THE IMPACT OF PART DELAYS: APD VS. FDM

INTRODUCTION

A recent study by additive manufacturing expert, Todd Grimm, documented the impact of required post-processing after 3D printing, as reported by six global organizations. While the data cited in Todd's report is unquestionably eye-opening in and of itself, we decided to take the analysis further to discover the impact that delays in receiving 3D printed parts has on organizations.

We conducted an analysis and comparison of the part turnaround speed and cost differences between two additive manufacturing systems: Stratasys' Fortus, and Rize One, using actual data provided by a global, single-product (with numerous models) consumer packaged goods (CPG) manufacturer who uses both systems in their additive manufacturing lab. We selected the Fortus for this comparison because the manufacturer's additive manufacturing lab manager agreed that it is the closest comparable system to Rize One from a capability standpoint.

While the conclusions of Todd's report were startling, the data uncovered in this analysis will undoubtedly cause you to rethink your entire R&D process and could very well make you your company's hero.

ANALYZING SPEED AND COSTS

Part Turnaround Time

CPG's lab manager outlined a few facts and averages for his company:

- Each engineer at his company works 235 days per year, excluding holidays and vacation days.
- CPG has 100 engineers, each producing an average of 12 unique designs per year, for a total of 1,200 unique designs per year
- Each engineer averages four iterations per design, however bear in mind that they are up to 26 iterations for one design
- The first iteration of a design takes five days vs. just one day for subsequent iterations
- Outsourcing requires an average of five days to deliver a part for each iteration of a design vs. two days for Fortus due to post-processing required after 3D printing

to remove supports and one day for Rize, since the part is available immediately after 3D printing with the Rize One 3D printer.

CPG's Part Delivery Time Data:

OUTSOURCE

ITERATION	DESIGN (DAYS)	PART TURNAROUND TIME (DAYS)	TEST (DAYS)	TOTAL
1	5	5	1	11
2	1	5	1	7
3	1	5	1	7
4	1	5	1	7

1 engineer
32 days per idea
7 ideas/year

FORTUS

ITERATION	DESIGN (DAYS)	PART TURNAROUND TIME (DAYS)	TEST (DAYS)	TOTAL
1	5	2	1	8
2	1	2	1	4
3	1	2	1	4
4	1	2	1	4

1 engineer
20 days per idea
12 ideas/year

RIZE

ITERATION1	DESIGN (DAYS)	PART TURNAROUND TIME (DAYS)	TEST (DAYS)	TOTAL
1	5	1	1	7
2	1	1	1	3
3	1	1	1	3
4	1	1	1	3

1 engineer
16 days per idea
15 ideas/year

RIZE-ALTERNATIVE

ITERATION	DESIGN (DAYS)	PART TURNAROUND TIME (DAYS)	TEST (DAYS)	TOTAL
1	5	1	1	7
2	1	1	1	3
3	1	1	1	3
4	1	1	1	3
5	1	1	1	3

1 engineer
19 days per idea
12 ideas/year

They discovered that, on average, completion of all four iterations of a design takes four days less per engineer using Rize vs. Fortus, and 16 fewer days vs. outsourcing. That four-day delay using Fortus means Rize is 20% faster per idea per engineer than Fortus and enables each engineer to produce 25% more designs than Fortus. Alternatively, if desired, it enables CPG's engineers to complete one additional iteration per idea per engineer in less time than it takes Fortus to complete four iterations.

Part Delivery Summary:

	OUTSOURCE	FORTUS	RIZE	RIZE (ALT)
# Days per idea/per engineer	32	20	16	19
# Ideas/year/per engineer	7	12	15	12
# Days for 100 engineers	3200	2000	1600	1900
# Ideas/year for 100 engineers	700	1200	1500	1200

- Rize 20% faster per idea per engineer than Fortus
- Rize 25% more ideas per engineer than Fortus

or

- An additional iteration per idea per engineer with Rize

When that difference extends across their 100 engineers, each averaging 12 unique ideas per year and each requiring an average of four iterations, the time implications for CPG became evident. The part delay adds up to 48 days per year per engineer or 4,800 total days of part delay per year across their 100 engineers.

Their analysis became even more compelling when they outlined and compared the costs of the two systems.

Cost Analysis

Initial Purchase Price:
The initial purchase price difference is clear. At $24,000, Rize is at least one-fourth the cost of the Fortus, $100,000+.

