

## MODULE 2

# Product and Package Analysis

*Conveyor Solutions Engineering | Professional Training Program*

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## SECTION 1: INTRODUCTION

Module 1 ended with a requirements document. The first thing that document contains is a product profile. Module 2 is where you turn that profile into precise, verified engineering inputs. Before a single conveyor is specified, before a belt speed is calculated, before a sorter is considered, you must know exactly what you are moving. Not approximately. Not generically. Exactly.

This sounds obvious. In practice it is one of the most consistently skipped or rushed steps in the industry. A customer sends over a spreadsheet with a minimum package size and a maximum package size and an engineer builds a system to handle both. The problem is that the minimum and maximum on that spreadsheet are often edge cases - products that represent two percent of daily volume but are driving one hundred percent of the system design. That is how you end up with a conveyor that is twice as wide as it needs to be, or running the wrong speed. Or, at a cost the customer did not expect.

Product analysis is the discipline of understanding not just what a customer handles, but what they handle most of the time, what is truly exceptional, and what the system actually needs to be designed around. Done well, it produces a product envelope that is honest, defensible, and buildable. Done poorly, it produces a system that either fails on the edge cases the engineer ignored or costs far more than necessary to handle edge cases that should have been excluded.

The primary tool for this work is the Package Calcs calculator, developed by Michael Collins for conveyor system design. This module teaches you how to use it, what it produces, and most importantly, how to exercise the engineering judgment that determines what goes into it.

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## SECTION 2: LEARNING OBJECTIVES

By the end of this module you will be able to:

- 1 Collect a complete and accurate product data set from a customer, including dimensions, weights, and packaging types across the full SKU range.
- 2 Analyze a customer's product mix to identify which packages drive the system design and which are outliers that should be treated as exceptions rather than design criteria.
- 3 Recognize non-standard package types - totes, polybags, soft packs, irregular items - and understand how each affects conveyor selection, speed, gap requirements, and sortation.

- 4 Use the Package Calcs calculator to produce the key engineering outputs that feed downstream decisions: conveyor width, roller centers, belt speed, gap, curve geometry, and incline angle.
- 5 Produce a verified product envelope - the design range the system must reliably handle - and document the assumptions and exclusions that define it.

## SECTION 3: PREREQUISITES

**Required Prior Knowledge**

Module 1: The Warehouse Ecosystem and Customer Discovery. You must have a completed requirements document with a product profile section before beginning product analysis.

Basic understanding of unit load concepts - what constitutes a package, a case, a tote, and a pallet - as introduced in Module 1.

Access to the Package Calcs calculator (PACKAGE\_CALCS\_r4). This module includes a walkthrough of the calculator. Have it open as you work through Section 5.

## SECTION 4: THE THREE W'S

The Three W's are applied here to the Package Calcs calculator and to the product analysis process itself. Both are distinct skills and both deserve their own framework.

### The Package Calcs Calculator

<b>WHY</b>	The Package Calcs calculator is the translation layer between what a customer handles and what the engineering must deliver. It takes raw product data - dimensions, weight, speed, gap - and produces the specific design parameters that drive conveyor selection. Without it, engineers guess. With it, engineers calculate. That distinction is the difference between a system that works and a system that almost works.
<b>WHEN</b>	Every time you have product data in hand and are preparing to specify any conveyor-based system. It does not matter whether the system is simple or complex. If packages are moving on conveyors, this calculator is in use. Run it before you select any equipment. Run it again if the product data changes.
<b>WHERE</b>	Package Calcs feeds every downstream module. The outputs drive conveyor width selection in Module 3, belt speed and gap calculations in Module 6, curve geometry in the curve modules, and incline analysis throughout. It is the first calculator in the workflow and its outputs are referenced in nearly every module that follows.

### Product Mix Analysis

<b>WHY</b>	<p>Customers give you data that describes their full range of products. That data is rarely a good proxy for system design requirements. The engineer's job is to understand the operational reality behind the data - which products actually run through the system, at what volume, and how often the outliers appear. A system designed around a customer's maximum package when that package represents two percent of volume may drive the cost to a place that makes the entire project too expensive.</p>
<b>WHEN</b>	<p>After the discovery meeting, when you have the customer's product data, before you open the Package Calcs calculator. The analysis comes first. What goes into the calculator should be a considered, deliberate set of design parameters, not a raw paste of the customer's spreadsheet.</p> <p>Pro tip: Sometimes I load the calculator with all of the product data first just to identify the outliers. Then I create a second calculator with those products removed. I review both versions with the customer early in the conversation.</p> <p>For example: "Hey, if we include this case, the conveyor width has to increase from 24 inch overall width (OAW) to 36 inch OAW. That change alone makes the conveyor significantly more expensive." This helps the customer clearly see what is driving the cost and decide whether that outlier product is really necessary.</p>
<b>WHERE</b>	<p>Product mix analysis happens between the discovery phase and the engineering phase. It is the step that converts raw customer data into defensible design inputs. It lives here in Module 2 and its outputs are what the rest of the program is built on.</p>

