AUTOMATED DEPOWDERING
GENTLE & EFFICIENT

EXECUTIVE SUMMARY

While 3D-printing is more and more used in the production, the demands placed on 3D-printed products are increasing. In order to remain competitive, companies must, in addition to ensuring high product quality, also pay attention to reducing costs for series production. Powder-bed processes, such as Multi Jet Fusion (MJF), Selective Laser Sintering (SLS) and High Speed Sintering (HSS), are commonly adapted technologies – but with high production costs. The post-processing is still a major cost driver today, but offers a high potential. Especially manual cleaning is time consuming and costly. Another problem is the high risk of damaging parts.

Meanwhile the DyeMansion Powershot C means a real alternative. This whitepaper discusses the advantages of automated part cleaning with the DyeMansion Powershot C compared to the problems occuring with manual cleaning.

PROBLEM

MANUAL CLEANING IS TIME CONSUMING AND EXPENSIVE

Manual cleaning forms the basis on which a part can be further processed. This process therefore also has an impact on the final part. Each individual part must be gripped by hand and blown off with a jet nozzle. For companies this means a high cost burden. In addition, the manual cleaning process takes a lot of time, which in turn reduces productivity and means long delivery times for high quantity orders. Also, the manual cleaning for each single part leads to increased personnel requirements.

SOLUTION

AUTOMATED CLEANING INCREASES THE PRODUCTIVITY

Using the DyeMansion Powershot C, up to 75% of an EOS P396 or HP Jet Fusion 4200 job can be cleaned in ten minutes. During the same period, significantly fewer parts can be cleaned manually.

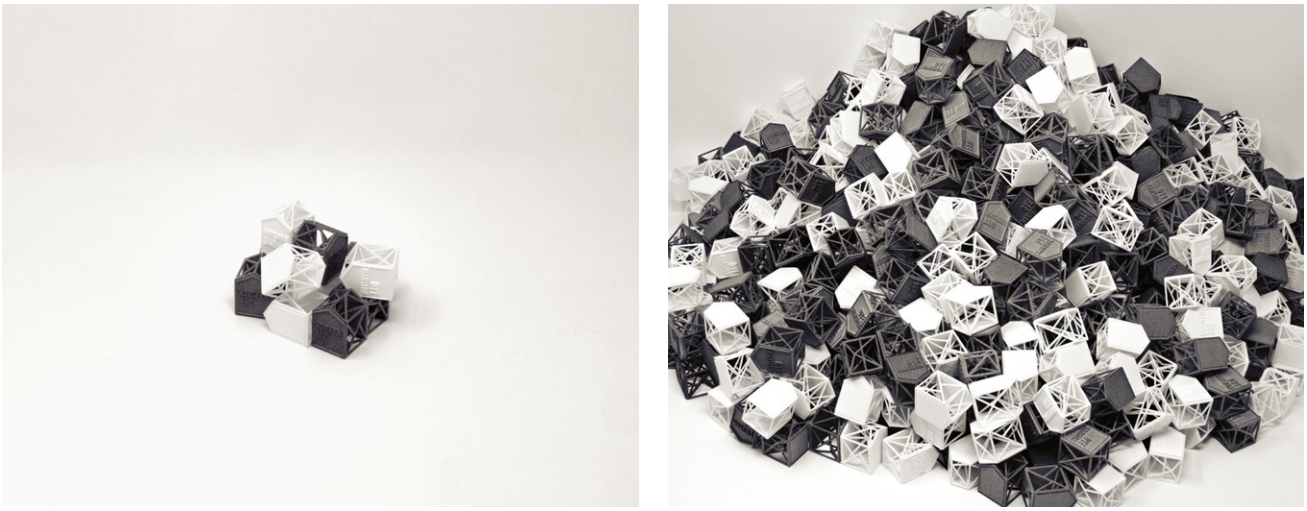


Figure 1: Comparison of manual and automatically cleaned parts within ten minutes

THE MANUAL LABOR TIME IS REDUCED

By using the DyeMansion Powershot C, in average only 4 minutes of work per job are required for loading and unloading the machine, while manual cleaning takes signifi cantly longer for the same capacity.

The following comparison of the actual amount of work involved shows how valuable time can be saved with the DyeMansion Powershot C.

