety Regulations*

16.4.2 *Food Contact and Medical Use Standards*

16.4.3 *Voluntary Certifications*

16.5 Raw Material Quality Control

16.5.1 *Silicone Rubber Inspection*

16.5.2 *Colorants and Additives*

16.5.3 *Testing of Incoming Materials*

16.6 Manufacturing Process Control

16.6.1 *Mixing and Dispersion*

16.6.2 *Moulding and Curing*

16.6.3 *Demoulding and Trimming*

16.6.4 *Post-Curing*

16.7 Physical, Mechanical, and Chemical Testing

16.7.1 *Physical Testing*

16.7.2 *Thermal and Environmental Testing*

16.7.3 *Chemical Safety Testing*

16.7.4 *Biocompatibility Tests*

16.8 Microbiological Quality Control

16.9 Labelling and Consumer Information

16.9.1 *Label Requirements*

16.9.2 *Packaging Standards*

16.10 Traceability and Batch Management

16.10.1 *Lot Coding and Traceable Manufacturing*

16.10.2 *Quality Documentation*

16.11 Common Defects and Their Prevention

16.12 Safety in Factory Operations

16.12.1 *Worker Safety*

16.12.2 *Equipment Safety*

16.13 Third-Party and Government Audits

16.14 Environmental and Ethical Considerations

16.14.1 *Eco-Friendly Silicone*

16.14.2 *Ethical Manufacturing*

## **17. Wooden Toys**

17.1 Introduction

17.2 A Timeless Legacy: The Historical Evolution of Wooden Toys

17.2.1 *Ancient Origins (3000 BCE – 500 CE)*

17.2.2 *Medieval to Renaissance Period (500 – 1700 CE)*

17.2.3 *Industrial Revolution and Mass Production (1700 – 1900)*

17.2.4 *Twentieth Century Shifts and Challenges*

17.2.5 *Overview the Wooden Toys*

**18. Types of Wooden Toys**

18.1 Types of Wooden Toys

18.1.1 *Building Blocks and Construction Sets*

18.1.2 *Puzzles*

18.1.3 *Role-Play and Imaginative Play Sets*

18.1.4 *Vehicles and Transport Toys*

18.1.5 *Educational Toys*

18.1.6 *Musical Instruments*

18.1.7 *Artistic and Unique Toys*

18.1.8 *Games and Classic Toys*

18.2 Raw Material Used In Wooden

18.2.1 *Primary Wood Materials*

18.2.2 *Wood Processing Materials*

18.2.3 *Finishing Materials*

18.2.4 *Hardware and Accessories*

**19. Manufacturing Process of Wooden Toys Manufacturing**

19.1 Procurement and Preparation of Raw Material

19.2 Design and Planning

19.3 Cutting and Shaping

19.4 Sanding and Smoothing

19.5 Assembly (If Required)

19.6 Coating, Painting, and Decoration

19.7 Finishing

19.8 Packaging

19.9 Materials used in Wooden Toys Manufacturing

19.9.1 *Primary Wood Materials*

19.9.2 *Wood Processing Materials*

19.9.3 *Finishing Materials*

19.9.4 *Hardware and Accessories*

## **20. Machinery Used in Wooden Toys Manufacturing**

20.1 CNC Machine

20.2 What Are Common Wood CNC Machining Techniques?

20.3 Wood Lathe Machine

20.4 Drill Press Machine

20.5 Veneer Peeling

## **21. Traditional Wooden Toys**

21.1 Introduction

21.2 Different Types of Traditional Wooden Toys

21.2.1 *Channapatna Toys (Karnataka)*

21.2.2 *Kondapalli Toys (Andhra Pradesh)*

21.2.3 *Lattu or Spinning Top (All India)*

21.2.4 *Wooden Bullock Cart (Rural India)*

21.2.5 *Etikoppaka Toys (Andhra Pradesh)*

21.2.6 *Pinguli Chitrakathi Figures (Maharashtra)*

21.2.7 *Bamboo and Cloth Toys (Northeast India)*

21.2.8 *Traditional Gilli Danda Set*

