LTI
Let's Solve

Whitepaper

Packing Systems:

A Critical part of OEM Supply Chain

Authors: Anuradha Katti & Rehbar Rahman

L&T | A Larsen & Toubro Group Company

Contents

1 Abstract

In the past decade, Automotive Industry has grown as an active sector, and forecasts suggest there is much more to come. The globalization of automotive industry has phenomenally accelerated during the latter half of the 1990s due to the construction of important overseas facilities and establishment of mergers between giant multinational automakers. In the auto industry, a large proportion of revenue comes from selling automobiles.

The parts market, however, is even more lucrative. About 88.1 million cars and light commercial vehicles were sold worldwide in 2016. Global car sales are expected to exceed 100 million units by 2020. Every year, automobile companies update their models. This is a part of normal operations, but there can be a problem when a company decides to significantly change the design of a model, and there arises a need to change the packaging for the same. It is crucial to have packaging solutions that deliver ultimate protection for high value goods and parts. Right from engines to small mechanical elements to interior items, the production of a vehicle requires thousands of different components. Therefore, it should come as no surprise that the automobile industry accounts for over 40% of all the industrial and transport packaging that is needed worldwide.

Original Equipment Manufacturers (OEM) supply parts to automotive manufacturers. Packaging is an indispensable part of this transaction between the OEM and plant. Similar to parts, packaging material has to go through its own life cycle comprising of inception, design, mass production and use & build out.

This paper presents an understanding of the Packaging Lifecycle in an automotive industry, and key aspects that need to be taken into account in order to design a comprehensive packaging solution.

2 Current Scenario of Automotive Industry

Automobiles are assembled using parts that are transported by Suppliers from varying distances.

A typical supply chain in Automotive industry includes, component suppliers (Tier 1, 2, 3), OEMs (car manufacturers), distributors, dealers (retailers) and customers:

- **Tier 1 suppliers**- mainly global world players - with own production or assembly capacities established close to OEM.

- **Tier 1 suppliers have their own Tier 2 suppliers that procure parts for these assembly units–** companies with own production or assembly plants establish close to 1-Tier suppliers.

- **Tier 3 suppliers** are local home companies that fulfil mainly quality and volume conditions of Tier 2 suppliers.

An OEM typically has around 300+ Part suppliers, who supply around 11,000+ parts. Suppliers need to cater to the Just-In-Time (JIT) and Just-In-Sequence (JIS) needs of OEMs. It is imperative that the parts reach the destination in an immaculate condition.