### Non-Standard Package Assessment

<b>WHY</b>	<p>A standard carton sits flat, has a rigid bottom, predictable dimensions, and behaves consistently on a conveyor. Some packages are not standard cartons. Totes, polybags, soft packs, tires, and irregular items each introduce handling considerations that a carton-based system cannot simply accommodate. Identifying non-standard packages early changes technology selection, system architecture, and cost.</p>
<b>WHEN</b>	<p>During product data collection and analysis. Ask specifically about non-standard items. Do not wait for the customer to volunteer this information. They may not think of their polybag shipments as a conveyor problem. You know it is one. Ask the question.</p>
<b>WHERE</b>	<p>Non-standard package assessment belongs in Module 2 and feeds technology selection directly in Module 4. The presence of polybags in a product mix, for example, eliminates certain sortation technologies immediately. The presence of tires changes the conveyor type, width, roller configuration, and potentially the entire system layout.</p>

## SECTION 5: CORE CONTENT

### 5.1 Why Product Data Is Never What It Looks Like

When you ask a customer for their product data, you will almost always receive one of two things: a general statement - our packages range from six by four by two to twenty-four by eighteen by twelve or a spreadsheet with a complete SKU list showing every product they carry. Both are useful and neither is sufficient on its own.

The general statement tells you the range but not the distribution. The spreadsheet tells you every SKU but not which ones actually run through the system in meaningful volume. What you need to understand is the operating reality - the product mix that the system will see on a typical day, at peak, and at the extremes. Those are three different things and they drive three different sets of design decisions.

#### FIELD INSIGHT | MICHAEL COLLINS

Customers almost always give you a generic min and max. The problem is that when you design to both ends of that range without understanding the volume behind each, you can end up building a system for a package that barely runs through it.

The first question I ask after I see a product data set is: what percentage of your daily volume does this minimum package represent? And the maximum? If the answer is less than five percent on either end, that product may be a candidate for manual handling or a separate process rather than a design driver.

You may be able to design a simpler, less expensive system for the ninety five percent and handle the edge cases differently. But you have to ask the question to even know that option exists. If you just take the data at face value and design to the full range, you may end up over engineering the system.

This might sound like the worst case is that you have to redo the engineering or update your proposal. In reality, you may lose the customer's trust. If your competition asks the right question and you don't, you lose credibility.

### 5.2 Collecting Complete Product Data

A complete product data set for conveyor system design covers six things: length, width, height, weight, packaging type, and volume distribution. The first four are what most engineers collect. The last two are what most engineers miss.

Complete Product Data Checklist
Length (L): The longest dimension of the package as it travels on the conveyor. Critical for roller center calculation, accumulation zone sizing, and gap requirements.
Width (W): The dimension perpendicular to travel direction. Drives conveyor belt width selection. Always confirm which dimension the customer means — orientation matters.

Height (H): Vertical dimension. Affects incline angle calculations, scan tunnel clearance, and certain sorter configurations.

Weight: In pounds. Drives roller diameter, belt tension, motor sizing, and accumulation pressure calculations. Get both the lightest and heaviest package. Per package if you can

Packaging type: Rigid carton, tote, polybag, soft pack,, irregular, or other. Each type carries handling implications that dimensions alone do not capture.

Volume distribution: What percentage of daily volume does each package type or size range represent? This is the data that separates design drivers from edge cases.

### 5.3 The Min / Max / Average Framework

The Package Calcs calculator organizes product data into three categories: minimum, maximum, and average. Understanding what each drives in engineering is what separates an engineer who uses the calculator correctly from one who just fills in the fields.

The minimum package creates hidden capacity and gap risks. In a ZPA accumulation system, zone length is sized for the largest package, which means a small package occupies only a fraction of that zone, leaving the rest empty. That dead space reduces effective accumulation capacity and distorts throughput if not accounted for. The minimum package also generates smaller gaps during speed transitions. At induction points, merges, and sorter transfers, gap is a function of package length and speed differential. A short package produces a smaller gap under the same speed change conditions that would produce an acceptable gap for a larger package. If sorter and transfer design was based on average or large package behavior, the minimum package can arrive at the decision point with insufficient gap to act on reliably.