This is a model calculation: The time required for cleaning is highly dependend on part size and volume.
The model calculation is based on the following assumptions:

Manual cleaning (part dimensions: approx. 3cm x 2,5cm x 2,5cm – lattice structures): 100 parts x 30 seconds manual cleaning per part x 3 runs/day x 5 days/week x 50 weeks/year + 4 minutes for machine loading and unloading per run x 3 runs/day x 5 days/week x 50 weeks/year = 675 hours/year vs. 50 hours/year with the Powershot C

Figure 2: Comparison of the manual labor time required for manual cleaning and automated cleaning with the DyeMansion Powershot C

SOLUTION

AUTOMATED PART CLEANING SAVES SPACE AND MANPOWER IN YOUR PRODUCTION

ONE DYEMANSION POWERSHOT C REPLACES UP TO FOUR MANUAL BLASTING SYSTEMS

Investing in automated depowdering increases your efficiency in many ways. Due to the short cycle time per run of 10 minutes, a Powershot C can replace up to four manual blasting cabinets.

If we stick to the assumptions from above (Figure 2) and assume that the required time for manual powder removal per part is 30 seconds and the loading/unloading time per run is 4 minutes, 100 parts will have a processing time of 54 minutes. In the Powershot C, the same 100 parts can be cleaned within 14 minutes (4 minutes loading/unloading + 10 minutes automated depowdering per run). In order to process the same throughput of parts at the same time as with the Powershot C, up to four manual blast machines would be required. The Powershot C thus ensures not only reduced cycle times, but also reduces your required production space and manpower.

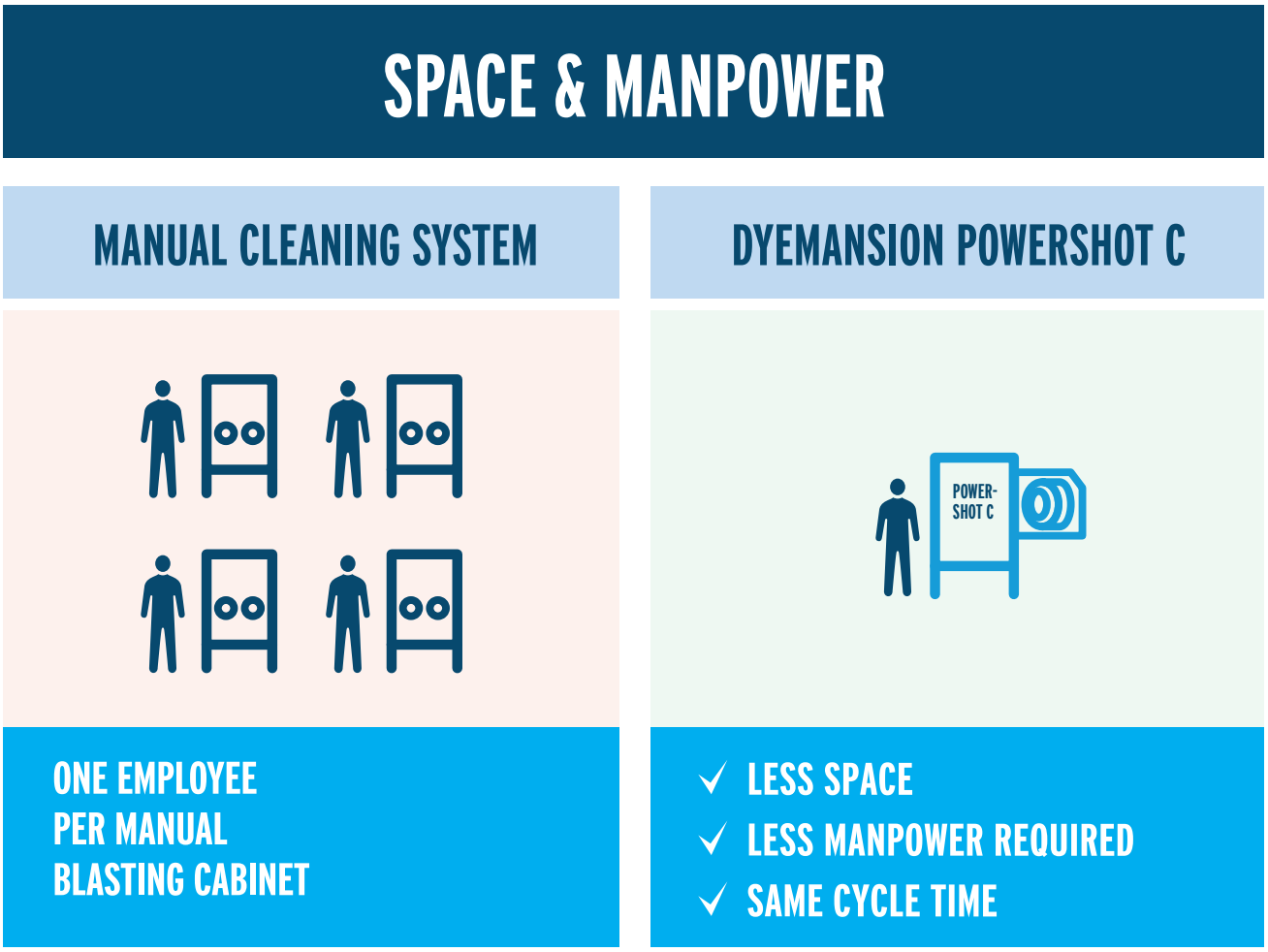
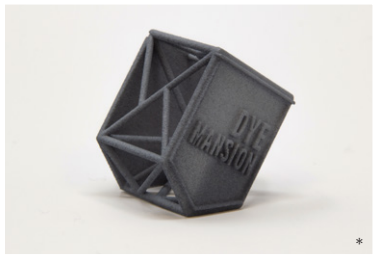