Annual Costs:
Consumables and maintenance agreements
Rize's costs for consumables and maintenance contracts are significantly less than Stratasys. In fact, the highest service contract for Rize, $3,500, is one-third the cost of Stratasys' service contract, $10,000+. And, Stratasys' consumables, $250Kg, are more than double the cost of Rize consumables, $99Kg.

The hidden costs of post-processing
The comprehensive costs associated with post-processing are frequently overlooked, including the materials, labor and special facilities, equipment and utilities required.

Since Rize is a zero-post-processing system, there are no post-post processing costs. That is not the case with Fortus. CPG spends $600 per year on the solvent in which Fortus 3D printed parts must be dipped for hours to remove the supports. Labor costs for post-processing run between $25,000-$50,000 per printer. Since CPG has six printers in addition to Rize One, their post-processing labor cost is between $150,000-$300,000 annually. However, for comparison reasons, the post-processing labor cost associated with CPG's one Fortus is between $25,000-$50,000 per year. In terms of facility space, CPG's additive manufacturing lab is 150 square feet. They have an additional 150 square feet of space dedicated to post-processing, amounting to approximately $4,500 per year in space needed for post processing vs. zero post-processing space needed for Rize. Moreover, their utilities and disposal costs associated with post-processing are at least $5,000 per year.

Rize APD and FDM methods of support removal following printing.

Uncovering the true cost of part delays

What does the 4,800 days of part delay per year, and therefore, delays in time to market, cost CPG? It's difficult to calculate specifically, but they estimate it could be millions of dollars.

In May of 2016, IndustryWeek Magazine interviewed a mid-sized manufacturer about this very topic. He explained that a competitor had beaten them to market with a new feature that was capturing their market share, potentially costing them $10 million in lost sales for the next year. Even if they could only regain half of the loss, every week of delay was costing them nearly $10,000 in lost profits, which is significant for a mid-sized company. If we apply those numbers to our CPG manufacturer, it would cost them nearly $7M in that one year. The cost of delays is of course dependent upon the value of the features, market and more.

Fortus and Rize One Cost Comparison:

	FORTUS	RIZE
SYSTEM	$100,000+	$24,000
MAINTENANCE CONTRACT	$10,000	$500-$3,500
CONSUMABLES	$250/Kg x 80 Kg/yr = $20,000	$99/Kg x 80 Kg/yr = $7,920
POST-PROCESSING SOLVENT	$600/yr	$0
POST-PROCESSING LABOR	$25,000-$50,000/printer	$0
POST-PROCESSING FACILITIES	Addt'l 150 sq. ft. x $30/sq. ft./yr. = $4,500/yr	$0
POST-PROCESSING DISPOSAL AND UTILITIES	$5,000/yr	$0
COST OF DELAYS	Part delay of 48 days per engineer/yr x 100 engineers = 4,800 days in total of part delays/yr ***What does that delay cost you? Millions?***	$0
TOTAL INITIAL	**$100,000+**	**$24,000**
TOTAL ANNUAL	**$90,100**	**$8,420-$11,420**

Considering all the above costs, CPG's analysis revealed that the total annual cost of the Fortus comes to $90,100 (excluding the estimated millions incurred due to part delays) vs. a maximum of $11,420 for Rize, using the top maintenance plan. This excludes the future cost implications of a competitor potentially beating them to market farther down the line due to part delivery delays and/or the risk of sub-optimal designs due to fewer iterations. Companies with multiple product lines would likely see exponentially greater cost impact.

Within just a few weeks of installing and using their Rize One 3D printer and completing their speed and cost analysis, the company began diverting as many print jobs as possible from Fortus to Rize One. Doing so is transforming their product design and development process.

"The time savings on part turnaround using Rize One is significant. With Rize One, we can deliver a usable part to an engineer the next day. You can imagine how this time savings escalates when taking into consideration the multiple iterations required for each component."
-CPG Lab Manager

ABOUT RIZE

Rize is transforming how products are designed and manufactured with our patented and versatile APD (Augmented Polymer Deposition) industrial 3D printing technology for your lab or office that enables you to iterate faster than any other technology, improving designs and exponentially speeding your entire R&D process. Our deeply experienced team of former Z Corporation, Objet and Revit materials, hardware and software experts, with over 20 patents, is fulfilling an unmet need for a completely office-safe and affordable 3D printing platform that can be used successfully across a wide variety of commercial applications, including, prototyping tooling, fixtures and jigs and customized end-use products. http://www.rize3d.com

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