Hence, there is need for robust packaging system to ensure that parts reach their destination in the desired condition. The best packaging solutions optimize the usage of space, so that all products can be easily packed and stacked. This helps reduce packaging waste, cost and make for lighter weight packaging that is easier and cheaper to transport.
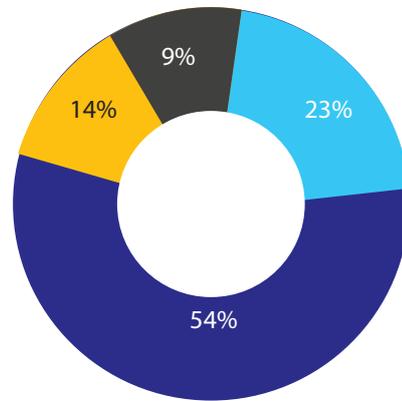
Fig. 1 Supplier percentage breakdown: Tier- based
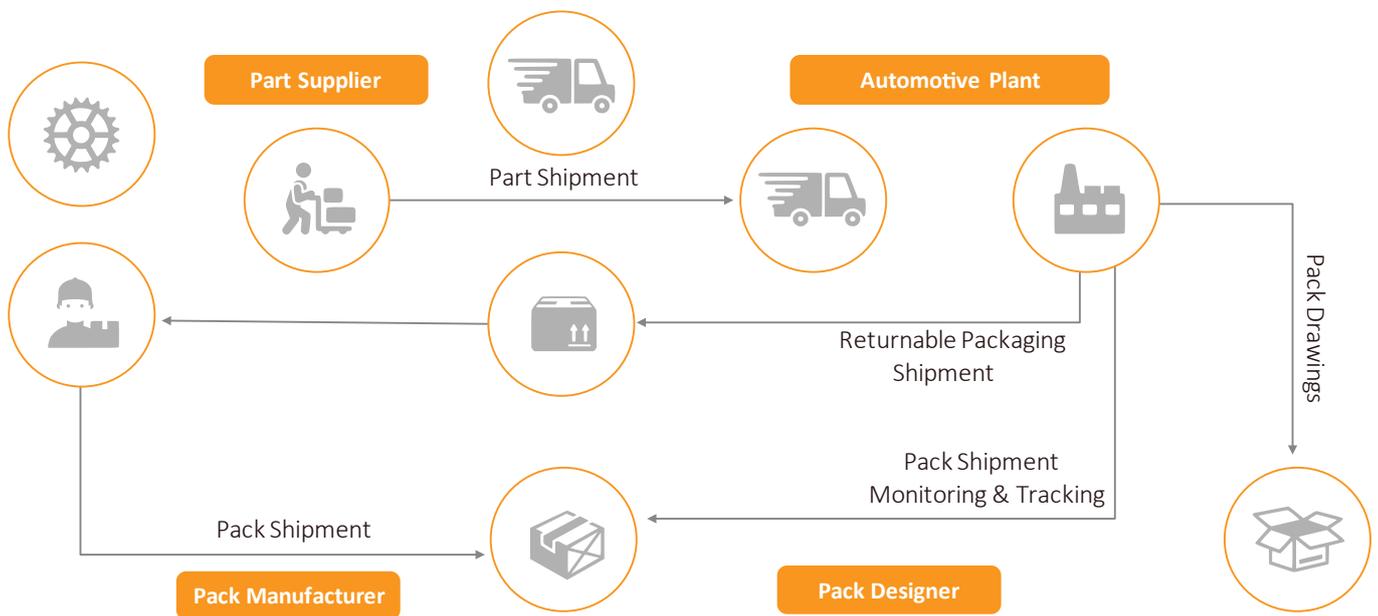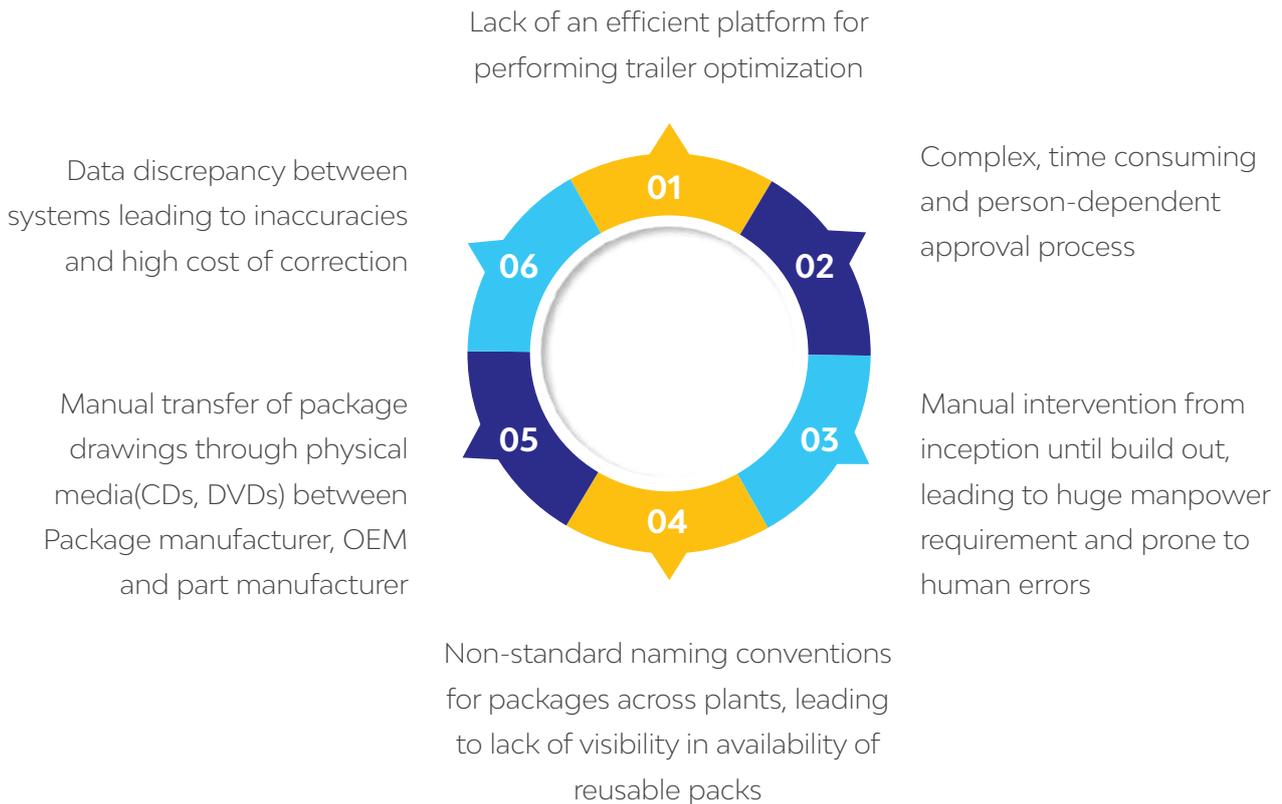
3   Key Stakeholders in the Packaging Lifecycle