The maximum package drives physical clearance, conveyor width, and curve geometry. The largest package determines the minimum belt width, the inside radius required on curves, and the clearance needed at transfers and merges. Building to the maximum without understanding its frequency is where over-engineering begins.

The average package drives speed and throughput calculations. Rate calculations use average package size and the required gap between packages at a given belt speed. The average, not the maximum or minimum, is what determines whether the system can hit the throughput target.

Understanding what each package extreme drives is only half the work. The minimum package's effect on ZPA zone occupancy and speed transition gap behavior are not abstract risks. They become real inputs when calculating system rate in Module 6 and when designing sorter induction and transfer requirements in Module 8. A solutions engineer who captures the full min, max, and average data in Module 2 and understands what each one drives will make better decisions at every stage that follows.

#### THE DESIGN ENVELOPE PRINCIPLE

The product envelope is the range the system is designed to handle reliably and automatically. Everything inside the envelope runs through the system without intervention. Everything outside the envelope is handled by a defined exception process - manual diversion, secondary system, or customer agreement.

Defining the product envelope explicitly is one of the most important acts of engineering judgment in this program. It requires agreement from the customer. It must be documented in the requirements document. And it must be revisited any time the product mix changes.

A system with a well-defined, agreed-upon product envelope is a system the customer can be held to. A system designed to handle everything is a system that can be blamed for anything.

## 5.4 Non-Standard Packages: What They Are and Why They Matter

Most conveyor system training focuses on cartons because cartons are the baseline. A rigid-bottom, rectangular carton with predictable dimensions behaves consistently on a conveyor. It transfers cleanly, accumulates predictably, scans reliably, and sorts accurately. When your product mix is ninety percent standard cartons, life is straightforward.

It rarely is. Non-standard packages introduce handling considerations that cannot be solved by applying the standard carton framework. The engineer who knows how to recognize and respond to non-standard packages is the engineer who does not get surprised after installation.

### Non-Standard Package Types and Their Implications

**Totes:** Rigid containers with a defined footprint, but often with handles, lids, or base flanges that affect roller contact and transfer behavior. Confirm the usable contact surface, not just the outer dimensions. In addition to the conveyor surface, tapered totes may require a larger zone to handle how the top of the tote will overhang the position of the photo electric sensor that detects the bottom. What this means is that if you had a 16" long tote in an 18" zone, it may seem fine, but if the top of the tote is 19" long, they would hit each other when accumulated.

**Polybags:** Flexible, no rigid bottom, shape changes under its own weight. Cannot be accumulated under pressure, jams on transfers, does not scan flat. Eliminates many sortation options. Requires flat belt surfaces and careful gap management.

**Soft packs:** Similar to polybags but often with more structure. Same core problems. Test on the actual conveyor configuration before committing to a design.

**Tires:** Round, heavy, roll unpredictably. Require specific conveyor configurations, side guides, and handling approaches entirely different from standard carton systems. If tires are in the product mix, they likely need their own handling path.

**Irregular items:** Anything that cannot be described by a consistent L x W x H. These items require human judgment at induction or a separate manual process. They cannot be assumed to behave like cartons regardless of their size.

**Hanging garments:** Require overhead conveyor systems entirely separate from flat conveyor infrastructure. Identifying hanging garments in a product mix early prevents fundamental system architecture errors.

### FIELD INSIGHT | MICHAEL COLLINS

Tires, polybags, anything that is not a standard carton - some consideration has to be made because it can drive the entire solution in a direction you did not plan for.

The key question I always ask is: what percentage of your volume is this non-standard item? If it is five percent or less, you probably do not design the whole system around it. You design an exception path and handle it separately. But if it is twenty percent, you have a different system entirely.

I have seen systems spec'd for standard cartons that turned out to have thirty percent polybags in the mix. Nobody asked. The system failed within a month of go-live. That is a discovery failure before it is an engineering failure.

## 5.5 Using the Package Calcs Calculator

The Package Calcs calculator was developed by Michael Collins as the primary product analysis tool for conveyor system design. It takes product dimensions, weights, and system parameters as inputs and produces the engineering outputs that drive downstream decisions. This section walks through the calculator field by field.