## **22. Manufacturing Process of Kondapalli Toys**

22.1 Key Characteristics of Kondapalli Toys

22.1.1 *Material and Craftsmanship*

22.1.2 *Themes and Designs*

22.1.3 *Cultural and Historical Significance*

22.1.4 *Environmental and Economic Aspects*

## 22.2 Manufacturing Process of Kondapalli Toys

22.2.1 *Stage 1: Raw Material Preparation*

22.2.2 *Stage 2: Design Planning and Template Creation*

22.2.3 *Stage 3: Primary Carving Process*

22.2.4 *Stage 4: Assembly Process*

22.2.5 *Stage 5: Surface Treatment and Priming*

22.2.6 *Stage 6: Painting and Decoration*

22.2.7 *Stage 7: Finishing and Quality Control*

22.2.8 *Stage 8: Packaging and Documentation*

## 23. Manufacturing Process of Etikoppaka Toys

### 23.1 Properties of Etikoppaka Wooden Toys

23.1.1 *Material and Sustainability*

23.1.2 *Craftsmanship and Design*

23.1.3 *Cultural Significance*

### 23.2 Manufacturing Process of Etikoppaka Wooden Toys

23.2.1 *Selection of Raw Material*

23.2.2 *Cutting and Sizing the Wood*

23.2.3 *Lathe Turning (Tharini Technique)*

23.2.4 *Sanding and Smoothing*

23.2.5 *Application of Natural Dyes*

23.2.6 *Lacquering (Colour Application on the Lathe)*

23.2.7 *Assembly (for Multicomponent Toys)*

23.2.8 *Final Polishing and Quality Check*

23.2.9 *Packaging*

23.3 Sustainability and Safety

## **24. Manufacturing Process of Channapatna Toys**

24.1 Properties of Channapatna Toys

24.1.1 *Handcrafted Wooden Toys*

24.1.2 *Eco-Friendly Materials*

24.1.3 *Bright and Vibrant Colours*

24.1.4 *Smooth Finish*

24.1.5 *Durability*

24.1.6 *Variety of Designs*

24.1.7 *Educational Value*

24.1.8 *Geographical Indication (GI) Tag*

24.1.9 *Sustainable Craft*

24.1.10 *Cultural Significance*

24.2 Manufacturing Process of Channapatna Wooden Toys

24.2.1 *Raw Material Procurement and Preparation*

24.2.2 *Wood Cutting and Shaping*

24.2.3 *Lac Preparation Process*

24.2.4 *Lacquer Application and Finishing*

24.2.5 *Assembly-Line Production System*

24.2.6 *Final Assembly and Detailing*

24.2.7 *Cultural and Environmental Significance*

24.3 Profitability of Entering the Channapatna Toys Industry

24.4 Opportunities for Profitability

## **25. Quality and Safety Control in Wooden Toys Production**

25.1 Introduction

25.2 Understanding Quality in Wooden Toys Manufacturing

25.3 Regulatory Landscape: Safety Standards for Wooden Toys

25.4 Raw Material Quality Control

*25.4.1 Wood Selection*

*25.4.2 Sourcing and Sustainability*

25.5 Manufacturing Process Quality Control

*25.5.1 Cutting and Shaping*

*25.5.2 Sanding and Surface Preparation*

*25.5.3 Assembly and Joinery*

25.6 Painting, Coloring, and Coating Safety

*25.6.1 Paint Selection*

*25.6.2 Paint Room Setup*

*25.6.3 Coating and Sealing*

25.7 Mechanical and Physical Safety Controls

25.8 Chemical Safety Testing

25.9 Final Inspection and Quality Assurance Protocols

25.10 Traceability and Batch Documentation

25.11 Packaging Safety Standards

25.12 Quality Control Personnel and Training

25.13 Common Defects and Remedial Actions

## **26. Rubber Toys**

### 26.1 Introduction

### 26.2 History of Rubber Toys

*26.2.1 Pre-1839: The Era before Vulcanization*

