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TRANSACTIONAL BILLING OF 3D PRINTED PARTS

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Title: Transactional Billing of 3D Printed Parts

This disclosure relates to the field of 3D printing, and in particular, to the approach of paying for the operation of a 3D printer. As with any industrial machine, 3D printers require a variety of consumable supplies and parts for printing. The cost of purchasing these supplies can be large and calculating the cost of final parts based on the usage of these supplies can be difficult.

To resolve these difficulties, a system is disclosed to provide transactional billing of finished parts through the use of Internet-connected 3D printers that allow accurate, centralized tracking of what was printed. This system provides a well-known cost for the printed parts, while shifting the burden of managing the cost of supplies onto the provider.

Key components of this system include an Internet-connected 3d printer, the Internet, one or more upload servers to receive printing data from 3d printers, one or more web application servers to run application logic, and one or more database server to store relevant data. These servers may be combined and run on one physical server.

The first step is that the customer submits a print job to the printer, and the printer prints it. When the printer is done printing, it uploads details of the print job to the upload server. These details include information enabling the provider to deliver continued service to the customer and accurately compute the cost of the print job: e.g.: supplies consumed, wear and tear on parts, and perhaps other metrics specific to the printing technology. A unique job identifier is defined by the printer or assigned at the time the data is uploaded. The exact details uploaded may vary by implementation or printer model.

Based on this uploaded data, and with knowledge of the 3D printing system in question, the application calculates the cost per unit of usage. The precise mechanism varies by implementation but possibilities include:

- A cost based upon a contractually agreed upon formula. In this embodiment, the application references the agreed formula, perhaps specific to each customer, and applies the result.
- Alternative implementations include additional factors specific to similarly situated customers: e.g.: currency, market segment, country, and 3D printing systems: printer model, material type, etc. Other factors are possible. Each combination of factors may represent one row in a database table that is then referenced by the application logic but other implementations are possible.

Using the selected pricing formula, the selected pricing constants based on the printer model, mode, and material, and variables from the print job, the application server calculates the cost. An example formula is: BUILD_INITIATION_PRICE + (FULL_BUILD_PRICE + (NEW_MATERIAL_SURCHARGE * job_remix_ratio)) * job_build_height_percentage) * (job_print_mode==”DRAFT” ? DRAFT_MODE_DISCOUNT : 1.0). Other formula may be derived and selected that take into account additional factors specific to a given printing technology.

The calculated cost is then stored in the database, associated with the unique job identifier, as well as with the printer serial number, and customer account. Under the rules of whatever business model is applied on top of this invention, the collection of cost records specific to each customer are collected at the end of each billing cycle and aggregated into a billing statement

The results of the billing statement are communicated to the customer, e.g: as an invoice presented for payment.

This system allows for accurate accounting of fused material, build height, print mode, and other key characteristics and transmission to a centralized location where it can be used to charge the customer based on usage (outputs), rather than raw materials, supplies, and other consumables (inputs).

By using this solution to charge for output, rather than inputs, the end-user has reduced uncertainty and up front costs, which can in turn lead to increased adoption and usage of 3D printers. Compared to traditional approaches to paying for supplies up front, this model offers cash flow advantages to customers who can save up front costs and get more predictable control over their costs.

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