Open the Package Calcs calculator before reading further. The goal is not to memorize the fields — it is to understand what each field is asking and why the output it produces matters. A student who can run the calculator but cannot explain what the outputs mean has not learned product analysis. They have learned data entry.

PACKAGE CALCS   INPUT FIELDS	
<b>Package ID</b>	A label for the package type or SKU being analyzed. Use a clear naming convention — you will often run the calculator for multiple package types in the same engagement.
<b>Length (L)</b>	Longest dimension in the direction of travel, in inches. If orientation on the conveyor is not yet determined, note this assumption.
<b>Width (W)</b>	Dimension perpendicular to travel, in inches. This drives belt width selection.
<b>Height (H)</b>	Vertical dimension in inches. Affects incline angle calculations and clearance requirements.
<b>Weight (WT lbs)</b>	Package weight in pounds. Used for roller sizing, motor calculations, and accumulation pressure analysis.
<b>Speed In</b>	Belt speed at the point of induction or entry to the section being analyzed, in feet per minute.
<b>Starting Gap</b>	The gap between packages at the entry point of the section, in inches. Often set by upstream equipment or system logic.
<b>Inside Radius</b>	The inside radius of any curve in the section, in inches. Use the manufacturer's published curve radius for the equipment being considered.

PACKAGE CALCS   KEY OUTPUTS	
<b>MIN / MAX / AVG Sizes &amp; Weights</b>	Summary of the product envelope across all package IDs entered. These drive the design range.
<b>Roller Centers</b>	The required center-to-center spacing of rollers to support the minimum package length. Critical: at least 3 rollers must be under any package at all times.
<b>Belt Width (BF)</b>	The minimum belt face width required to support the maximum package width, including any curve geometry adjustment.

<b>Min Curve BF</b>	The minimum belt face required at a curve based on package diagonal and curve radius. Often larger than the straight-run width.
<b>Gap</b>	The required gap between packages at the given belt speed to achieve the target throughput rate.
<b>Rate</b>	Theoretical throughput rate in packages per minute or hour at the given speed and gap.
<b>Max Angle of Incline</b>	The maximum incline angle the package can handle without sliding, tumbling, or tipping. Driven by package height-to-length ratio and weight distribution.
<b>Box Tumble Angle</b>	The angle at which the package will tip over rather than slide. This is a design limit, not a target.

## 5.6 Reading the Outputs: Engineering Judgment Over Calculator Outputs

Running the Package Calcs calculator produces numbers. Knowing what to do with those numbers requires engineering judgment. This section covers the decisions that the calculator cannot make for you.

The first judgment call is which package drives each output. The minimum package drives roller centers and gap. The maximum package drives belt width and curve geometry. But if the maximum package represents two percent of volume, you have a decision to make: design the system to handle it automatically, design an exception path for it, or have a conversation with the customer about whether it belongs in the automated envelope at all.

The second judgment call is what to do when the outputs conflict.. When output conflicts, you do not average them. You analyze the volume behind each extreme and make a decision about the design envelope.

The third judgment call is when to run the calculator again. Product data changes. Customers discover SKUs they forgot to mention. Non-standard packages appear mid-project. Any time the product profile changes materially, the Package Calcs calculator runs again. The outputs you produced in week one are only valid as long as the inputs that produced them are accurate.

## 5.7 When Other Calculators Apply

The Package Calcs calculator is the primary tool for conveyor-based systems. It is designed for the product analysis that feeds belt conveyor, roller conveyor, and standard sortation system design. For more specialized solution types, other manufacturers provide their own calculators and sizing tools.

<b>When to Look Beyond Package Calcs</b>
Goods-to-person systems (AutoStore, Kardex, Hanel, SSI Schaefer, and others): Each manufacturer provides proprietary sizing tools that account for tote dimensions, throughput rates, port configurations, and grid density. These tools are specific to their system architectures and cannot be substituted with general conveyor calculations.

Automated Storage and Retrieval Systems (ASRS): Stacker crane systems and shuttle systems have manufacturer-specific throughput calculators based on travel time, cycle time, and aisle configuration. The Package Calcs calculator does not apply here.

Sorter throughput calculators: For high-speed crossbelt or sliding shoe sorters, sorter manufacturers provide rate calculators based on induction speeds, divert rates, and product spacing. These work alongside Package Calcs, not instead of it.

The rule: Package Calcs is your starting point for any system where packages move on conventional conveyor infrastructure. For specialized automation platforms, identify the manufacturer early and obtain their sizing tools. Never try to substitute a general calculator for a manufacturer-specific one.