*26.2.2 1839: Invention of Vulcanization*

*26.2.3 Mid to Late 1800s: Early Rubber Toys*

*26.2.4 Early 20th Century: Popularity and Innovation*

*26.2.5 1940s–1950s: War, Shortage & Synthetic Rubber*

*26.2.6 1960s–1980s: Expansion and Global Reach*

*26.2.7 1990s–Present: Safety, Sustainability & Innovation*

*26.2.8 Current Trends and Cultural Relevance*

### 26.3 Advantages of Entering In Rubber Toys Manufacturing Industry

## **27. Manufacturing Process of Rubber Toys**

### 27.1 Compression Moulding Process

### 27.2 Injection Moulding Process

### 27.3 Latex Dipping Process

### 27.4 Rotational Moulding Process

### 27.5 Blow Moulding Process

### 27.6 Quality Assurance & Testing Protocols

*27.6.1 Physical Testing*

*27.6.2 Chemical Safety Testing*

*27.6.3 Mechanical Testing*

### 27.7 Environmental and Sustainability Aspects

*27.7.1 Eco-Friendly Material Use*

27.7.2 *Waste Minimization Techniques*

27.7.3 *Product Lifecycle and Recycling*

## 27.8 Emerging Innovations in Rubber Toys Manufacturing

27.8.1 *3D Printing Applications*

27.8.2 *Smart Materials*

27.8.3 *Advanced Surface Technology*

## 28. Quality and Safety Control for Rubber Toys Production

### 28.1 Material Selection and Testing in Rubber Toys Production

#### 28.2 Key Considerations for Material Selection

28.2.1 *Non-Toxic Raw Materials*

28.2.2 *Supplier Qualification*

28.2.3 *Prohibited and Restricted Substances*

28.2.4 *Chemical Testing*

28.2.5 *Physical and Mechanical Properties*

28.2.6 *Colorants and Additives Testing*

28.2.7 *Documentation and Traceability*

### 28.3 Prototyping and Design Validation in Rubber Toys Production

28.3.1 *Conceptual Design and Modeling*

28.3.2 *Material Selection*

28.3.3 *Prototype Fabrication*

28.3.4 *Refinement and Iterative Development*

### 28.4 Design Validation and Safety Testing

28.4.1 *Physical and Mechanical Testing*

28.4.2 *Choking Hazard Assessment*

### 28.5 Risk Assessment and Compliance

28.5.1 *Age Appropriateness and Hazards*

28.5.2 *Iterative Design Review*

28.6 In-Process Testing

28.7 Performance and Mechanical Testing

28.7.1 *Mechanical Testing*

28.7.2 *Performance Testing*

28.7.3 *Standards and Compliance*

28.7.4 *Quality Control*

## **29. Soft Toys**

29.1 Introduction

29.2 The History of Soft Toys

29.2.1 *Ancient Origins*

29.3 The Birth of Modern Soft Animals

29.4 The Teddy Bear Revolution

29.4.1 *The American Story*

29.4.2 *The German Story*

29.5 Evolution through the Decades

29.5.1 *Early 20th Century (1900s-1940s)*

29.5.2 *Mid-Century (1950s-1970s)*

29.5.3 *The Collectible Era (1980s-1990s)*

29.5.4 *Modern Era (2000s-Present)*

29.6 Key Benefits of Entering the Soft Toys Manufacturing Industry

29.6.1 *Growing Market Demand*

29.6.2 *High Emotional Value & Repeat Purchase Potential*

29.6.3 *Relatively Low Entry Barriers*

29.6.4 *Diversified Consumer Segments*

29.6.5 *Strong E-Commerce Growth*

29.6.6 *Customization & Niche Branding*

29.6.7 *Export Potential*

29.6.8 *Eco-Friendly & Sustainable Product Demand*

29.6.9 *Collaborations & Licensing Opportunities*

