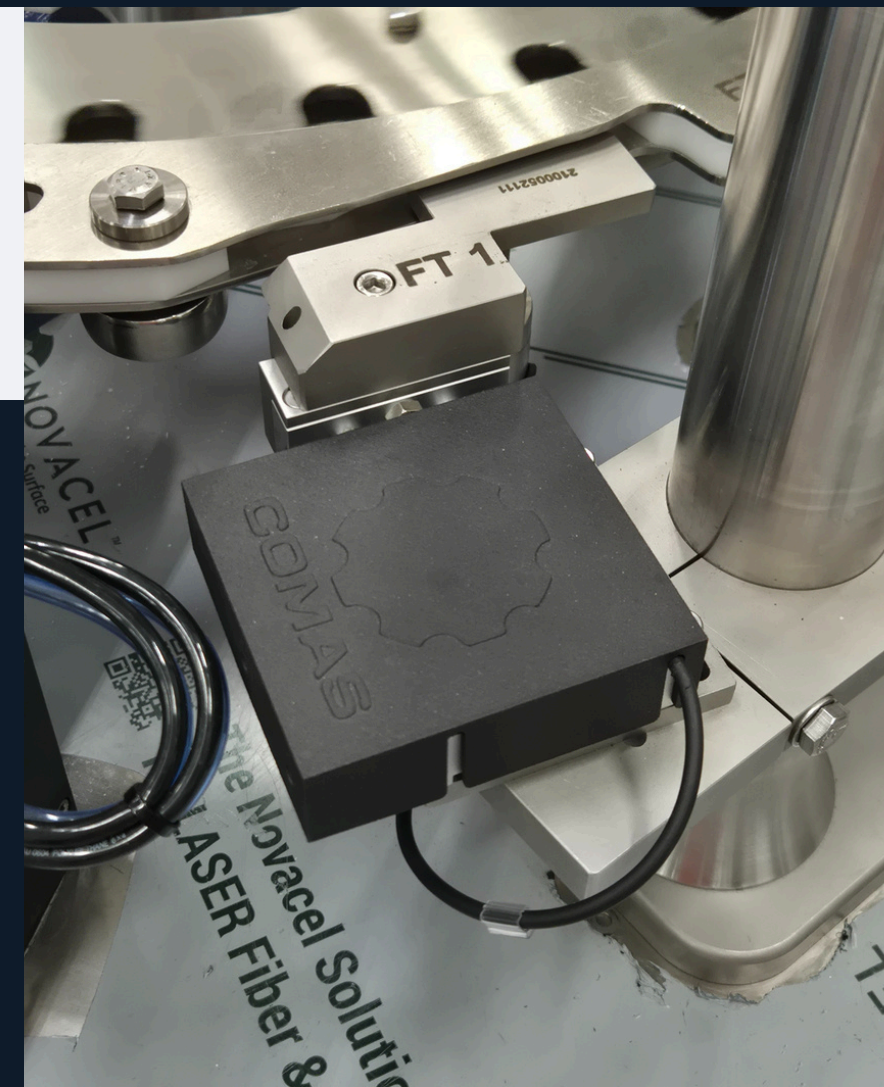


# From Prototype to Production: A Decision Framework for Industrial Additive Manufacturing

How engineering teams reduce development cycles by **60–75%**, eliminate **€15,000** tooling per variant, and scale production **from 1 to 10,000 parts**.



- ✓ 12 pages of technical content
- ✓ Real case study (OMNIA Technologies Group)
- ✓ ROI calculator included
- ✓ HP MJF and Carbon DLS material specifications



**60–75%**  
**Time-to-market reduction**

**€8–15k**  
**Tooling saved per variant**

**1–10,000**  
**Economical batch size**

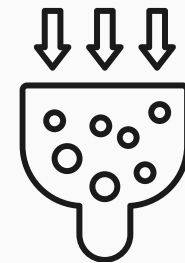
*For:*

- *Engineering Managers*
- *R&D Directors*
- *Technical Operations Leaders*



# THE PRODUCTION BOTTLENECK

## Traditional Manufacturing Challenges in Machinery Development



### TIME

- 4–8 weeks tooling
- 12–16 weeks total cycle

### COST

- €8–15k tooling
- MOQ 500–1,000

### DESIGN

- Assembly constraints
- Limited geometry



**If:**

- **Development cycle > 12 weeks**
- **≥ 3 design iterations per year**
- **Tooling cost > €10,000 per variant**

Then traditional manufacturing is structurally inefficient.