Fig. 2 Key Stakeholders

- **OEM** (Part Supplier) supplies parts to the automotive plant

- Pack Designer supplies the pack drawings to the automotive plant as per the requirements

- Pack Manufacturer does mass production of packages, and ships it to the Automotive plant, or the OEM

4 Challenges faced by Automotive Manufacturers

LTI has worked with auto companies for implementing packaging solutions, and observed the following key challenges that hamper reusability, efficiency, and lead to Automotive

Lack of an efficient platform for performing trailer optimization

Data discrepancy between systems leading to inaccuracies and high cost of correction

Complex, time consuming and person-dependent approval process

Manual transfer of package drawings through physical media(CDs, DVDs) between Package manufacturer, OEM and part manufacturer

Manual intervention from inception until build out, leading to huge manpower requirement and prone to human errors

01 02 03 04 05 06

Non-standard naming conventions for packages across plants, leading to lack of visibility in availability of reusable packs

5 Packaging Lifecycle

Inception:

This involves identifying the need for packaging. Depending upon the part, there may be a need for new packaging or reuse of existing packaging. Stakeholders get together and agree on the specifications related to packaging material, dimension, quantity, etc.

Design:

Automobile companies need to identify a Pack Designer to create the technical drawings, prototypes and perform line trials. Specification finalized during inception is shared with shortlisted vendors (pack designer). Pack Designers need to submit the bid along with schedule and cost for designing. Bids are analysed and contract is awarded to this designer. Pack Designer is responsible for creating the technical drawings, performi... ...delivering to the requesting plant...

Create package
drawings for
bulk manufacturing

End of expendable Packs
Reuse of returnable packs

Expendable   Returnable

Identify the need
for packaging
(New / Existing)

End of expendable Packs
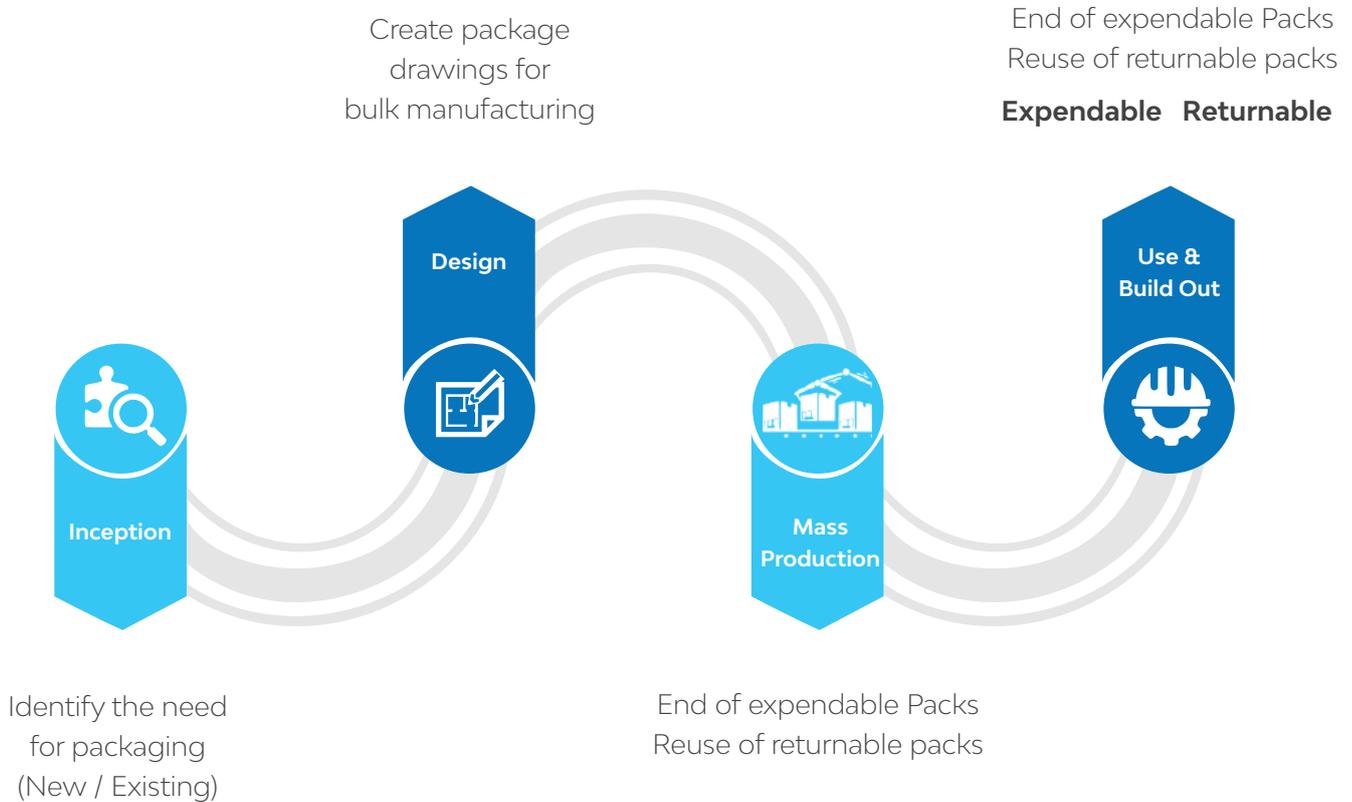Reuse of returnable packs