29.6.10 *Resilience in Economic Downturns*

### **30. Manufacturing Process of Soft/Plush Toys**

30.1 Ordering Plush Material from Fabric Mills

30.2 Fabric Cutting Methods for Plush Manufacturing

30.3 Pattern Printing

30.4 Plush Embroidery

30.5 Sewing

30.6 Stuffing the Plush Toy Shell

30.7 Needlework Sewing and Hand Shaping

30.8 Quality Inspection for Bulk Plush Toys

30.9 Attaching Hang Tags & Packaging

### **31. Machinery Used in Soft Toys Manufacturing**

31.1 Fabric Cutting Machines

31.1.1 *Computerized Fabric Cutting Machines (CNC Fabric Cutters)*

31.1.2 *Manual Fabric Cutting Machines*

31.2 Sewing and Stitching Machines

31.2.1 *Flatbed Industrial Sewing Machines*

31.2.2 *Overlock or Serger Machines*

31.2.3 *Zig-Zag Stitching Machines*

31.2.4 *Post-Bed and Cylinder-Bed Machines*

31.2.5 *Programmable Pattern Sewing Machines*

### 31.3 Embroidery Machines

31.3.1 *Single-Head Embroidery Machines*

31.3.2 *Multi-Head Embroidery Machines*

31.3.3 *Advantages*

### 31.4 Stuffing Machines

31.4.1 *Fibre Stuffing Machines*

31.4.2 *Weighing & Dispensing Units*

31.4.3 *Manual Stuffing Guns*

### 31.5 Heat Sealing and Ultrasonic Machines

31.5.1 *Ultrasonic Welding Machines*

31.5.2 *Heat Press Machines*

### 31.6 Closing Stitch Machines

31.6.1 *Blind Stitch Machines*

31.6.2 *Handheld Bag Closing Machines*

### 31.7 Labelling and Tagging Machines

31.7.1 *Tagging Machines*

31.7.2 *Heat Transfer Labelling Machines*

### 31.8 Metal Detection and Quality Control Equipment

31.8.1 *Needle/Metal Detectors*

31.8.2 *Visual Inspection Conveyor Systems*

### 31.9 Toy Finishing Equipment

31.9.1 *Brushing Machines*

31.9.2 *Air Blowers*

31.9.3 *Steamers and Pressing Tables*

31.10 Packing and Compression Machines

31.10.1 *Vacuum Compression Machines*

31.10.2 *Shrink Wrapping Machines*

31.10.3 *Carton Sealing and Labeling Machines*

31.11 Robotic and Conveyor Integration

31.12 Additional Supporting Equipment

31.12.1 *Humidity Control Systems*

31.12.2 *CAD Design Stations*

31.12.3 *ERP and Production Management Software*

31.13 Safety Standards and Certification Machinery

**32. Manufacturing of Electronic Toys**

32.1 Introduction

32.2 Market Research and Concept Development

32.3 3D Modelling and Computer-Aided Design (CAD)

32.4 Prototype Development and Testing

32.5 Electronic Circuit Design

32.6 Safety Compliance and Regulatory Requirements

32.7 Intellectual Property Rights and Patent Strategy

32.8 Quality Assurance and Safety Standards

32.8.1 *International Safety Standards*

32.9 Quality Management Systems (QMS)

32.10 Testing Protocols

32.11 Continuous Improvement Practices

**33. Manufacturing Process of Electronic Toys**

- 33.1 Injection Moulding Machines
- 33.2 Electronic Assembly Equipment
- 33.3 Testing and Quality Control Equipment
- 33.4 Packaging Machinery
- 33.5 Usability and Operational Aspects of Manufacturing Equipment
- 33.6 Infrastructure and Support Systems
- 33.7 Step-by-Step Manufacturing Process
  - 33.7.1 *Plastic Component Manufacturing*
  - 33.7.2 *Electronic Component Assembly*
  - 33.7.3 *Mechanical Assembly*