# WHY ADDITIVE MANUFACTURING IS NOW PRODUCTION-READY

## WHAT HAS CHANGED

1995–2010 → Prototyping

2010–2018 → Functional validation

2018–Today → End-use production

**Carbon**<sup>®</sup>

## Core Advantages

### 1. ZERO TOOLING COSTS

- No molds required
- File update replaces retooling

### 3. GEOMETRIC FREEDOM

- Lattice optimization for weight reduction
- Organic geometries impossible with traditional methods

### 2. ON-DEMAND PRODUCTION

- Batch size 1–10,000
- Zero inventory risk

### 4. COMPRESSED LEAD TIMES

- From CAD to finished part: 1-3 weeks
- Integrated post-processing and QC

# MATERIAL SPECIFICATIONS

Production-grade materials for demanding applications

## HP MULTI JET FUSION

### NYLON PA12

- TENSILE STRENGTH: 48 MPA
- ELONGATION AT BREAK: 20%
- TEMPERATURE RANGE: 95°C TO 350°C
- CHEMICAL RESISTANCE: OILS, GREASES, HYDROCARBONS

**Application:** Functional prototypes | End-use parts | Medium-duty components

### TPU THERMOPLASTIC POLYURETHANE

- SHORE HARDNESS: 88A
- HIGH FLEXIBILITY & IMPACT RESISTANCE
- ABRASION RESISTANT
- TEMPERATURE RANGE: -31°C TO 192°C

**Application:** Flexible parts | Gaskets | Impact-absorbing components

## CARBON DLS™ (i.e. Carbon resins)

### RPU 70 (RIGID POLYURETHANE)

- TENSILE MODULUS: 1700 MPA
- HDT: 60°C
- HIGH STIFFNESS & DIMENSIONAL STABILITY
- CHEMICAL RESISTANT

**Application:** Industrial fixtures | High-temp applications | Structural components

### EPX 82 (EPOXY RESIN)

- TENSILE MODULUS: 2800 MPA
- HDT: 130°C
- SUPERIOR MECHANICAL PROPERTIES
- EXCELLENT THERMAL STABILITY

**Application:** Aerospace components | Automotive under-hood | High-performance parts

### EPU 46 (ELASTOMERIC POLYURETHANE)

- SHORE HARDNESS: FROM 56A TO 78A
- HIGH REBOUND RESILIENCE
- EXCELLENT ABRASION RESISTANCE
- SOFT-TOUCH SURFACE FINISH

**Application:** Cycling saddles | Rowing pads | Footwear | Ergonomic grips

# Real Data from Industrial Applications

## QUANTIFIED PERFORMANCE METRICS

Verified performance metrics from completed projects

### TIME-TO-MARKET REDUCTION



- Prototype development: 6 days vs 4-6 weeks traditional
- 100-part production run: 10 days vs 8-12 weeks traditional
- Design iteration cycle: 48 hours vs 3-4 weeks
- Result: 60-75% development time reduction

### COST IMPACT



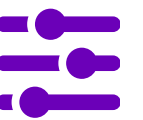
- Tooling elimination: €8,000-€15,000 saved per variant
- Inventory reduction: 70-85% lower stock value
- Obsolescence elimination: 15-20% annual carrying cost removed
- Typical ROI: 4-8 months

### ENGINEERING PERFORMANCE



- Weight reduction: 40-60% through topology optimization
- Part consolidation: 5-15 components → single part
- Thermal efficiency improvement: +50-80% with conformal channels
- Material waste reduction: 95% vs subtractive methods

### PRODUCTION FLEXIBILITY



- Economic batch size: 1-10,000 parts
- Variant cost: €0 additional per design change
- Customization at scale: unlimited part variations

# CASE STUDY: COMAS – OMNIA Technologies

Automation Machinery Manufacturer Achieves 60% Lead Time Reduction

**83% LEAD TIME REDUCTION**



## COMPANY PROFILE

COMAS (OMNIA Technologies Group) – Global leader in filling and capping machines for pharmaceutical, cosmetics, and diagnostics industries.