Figure 3: Comparison of required production space and manpower needed for manual blasting cabins vs. the DyeMansion Powershot C

PROBLEM

MANUAL CLEANING CAN DAMAGE THE PARTS

Due to the poorly uniform irradiation distribution, which is unavoidable with manual cleaning, part damages of various kinds can occur. Damaged parts have to be re-produced, which means additional time and costs.



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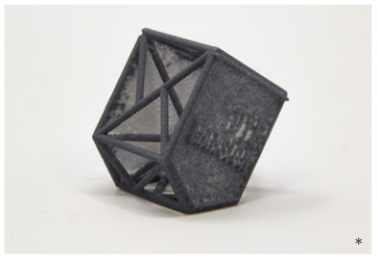
PRESSURE MARKS

Pressure marks occur, for example, when the operator covers points by holding the parts. This results in uneven cleaning. Pressure marks are often only visible after dyeing.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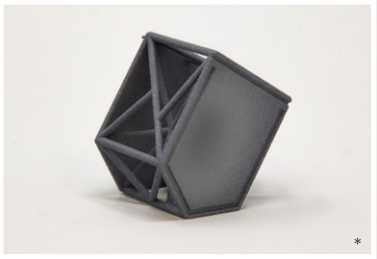
POWDER RESIDUES

Particularly in the case of parts with complex geometries and pockets with different depths, powder residues often stay during manual cleaning. That can cause an inconsistent coloring.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BURN MARKS

Burn marks on parts are caused by too short distance, too long irradiation and too high pressure. Affected parts cannot be colored reproducibly afterwards.

* The damages are demonstrated on grey colored parts.