Fig. 3 Packaging Lifecycle

Mass Production:

Automobile companies need to identify a pack manufacturer for the Mass production of packages. Technical drawings from the design phase are shared with shortlisted vendors (pack manufacturers). Pack Manufacturers need to submit the bid along with plan, schedule and cost for manufacturing and shipping the packaging. Bids are analysed, and contract is awarded to a pack manufacturer.

Pack Manufacturer is responsible for manufacturing the packs, ensuring Quality, and shipping to the OEM supplier or plant (Consolidation Centre) in a timely manner. Plants will track the performance of the pack manufacturer at defined intervals and contemplate corrections/changes in case of deviations, non-performance.

Use & Build Out:

Parts are packaged and shipped by the OEM to the plant. Packages may be expendable or returnable. Material like cardboard is expendable, and may not be reusable. Returnable packaging is sent back to the supplier for the next lot until it is phased out. Expendable packaging is discarded after use.

6 Packaging Stages

Following chart depicts the key tasks that are performed at different stages within the lifecycle.
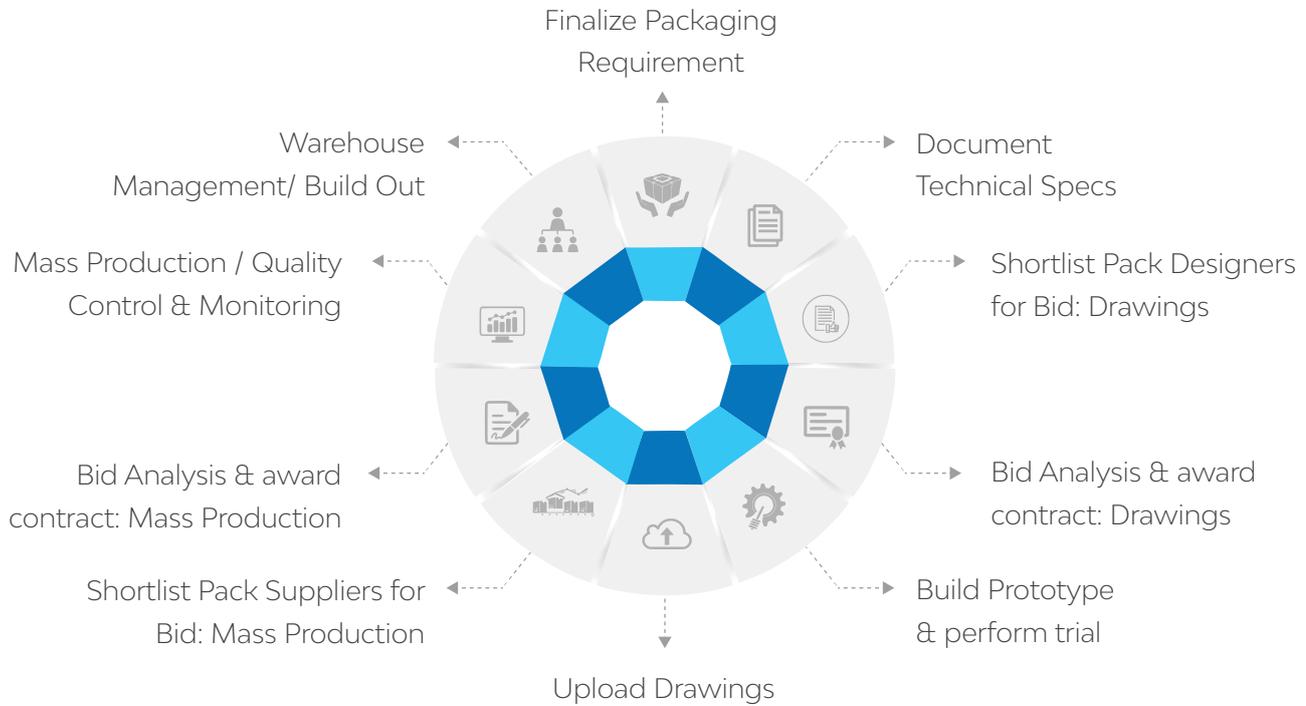