## **34. Materials and Components for Electronic Toys**

- 34.1 Plastic Materials
- 34.2 Electronic Components
  - 34.2.1 *Microcontrollers (MCUs)*
  - 34.2.2 *Sensors*
  - 34.2.3 *Actuators*
  - 34.2.4 *Power Management Systems and Batteries*
  - 34.2.5 *Wireless Communication Modules*
  - 34.2.6 *Memory and Data Storage Components*
  - 34.2.7 *Passive Components*
- 34.3 Hardware Components
- 34.4 Packaging Materials
- 34.5 Quality Standards for Materials

## **35. Machinery and Equipment Overview for Electronic Toys Production**

- 35.1 Plastic Component Manufacturing
- 35.2 Electronic Component Assembly (SMT & THT)
- 35.3 Inspection and Testing Equipment
- 35.4 Mechanical & Safety Testing
- 35.5 Packaging Systems
- 35.6 Material Handling & Utilities

## **36. Packaging and Distribution for Electronic Toys**

- 36.1 Packaging Design Considerations
- 36.2 Automated Packaging Processes
- 36.3 Quality Control in Packaging
- 36.4 Distribution and Logistics

## **37. Magnetic Toys**

- 37.1 Properties of Magnetic Toys
  - 37.1.1 *Magnetic Attraction and Repulsion*
  - 37.1.2 *Polarity Awareness*
  - 37.1.3 *Conductivity and Safety Coating*
  - 37.1.4 *Strength of Magnets*
  - 37.1.5 *Durability and Flexibility*
  - 37.1.6 *Reusability and Reconfiguration*
  - 37.1.7 *Interactive Learning*
  - 37.1.8 *Multi-Sensory Appeal*
  - 37.1.9 *Compatibility*
- 37.2 Key Benefits of Entering the Magnetic Toy Industry
  - 37.2.1 *Strong Market Growth and Demand*
  - 37.2.2 *Alignment with Educational Trends*

37.2.3 *Developmental and Educational Benefits*

37.2.4 *Broad Appeal and Versatility*

37.2.5 *Positive Social Impact*

### 37.3 Key Challenges in the Magnetic Toy Industry

37.3.1 *Safety and Regulatory Compliance*

37.3.2 *Counterfeiting and Intellectual Property Protection*

37.3.3 *Manufacturing and Material Costs*

37.3.4 *Market and Inventory Management*

37.3.5 *Administrative and Legal Burdens*

37.3.6 *Product Design and Innovation*

## 38. Manufacturing Process of Magnetic Toys

38.1 Raw Material Selection and Magnet Fabrication

38.2 Magnet Compaction and Sintering

38.3 Machining and Finishing of Magnets

38.4 Plastic Component Production

38.5 Assembly Line Integration

38.6 Quality Control and Safety Assurance

38.7 Advanced Manufacturing Technologies

38.8 Sustainability and Environmental Responsibility

38.9 Use of Injection Moulding in Magnetic Toy Manufacturing

## 39. Machinery Used in Magnetic Toys Manufacturing

39.1 Injection Moulding Machines

39.1.1 *Advantages*

39.1.2 *Types of Machines Used*

39.2 3D Printing Machines

39.2.1 *Role in Magnetic Toy Prototyping*

39.2.2 *Advantages*

39.2.3 *Technologies Commonly Used*

### 39.3 Magnet Insertion and Encapsulation Equipment

39.3.1 *Criticality of Magnet Handling*

39.3.2 *Core Functions and Benefits*

39.3.3 *Types of Equipment Deployed*

### 39.4 Assembly Line Equipment

39.4.1 *Automation for Consistency and Safety*

39.4.2 *Key Tools and Subsystems*

39.4.3 *Assembly Line Configurations*

### 39.5 Safety and Quality Testing Machinery

39.5.1 *Rationale for Stringent Testing*

39.5.2 *Primary Testing Tools*

### 39.6 Packaging and Labeling Machinery

39.6.1 *Final Step: Secure, Informative Packaging*

39.6.2 *Core Equipment*

### 39.7 Conclusion

## 40. Manufacturing Process of Magnetic Toys

40.1 Raw Material Selection and Magnet Fabrication

40.2 Magnet Compaction and Sintering

40.3 Machining and Finishing of Magnets

40.4 Plastic Component Production

40.5 Assembly Line Integration

40.6 Quality Control and Safety Assurance

- 40.7 Advanced Manufacturing Technologies
- 40.8 Sustainability and Environmental Responsibility
- 40.9 Use of Injection Moulding in Magnetic Toy Manufacturing