## SECTION 6: TIPS AND TRICKS

### TIPS AND TRICKS | MICHAEL COLLINS

Always ask what percentage of volume the minimum and maximum packages represent before you design anything around them. A package that represents two percent of volume is probably not a design driver. It might be an exception. That is a conversation worth having before the engineering starts.

Run the calculator for at least three package scenarios: the most common package, the smallest package, and the largest package. If those three produce consistent outputs, you have a clean design. If they conflict, you have a product mix problem that needs resolution before you can design.

When you encounter polybags or soft packs in a product mix, your first question is not what conveyor handles them. It is whether they need to run through the automated system at all. Sometimes the answer is a separate manual pack station or a secondary process. That simplifies the main system and reduces cost.

The weight field is underused. Engineers focus on dimensions and forget that a very heavy package in a mix of light packages changes motor sizing, accumulation back-pressure limits, and roller diameter requirements throughout the system. Do not skip the weight analysis. All of the buzz is around the motorized driven roller system (MDR) ; they always have a max weight per foot, and per zone. So one output to look at in the calculator is the per ft weight. And the overall weight of a given package compared to its length. You might find that MDR can't be used. That is worth a conversation too.

Document every assumption you make during product analysis. When the customer comes back six months after installation and says a certain package is jamming, your documentation tells you whether that package was inside the agreed design envelope or outside it. That distinction matters.

How you handle that conversation is entirely based on how you build the relationship with the customer, and your own sales team.

## SECTION 7: NOTES AND INSIGHTS

### NOTES AND INSIGHTS

The Mecalux Technical Warehouse Manual identifies product characteristics as the first and most fundamental category of information required to plan any warehouse system. Dimensions, weight, rotation, compression resistance, stackability, and special handling requirements all feed the design before any equipment is selected. The Package Calcs calculator operationalizes this principle for conveyor system design.

The Total Guide to Warehouse Automation makes the point that thinking about your whole warehouse - not just one or two isolated processes - is essential to operational efficiency. Product analysis is where that whole-system thinking begins. The package you are analyzing will be received at the dock, stored, picked, conveyed, sorted, consolidated, and dispatched. Understanding it fully at the analysis stage prevents problems at every downstream stage.

In complex goods-to-person or ASRS environments, product analysis becomes even more critical because the storage system must be designed around the specific tote or container that interfaces with the automation. The Package Calcs calculator covers the conveyor side of that interface. The manufacturer's sizing tools cover the storage and retrieval side. Both must agree on the container specification or the system fails at the handoff.

A product envelope that is too broad costs money. A product envelope that is too narrow generates exceptions. The engineering judgment that defines the right boundary is what distinguishes a senior solutions engineer from a junior one. The calculator gives you the parameters. Experience tells you where to draw the line.

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## SECTION 8: EXPERT CALLOUT

### EXPERT CALLOUT

*Placeholder for expert insight on product analysis and the real-world cost of designing to the wrong product envelope. Reviewer to share a specific example of how incomplete or inaccurate product data changed a project outcome, and what they do differently now to ensure the product profile is accurate before engineering begins.*

*[ Reviewer Name, Title, Company ]*

## SECTION 9: PITFALLS

- ! Accepting the customer's min/max data without asking about volume distribution. The min and max define the range. They do not tell you what the system actually sees most of the time. Always ask what percentage of daily volume each end of the range represents before you use it as a design input.
- ! Designing the full system to accommodate a non-standard package without first asking whether it needs to run through the automated system at all. Polybags, tires, irregulars, and hanging garments often have better solutions than forcing them through a standard conveyor system. Ask the question before you build around the exception.
- ! Running the Package Calcs calculator once and treating the outputs as permanent. Product mixes change. Customers discover SKUs they did not mention. SKUs are added and discontinued. Any material change to the product profile invalidates the original outputs. Build the habit of re-running the calculator when the product data changes.
- ! Skipping the weight field because it feels less important than dimensions. Weight drives motor sizing, roller specifications, accumulation back-pressure limits, and incline feasibility. A mix of very light and very heavy packages in the same system creates design conflicts that dimensions alone will never reveal.
- ! Failing to document the product envelope and get customer sign-off before engineering begins. The product envelope is an agreement between the engineer and the customer about what the system is designed to handle. Without that agreement in writing, every exception becomes a warranty claim and every jam becomes a system failure in the customer's eyes.