## CHALLENGE



- ❌ High-precision components required for regulated industries
- ❌ Frequent design iterations during product development
- ❌ Small to medium production volumes (50-500 parts)
- ❌ Tight tolerances and material certifications mandatory

## SOLUTION IMPLEMENTED



- ✅ CAD file and feasibility analysis
- ✅ HP Multi Jet Fusion technology with nylon PA12 material
- ✅ Design for additive manufacturing optimization
- ✅ Custom prototypes, adjusts after first test, production

## Components Produced

**Anti-rotation devices**  
– prevent bottle spinning during capping

**Dosing bellows** – precise fluid transfer in pharmaceutical machinery

**Ophthalmic tube parts**  
– complex geometries for eye-drop systems

**Nasal spray components** – uniform dosing accuracy

**Diagnostic holders** – optimized for strength and dimensional stability

## Measured Results

**42 → 7 days** | Lead time reduction

**€8,400** Saved per iteration

**3 in 1 month** | Design cycles

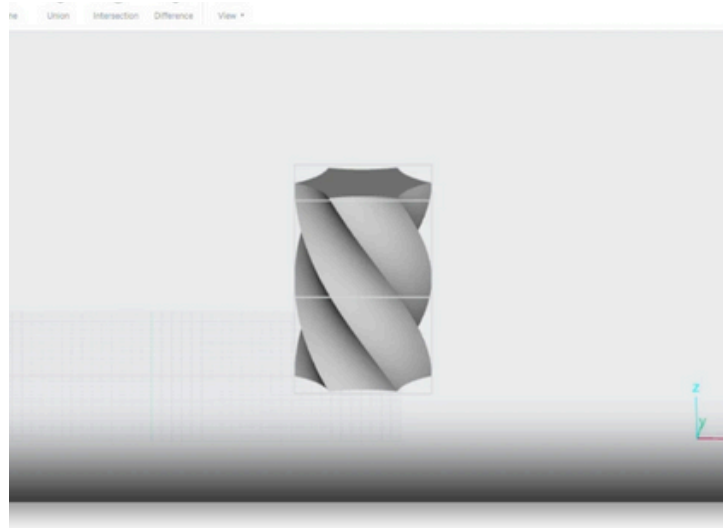
**100%** | Traceability compliance

# Engineering Support to De-Risk Implementation

DfAM strategies to maximize performance and cost efficiency

## 1. Topology Optimization ↑

- Material removal in low-stress areas
- Weight reduction: 40-60% while maintaining strength
- Example: Aerospace bracket – 2.4 kg → 1.1 kg (-54%)

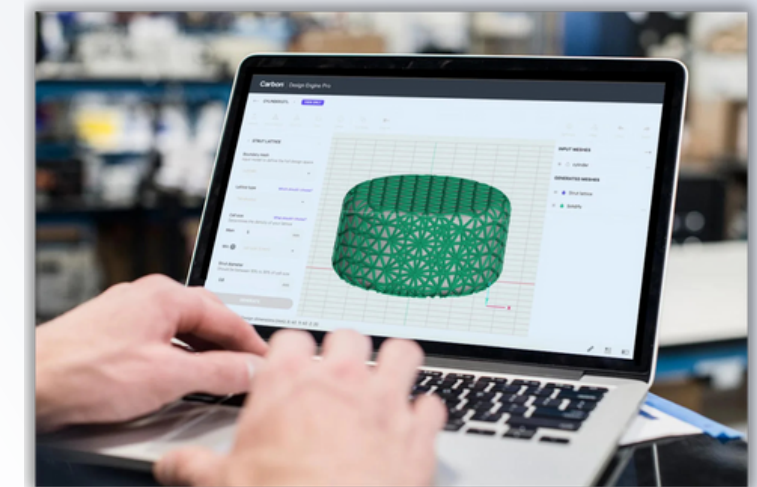


## 2. Part Consolidation ↑

- Eliminate assembly operations
- Reduce failure points
- Example: 12-part valve assembly → single component
- Time saving: -90% assembly labor

## 3. Lattice Structures ↑

- Engineered cellular geometries
- Strength-to-weight optimization
- Vibration dampening
- Material cost reduction



## 4. Mass Customization ↑

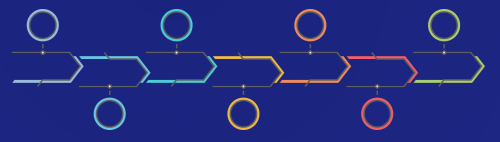
- Patient-specific medical components
- Custom tooling and fixtures
- Serialized part production
- Cost: identical across all variants

## Prototek Design Support Services

- Pre-production file optimization
- FEA simulation and validation
- Material selection guidance
- DfAM (Design for Additive Manufacturing) consultation