## **41. Quality Control and Safety Concerns for Magnetic Toys**

- 41.1 Introduction
- 41.2 Raw Material Safety and Compliance
- 41.3 Magnet Strength and Retention Testing
- 41.4 Small Parts and Choking Hazard Assessment
- 41.5 Chemical and Toxicity Testing
- 41.6 Mechanical Durability Testing
- 41.7 Lifecycle and Fatigue Simulation
- 41.8 Magnetic Flux Density Compliance
- 41.9 Sharp Point and Edge Testing
- 41.10 Packaging and Labelling Quality Assurance
- 41.11 Final Random Inspection (FRI) and AQL Sampling
- 41.12 Documentation and Compliance Records
- 41.13 Risk Mitigation and Continuous Improvement

## **42. Metal/Die Casting Toys**

- 42.1 Types of Die Casting
- 42.2 Hot Chamber Die Casting
- 42.3 Cold Chamber Die Casting
- 42.4 Variations of the Die Casting Process

*42.4.1 Gravity Die Casting*

*42.4.2 Pressure Die Casting*

*42.4.3 Vacuum Die Casting*

42.4.4 *Squeeze Die Casting*

42.4.5 *Semisolid Die Casting*

## 42.5 Metal Materials Used in Die Casting

42.5.1 *Zinc Alloys*

42.5.2 *Aluminum Alloys*

42.5.3 *Magnesium Alloys*

42.5.4 *Copper-Based Alloys (Bronze and Brass)*

42.5.5 *Lead and Tin-Based Alloys (Limited Use)*

## 42.6 Considerations When Choosing a Die Casting Material

42.6.1 *Mechanical Requirements*

42.6.2 *Weight Constraints*

42.6.3 *Corrosion Resistance*

42.6.4 *Production Volume*

42.6.5 *Finish and Aesthetics*

42.6.6 *Cost Efficiency*

## 43. Manufacturing Process of Metal and Die-Cast Toys

43.1 Design and CAD Modelling

43.2 Prototyping

43.3 Die and Mould Making

43.4 Metal Melting and Die Casting

43.5 Trimming and Flash Removal

43.6 Surface Finishing

43.7 Painting and Surface Coating

43.8 Assembly and Integration

43.9 Quality Control and Testing

## **44. Quality and Safety Control in Metal/Die-Cast Toys Manufacturing**

### 44.1 Introduction

### 44.2 Overview of Metal and Die-Cast Toys Manufacturing

### 44.3 Regulatory Standards and Certifications

### 44.4 Raw Material Quality Control

#### *44.4.1 Metal Alloys*

#### *44.4.2 Tests & Checks*

#### *44.4.3 Mould Material*

### 44.5 Die Casting Process Control

#### *44.5.1 Melting and Alloying*

#### *44.5.2 Injection & Moulding*

#### *44.5.3 Ejection and Deburring*

#### *44.5.4 Quality Measures*

### 44.6 Surface Treatment and Coating Safety

#### *44.6.1 Surface Finishing*

#### *44.6.2 Key Checks*

#### *44.6.3 Painting and Coating*

#### *44.6.4 Paint Safety Tests*

### 44.7 Mechanical and Structural Safety Testing

#### *44.7.1 Choking and Swallowing Hazards*

#### *44.7.2 Load and Impact Tests*

#### *44.7.3 Sharp Edge and Point Testing*

#### *44.7.4 Torque and Tension Testing*

### 44.8 Chemical and Toxicological Safety

#### *44.8.1 Chemical Testing Protocols*

### 44.9 Electronics and Battery Safety (for Motorized Metal Toys)

#### *44.9.1 Electrical Safety Considerations*

#### *44.9.2 Battery Safety Tests*

### 44.10 Final Quality Assurance and Inspection

#### *44.10.1 Inspection Checklist*

#### *44.10.2 QC Tools*

### 44.11 Traceability and Batch Control

### 44.12 Packaging and Logistics Safety

### 44.13 Common Quality Defects and Remedies

### 44.14 Environmental and Worker Safety Integration

## **45. BIS Specifications**

## **46. Factory Layouts for Toys Manufacturing**

## **47. Factory Layout Description**

### 47.1 Introduction

### 47.2 Administrative and Support Infrastructure

### 47.3 Raw Material Storage and Handling Zone

### 47.4 Pre-Processing and Material Preparation Section

### 47.5 Main Manufacturing Floor

### 47.6 Quality Assurance and Inspection

### 47.7 Packaging and Labelling Section

### 47.8 Finished Goods Warehouse and Dispatch

### 47.9 Utilities and Maintenance

### 47.10 Conclusion

## **48. Process Flow Diagrams**

#### 49. Photographs of Machinery with Supplier Details

- Industrial Alu-alu Blister Machine - Automatic Grade