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## SECTION 10: FOREST THROUGH THE TREES

### How Product Analysis Connects to Everything That Follows

Every module after Module 2 builds on the product envelope you define here. It is not possible to overstate how far forward this work reaches.

Module 3 uses the Package Calcs output to select conveyor type and determine whether belt, roller, or wheel conveyor is appropriate for the product mix. Module 4 uses the product profile to eliminate technology options that cannot handle the product. Module 6 uses the package dimensions and gap requirements to calculate rate and speed. Module 7 uses the product envelope to size accumulation zones. Every rate calculation, every gap calculation, every incline check, every curve geometry calculation in this program is downstream of the work you do in Module 2.

This is also the module where the connection between discovery and engineering becomes concrete. In Module 1 you learned to ask the right questions. In Module 2 you turn the answers into numbers. The quality of those numbers is a direct reflection of how well the discovery was done. A thorough discovery produces rich, accurate product data. A rushed discovery produces generic ranges that generate engineering guesswork.

When a system fails after installation because packages jam, mistrack, miss scan points, or divert to the wrong lane, trace the failure back. It almost always leads to a product analysis that was incomplete, a product envelope that was too broad, or a non-standard package that was not accounted for. Module 2 is where those failures are prevented.

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## SECTION 11: KEY TAKEAWAYS

### KEY TAKEAWAYS | MODULE 2

Product analysis is the translation layer between the customer's operation and the engineering. Every downstream decision depends on the accuracy of the product envelope defined here.

Min and max package data is not a design input until you know the volume behind it. Always ask what percentage of daily volume the extremes represent before designing around them.

Non-standard packages - polybags, totes, tires, irregulars - must be identified explicitly. Their presence changes technology selection, system architecture, and cost. Finding them after the design is complete is always more expensive than finding them here.

The Package Calcs calculator produces the engineering parameters that drive every downstream calculation. Run it deliberately, understand every output, and re-run it any time the product profile changes.

For goods-to-person systems, ASRS, and specialized automation platforms, manufacturer-specific sizing tools apply alongside or instead of Package Calcs. Identify the platform early and obtain the right tools before engineering begins.

The product envelope is an agreement with the customer, not just an engineering assumption. Document it. Get sign-off. It protects both the engineer and the customer when edge cases appear after installation.

Document every assumption. When a package jams six months after go-live, your documentation tells you whether it was inside or outside the agreed design envelope. That distinction determines who is responsible.

## SECTION 12: MODULE ASSESSMENT

### Knowledge Check

**Q1**

What are the six data points that constitute a complete product data set for conveyor system design? Why is volume distribution the most commonly missed and the most consequential?

**Q2**

Explain what each of the three Package Calcs categories - minimum, maximum, and average - drives in the engineering. Give a specific example of an engineering decision driven by each.

**Q3**

A customer's product mix includes standard cartons and polybags. What questions do you ask before deciding whether polybags belong inside the automated system's design envelope?

### Calculator Exercise

**Q1**

Using the Package Calcs calculator, run analysis for the following product profile and record all key outputs. Small carton: 8L x 6W x 4H, 2 lbs. Standard carton: 14L x 10W x 8H, 8 lbs. Large carton: 20L x 16W x 12H, 22 lbs. Belt speed: 90 FPM. Starting gap: 6 inches. Inside radius: 18 inches. After running the calculator: Which package drives roller center selection? Which drives belt width? Which drives the maximum incline angle? Are there any conflicts between the outputs that require a design decision?

### Scenario Question

**Q1**

A customer provides you with the following product data: minimum package 4L x 3W x 2H, 0.5 lbs (polybag, 8% of volume). Standard package 12L x 8W x 6H, 5 lbs (rigid carton, 85% of volume). Maximum package 24L x 18W x 14H, 35 lbs (rigid carton, 7% of volume). How do you approach the product envelope definition for this system? What is your recommendation for the polybag? What is your recommendation for the maximum carton? What does your design envelope look like and how do you document and present it to the customer?

## END OF MODULE 2

Next: Module 3 | Conveyor Fundamentals and Component Anatomy

Before continuing, complete the calculator exercise with real numbers in the Package Calcs tool. Do not proceed to Module 3 until you can produce and explain all key outputs.

The product envelope you define in this module carries forward into every downstream module. Keep your Package Calcs outputs accessible throughout the program.

The scenario question is designed for instructor-led discussion. There is no single correct answer. The goal is to demonstrate structured product analysis judgment, not to produce a memorized response.