Fig. 4 Packaging Stages

· **Finalize Packaging Requirement**

 All stakeholders from the packaging department brainstorm and identify the need for packaging,along
with the detailed specifications. Aspects such as reusability, leveraging existing resources are   discussed,
and an approach is finalized.

· **Document Technical Specs**

 Requirements finalized are documented in the form of a specification document that goes through an
approval workflow for stakeholder consensus and agreement.

· **Shortlist Pack Suppliers for Bid: Drawings**

 Automobile companies will identify potential pack suppliers and invite bids for the technical drawings of
the packages. Specifications document is shared with the suppliers for them to be able to place their bids.

· **Bid Analysis & Award Contract: Drawings**

 Bids are analysed, past performances are taken into consideration and the contract is awarded to a pack
supplier.

· **Build Prototype & Perform Trial**

Pack Supplier will create a prototype prior to creating the technical documents. Prototype reviews and line trials will be conducted, along with the packaging department users. This would normally follow multiple iterations before the prototypes are fully approved.

· **Upload Drawings**

Pack Supplier will create the technical drawings (pdfs, images, catia files) and upload within the packaging portal. These would go through an approval workflow from the plant stakeholders.

· **Shortlist Pack Suppliers for Bid: Mass Production**

Automobile companies will identify potential suppliers and invite bids for the mass production of packages. The technical drawings create by the Pack Designers are shared with the Pack Suppliers for them to be able to place their bids.

· **Bid Analysis & Award Contract: Mass Production**

Pack Suppliers would submit a bid along with the complete plan. Bids are analysed, past performances are taken into consideration, and the contract is awarded to a pack supplier for mass production.

· **Mass Production / Quality Control & Monitoring**

Pack Supplier starts mass production of packages. Quality standards and checks are placed to ensure the packages meet the quality guidelines. Daily tracking of the planned vs. actuals is monitored and communicated to the plants. Plants will take corrective actions in case of variances being reported.

·

· **Warehouse Management / Build Out**

Floor Space needs to be efficiently utilized in order to efficiently maintain inventory, discard expendables and ensure just in time/just in sequence delivery of packaging material and sustain normal business operations.

7   LTI's views on the Maturity levels of a Packaging solution

Maturity Levels

Depending upon the extent to which a Solution can provision for the maturity parameters, four maturity levels have been defined as follows:

Level 01 Initial	Level 02 Defined	Level 03 Managed	Level 04 Optimized
• Inconsistent processes across plants	• Consistent/ Standardized processes setup & followed across plants	• Formal processes with accountability, Tracking of metrics	• Pro-active improvements to deliver more value
• Use of local / regional systems	• Use of Global systems for integration (BOM, Supplier portal, Production Control, Quotation, Finance)	• Make use of metrics to take decisions (Variance, Supplier performance evaluation, Shortlist for bidding), Scaling to accommodate new plants globally	• Process improvements through innovative technological improvements
• Use of Localized templates and deliverables	• Defined platforms for stakeholder collaboration, Consistent role and workflow definitions	• Automated process to reduce manual intervention & improve process efficiency	• Process optimization in case of redundant processes
• Ad hoc stakeholder collaboration			• On demand reporting & analytics available across functions
• Inconsistent work flows			
• Lack of visibility into reusability aspects			