- Automatic Toy Filling Machine
- Webbing Cutting Machine
- Toy Stuffing Machine / Plush Toy Filling Machine / Teddy Bear Making Machine
- Cold Chamber Pressure Die Casting Machines
- Hot Chamber Pressure Die Casting Machines
- High Pressure Die Casting Machine
- Roller Conveyor System
- Artificial Intelligence Lockstitch Machine
- Embroidery Machine
- Plastic Toy Manufacturing Machine
- Toy Making Blow Moulding Machine
- CNC Lathe Machine
- Lockstitch, Automatic Welting Machine
- Industrial Alu-alu Blister Machine - Automatic Grade
- Aluminium Rotary Furnace
- Injection Moulding Machine
- Ram Type Injection Moulding Machine
- Multicolour Blow Moulding Machine

#### 50. References

## About NIIR

**NIIR PROJECT CONSULTANCY SERVICES (NPCS)** is a reliable name in the industrial world for offering integrated technical consultancy services. NPCS is manned by engineers, planners, specialists, financial experts, economic analysts and design specialists with extensive experience in the related industries.

Our various services are: Detailed Project Report, Business Plan for Manufacturing Plant, Start-up Ideas, Business Ideas for Entrepreneurs, Start up Business Opportunities, entrepreneurship projects, Successful Business Plan, Industry Trends, Market Research, Manufacturing Process, Machinery, Raw Materials, project report, Cost and Revenue, Pre-feasibility study for Profitable Manufacturing Business, Project Identification, Project Feasibility and Market Study, Identification of Profitable Industrial Project Opportunities, Business Opportunities, Investment Opportunities for Most Profitable Business in India, Manufacturing Business Ideas, Preparation of Project Profile, Pre-Investment and Pre-Feasibility Study, Market Research Study, Preparation of Techno-Economic Feasibility Report, Identification and Section of Plant, Process, Equipment, General Guidance, Startup Help, Technical and Commercial Counseling for setting up new industrial project and Most Profitable Small Scale Business.

NPCS also publishes various process technology, technical, reference, self employment and startup books, directory, business and industry database, bankable detailed project report, market research report on various industries, small scale industry and profit making business. Besides being used by manufacturers, industrialists and entrepreneurs, our publications are also used by professionals including project engineers, information services bureau, consultants and project consultancy firms as one of the input in their research.

Our Detailed Project report aims at providing all the critical data required by any entrepreneur vying to venture into Project. While expanding a current business or while venturing into new business, entrepreneurs are often faced with the dilemma of zeroing in on a suitable product/line.

---

**NIIR PROJECT CONSULTANCY SERVICES**, 106-E, Kamla Nagar, New Delhi-110007, India.  
**Email:** [npcs.india@gmail.com](mailto:npcs.india@gmail.com) **Website:** [NIIR.org](http://NIIR.org)

Sat, 10 Jan 2026 03:14:39 +0000