SOLUTION

AUTOMATED CLEANING ENABLES A GENTLE SURFACE TREATMENT

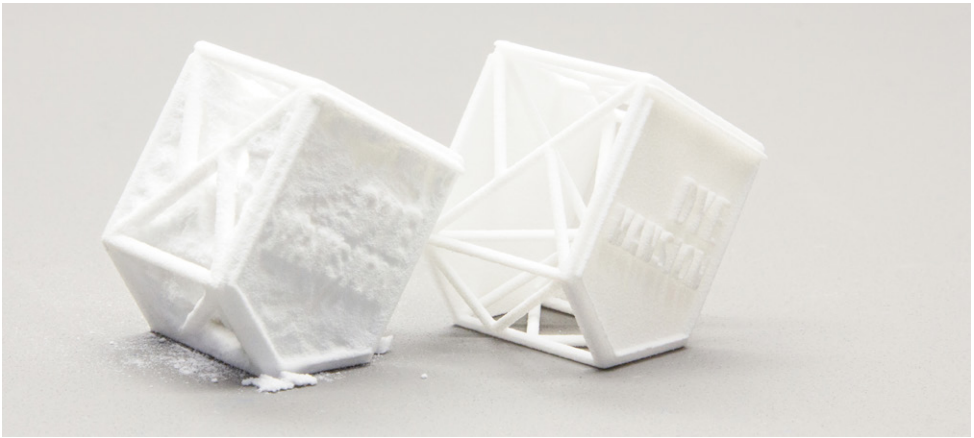
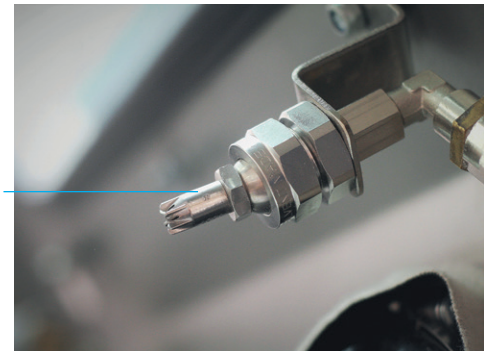
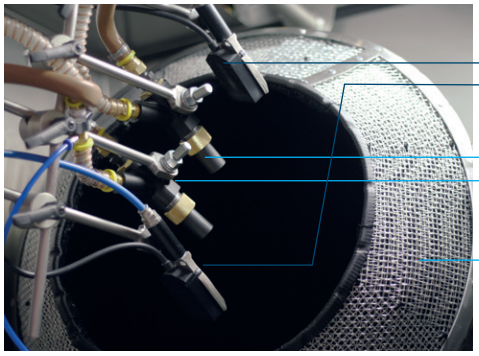


Figure 4: Parts before and after automated cleaning with the DyeMansion Powershot C

GENTLE SURFACE TREATMENT ALLOWS EFFICIENT PART CLEANING WITHOUT AFFECTING THE SURFACE





The uniform rotation of the parts in the rotating basket at a constant distance from the blasting nozzle setup ensures a reproducible blasting process without damaging the parts – regardless of the part geometry. Integrated ionizing nozzles achieve powder and glass-free parts in just a few minutes. The adjustable cyclone separates the excess powder and damaged blasting media from the glass beads and ensures that only clean and functional blasting media returns to the cleaning process and thus stabilizes the process sustainably. Clean depowdered parts play a major role when it comes to the quality of the end product.

SPECIFICATIONS POWERSHOT C

TECHNICAL DATA

PERFORMANCE	
Capacity	Up to 75% of EOS P396 or HP Jet Fusion 4200 build job
DIMENSIONS (L X W X H)	
Blasting cabinet	1665mm x 1300mm x 2030mm 65.6inch x 51.2inch x 79.9inch
Required space for operations	2465mm x 2915mm x 2300mm 97.0inch x 114.8inch x 90.6inch
POWER	
Connection	400V, 50Hz, CEE 16A or 208V, 60Hz, NEMA L21-20A
Consumption	1 kW
Noise Level	> 85dB
COMPRESSED AIR	
Connection	Hose nozzle, Air tube inside Ø 19mm | 3/4" or 1/2"IT
Consumption	**Recommended:** 1.4m³/min at 2.2bar | 50cfm at 32psi **Maximum:** 2.5m³/min at 7bar | 88cfm at 101psi

EASY HANDLING OF THE DYEMANSION POWERSHOT C

1 **LOAD MACHINE**

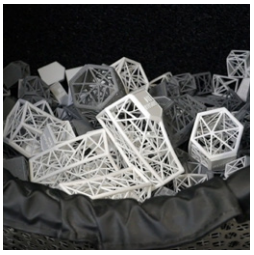
2 **START AUTOMATED CLEANING PROCESS TIMER**

3 **START MACHINE**

4 **AUTOMATED CLEANING PROCESS**

5 **UNLOAD MASCHINE, READY FOR NEXT JOB**

Cycle time: 10 minutes



Cleaned parts

Figure 5: The process of automated part cleaning with the DyeMansion Powershot C

DYEMANSION POWERSHOT C
AT A GLANCE

SIGNIFICANT INCREASE OF PRODUCTIVITY

With the DyeMansion Powershot C, parts can be completely cleaned within only ten minutes. This provides significant productivity benefits, saving time and money.

GENTLE PROCESS AVOIDS PART DAMAGES

The uniform rotation of the blasting basket prevents damage caused by irregular distance and pressure during manual cleaning. The Powershot C is the first step in the DyeMansion Print-to-Product Workflow, which turns raw parts into high-value products.

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