Fig. 5 Maturity Levels

Key drivers that determine the maturity level of a packaging solution:

• Stakeholder Collaboration

• System Integration

• Automation

LTI
Let's Solve

Stakeholder Collaboration

The solution should provide a collaborative platform for the following stakeholders:

· Packaging Team (Users from packaging department of the Automotive plant)

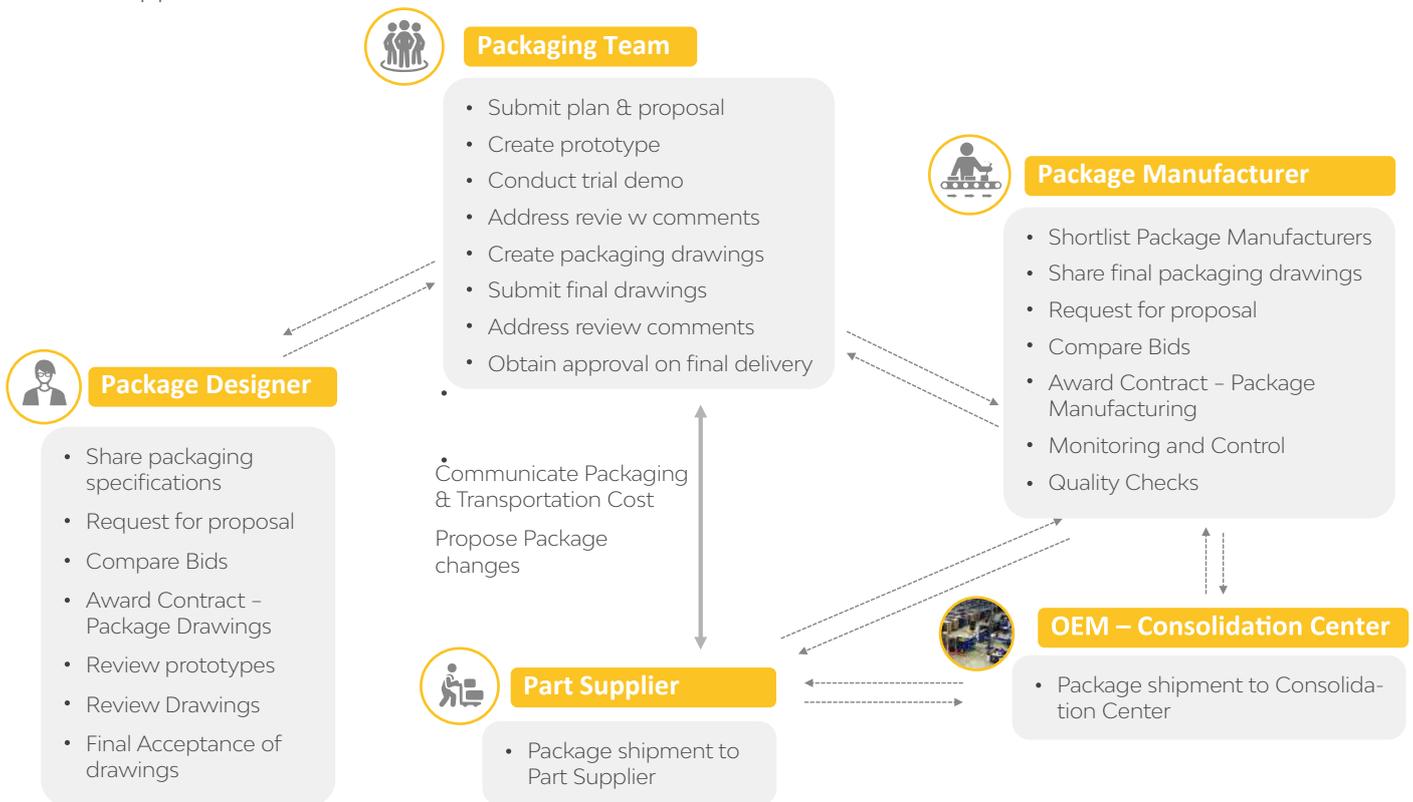· Package Designer

· Package Manufacturer

· Part Supplier

Packaging Team
· Submit plan & proposal
· Create prototype
· Conduct trial demo
· Address revie w comments
· Create packaging drawings
· Submit final drawings
· Address review comments
· Obtain approval on final delivery