# Prototek Production Process: from CAD file to certified production parts

*How to Implement Additive Manufacturing in Your Process*



Proven 4-phase integration framework

<p><b>WEEK 1</b> IDENTIFICATION &amp; FEASIBILITY ANALYSIS</p> <ul style="list-style-type: none"><li>✓ CAD file reception, technical evaluation, and geometry verification</li><li>✓ Technology and material recommendation (HP MJF, Carbon DLS) with DfAM optimization</li><li>✓ Cost and lead time estimation</li></ul>	<p><b>WEEK 2-4</b> PROTOTYPE VALIDATION</p> <ul style="list-style-type: none"><li>✓ First prototype production, dimensional and visual quality control, and delivery for customer testing</li><li>✓ Mechanical properties verification and design iteration as needed</li><li>✓ Final prototype approval</li></ul>	<p><b>ONGOING</b> SCALABLE PRODUCTION</p> <ul style="list-style-type: none"><li>✓ Production planning and flexible scheduling for on-demand runs</li><li>✓ Small to large batch production (1–1,000+ parts) with consistent quality</li><li>✓ Integrated post-processing workflow</li></ul>	<p><b>FINAL STAGE</b> POST-PROCESSING &amp; QUALITY CONTROL</p> <ul style="list-style-type: none"><li>✓ Part cleaning, support removal, and surface finishing (dyeing, vapor smoothing, painting)</li><li>✓ Mechanical testing, internal quality verification, and batch certification</li><li>✓ Packaging, traceability documentation, and shipping to customer.</li></ul>
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**Output:** Optimized CAD file + production proposal

**Output:** Validated prototype ready for production scale-up

**Production capacity**  
**Production Flexibility**  
From 1 piece to 10,000+ parts/month  
Same quality, same materials, scalable capacity

**Quality assurance**  
**ISO 9001& ISO 27001 Certified Process**  
Full material traceability with batch reports  
Dimensional tolerances verified per specification

# Expected Outcomes & ROI

Quantified business impact based on real cases

## YEAR 1 FINANCIAL IMPACT

(Based on 15-20 component integration in your production)

<p><b>Tooling Cost Elimination</b> €120,000 - €200,000</p>	<p><b>Inventory Reduction</b> €80,000 - €150,000</p>
<p><b>Obsolescence Elimination</b> €15,000 - €30,000</p>	<p><b>Revenue Acceleration</b> 2-month gain</p>

**TOTAL YEAR 1 SAVINGS → €250,000 - €450,000**



Typical ROI: 4-8 months | Most companies break even on first project

## KEY OPERATIONAL IMPROVEMENTS

<p>Development cycle <b>-60%</b></p>	<p>Design iterations <b>3X5 more</b></p>
<p>Design change response <b>few days</b></p>	<p>Prototype to production <b>6-10 days</b></p>
<p>Supply chain complexity <b>-40%</b></p>	<p>Material waste reduction <b>95%</b></p>



**CALCULATE YOUR ROI**

# Start Your Additive Manufacturing Journey



Three pathways to evaluate and implement

①

## FREE COMPONENT ASSESSMENT 48-72 hour turnaround

- Send CAD files
- Get cost comparison
- Technical feasibility
- DfAM recommendations

[Request Assessment ↓]

②

## PILOT PROJECT 2-3 weeks

- 5-10 functional parts
- Mechanical testing
- Performance validation
- Production readiness

[Start Pilot Project ↓]

③

## STRATEGIC PLANNING SESSION Complimentary for qualified companies

- 90-min consultation
- Roadmap review
- ROI projection
- Implementation timeline

[Schedule Session ↓]

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*"Additive manufacturing allowed us to compress development cycles from months to days, while maintaining the precision and certification standards required in pharmaceutical and cosmetic machinery.*

*The partnership with Prototek gave us production-ready parts with full traceability."*

– D. Fulceri, Engineering Manager, COMAS (OMNIA Technologies)

### Key Takeaways

✓ Reduce time-to-market by <b>60-75%</b>	✓ Produce <b>1 to 10,000</b> parts economically
✓ Eliminate <b>€8,000-€15,000</b> tooling costs per variant	✓ Achieve geometric complexity impossible with traditional methods
✓ Free capital tied up in inventory ( <b>70-85%</b> reduction)	✓ Start with pilot project, scale based on results

**Request Component Analysis:**

<https://prototek.it/en/contacts>