Package Manufacturer
· Shortlist Package Manufacturers
· Share final packaging drawings
· Request for proposal
· Compare Bids
· Award Contract – Package Manufacturing
· Monitoring and Control
· Quality Checks

Package Designer
· Share packaging specifications
· Request for proposal
· Compare Bids
· Award Contract – Package Drawings
· Review prototypes
· Review Drawings
· Final Acceptance of drawings

Communicate Packaging & Transportation Cost

Propose Package changes

Part Supplier
· Package shipment to Part Supplier

OEM – Consolidation Center
· Package shipment to Consolidation Center

Fig. 6 Stakeholder Collaboration

System Integration

The solution must be well-integrated with the following systems within the IT landscape:

· Design Bill Of Material

· Supplier portal

· Ordering system

· Quotation system

· Finance

Let's Solve

Diagram below indicates an ideal solution with the system touch points and data flow:

Fig. 7 System Integration

Automation

The solution should have the following processes automated. Eliminating manual intervention will improve accuracy within the system and bring efficiency:

· Associate parts with the correct packages (Based on the part characteristics)

· Information (Packaging, Drawings, Purchase Orders, Plans, etc.) transfer between different stakeholders

· Notifications and alerts on pending/required actions and intimations (Pending submissions, Reviews, Corrections, etc.)

· Data flow between the different interfacing systems

· Evaluation based on past performance, shortlisting suppliers & recommendations for package supplier selection

· Monitoring the actuals vs. planned & calculating variances during Mass production stage

8 LTI's Experience

While engaging with multiple Automotive companies, LTI has worked with various Business teams, and implemented packaging solutions of varying degrees of maturity. Key aspects of the solution are:

- Collaborative platform for different stakeholders such as packaging department, packaging designers, packaging suppliers, part suppliers

- Standard naming convention for packages, enabling package reusability across different plants

- Integration of the solution with global systems such as D-BOM, Ordering, Quotation, Supplier Portal & Finance within the IT landscape

- Automation with regards to linking parts with similar characteristics, so that packaging can be automatically assigned to linked parts

- Workflow-based system for delegation, reviews, approvals and rejections

- Email, alert-based notifications for pending items or items requiring user action

- Scheduled reports for analysis and tracking

- Tracking the actuals Vs planned and highlighting deviations beyond acceptable limits

These solutions have helped the organizations realize the benefits that were envisaged at the start of the project.

9 Conclusion

Packaging is an integral part of the Automotive supply chain. There is need for a robust and mature solution to cater to demands of the packaging lifecycle.

It is imperative that there is detailed and comprehensive understanding of the constraints, challenges and innumerable aspects/processes that are required for the making an efficient and optimized solution. LTI, through its experience with multiple clients, has gained tremendous knowledge and expertise in the area of packaging.

LTI is capable of collaborating and developing a mature packaging solution that will:-

- Be a fit within the IT landscape

- Eliminate manual processes to achieve efficiency, optimization and error elimination

- Improve the turnaround time by eliminating the need for manual follow ups

- Bring in resource usability and lead to cost reduction

10 About the author(s)

Rehbar Rahman is a Sr. Project Manager / Business Analyst at LTI's Manufacturing Business Unit. He has 12 years of industry experience across the complete Software Development Lifecycle. He has executed development, maintenance & rollout projects for Automotive, Manufacturing, Healthcare and Media & Entertainment domains across North America and Europe. He holds a BE degree in Electronics engineering.

Anuradha Katti heads the Delivery for a leading North American Automotive OEM and Suppliers portfolio at LTI's Manufacturing Business Unit. Anuradha has 25 + years of experience in Software industry from the grass root level and in wide range of roles in delivery. She has worked extensively with large Automotive, Industrial Manufacturing and E&C clients from Americas, Europe and India. She has nurtured and grown many client relationships, along with the account management teams in the role of a Delivery Manager. She has solved complex business problems and delivered major cost and business benefits to clients in this role.

Previously, she also has headed IT for Railway business division of LTI, where she was responsible for establishing the complete IT function right from infrastructure to software solutioning and implementation.

info@Lntinfotech.com

A Larsen & Toubro
Group Company