



Dedicated to the Art of Clear Aligners

The Stratasys J700 Dental
3D Printer





The Current Clear Aligner Market

A recent survey of U.S. workers found 96% believe a pleasing smile is an important aesthetic feature. For many, however, achieving this winning smile requires a treatment plan to overcome orthodontic issues, namely braces. But the negative aesthetics associated with metal braces, as well as perception of the significant discomfort and pain associated with them has helped fuel the rise of clear aligners. Notably, studies indicate that clear aligners are associated with less pain of treatment and less impact on quality of life.

Consequently, the rise of clear aligners as a treatment method for crooked teeth is poised for explosive growth, both in the U.S. and globally. Estimates point to an expected compound annual growth rate of nearly 13% for the clear aligner market for the period 2016-2020. The expansion and acceptance of aesthetic procedures, growth in disposable income, and procedural availability, all contribute to these projections. North America is the largest market and is expected to account for more than 63% of the total market share by 2020. Specifically, clear aligners which dominate this segment, are forecast to generate revenue of roughly \$2 billion by 2020.

Clear aligners are a valid treatment option for six million of the estimated 10 million orthodontic cases each year. However, to date, the current clear aligner market leader has captured only nine percent of those six million cases.

This means it is a critical time to enter this market, as large suppliers and manufacturers in the dental industry who are early to market with clear aligner production have the potential to capitalize on this high-growth industry. Both established labs and new entrants to the market can benefit from this growth by taking advantage of scalable, 3D printing solutions which offer an alternative to large-investment 3D printers. Regardless of the size of your current lab, there is significant opportunity to capitalize on the projected explosive growth in the clear aligner market in the next few years.

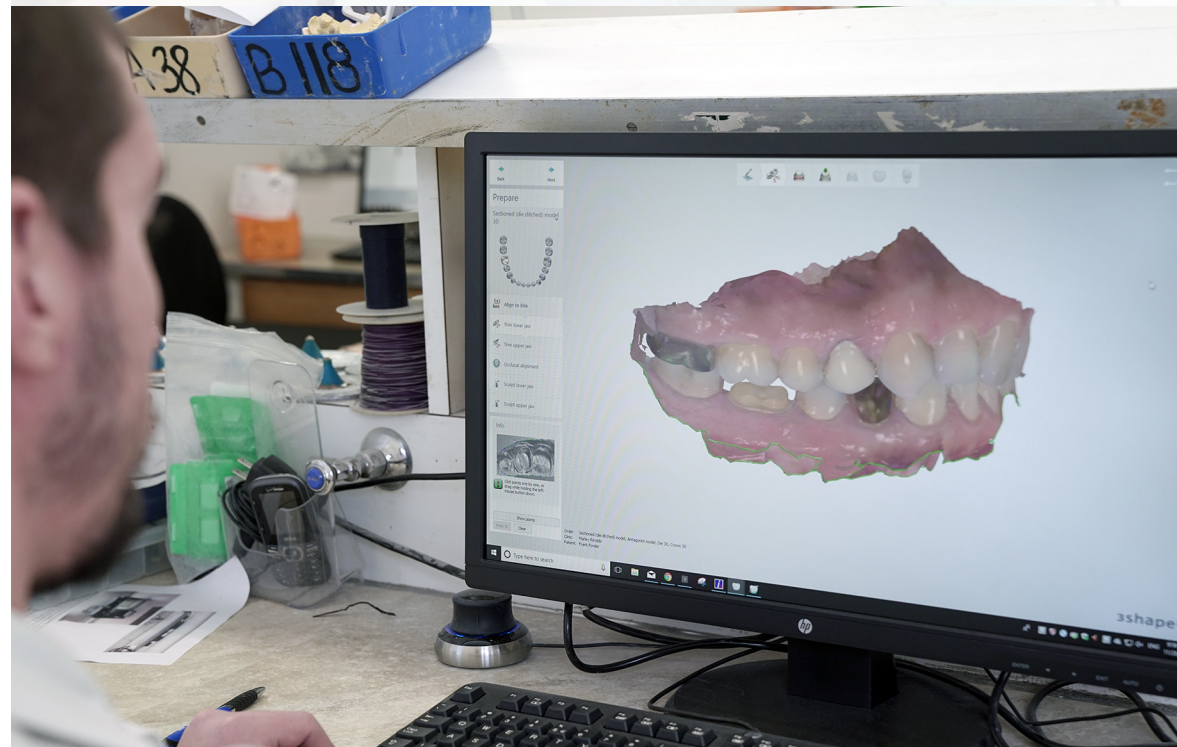
Clear Aligner Process

Clear aligners are produced through a simple process: scan, design, produce and ship:

1. Intra-oral scan files or a molded arch is generated by the dentist and sent to the dental lab.
2. The lab receives the scan or mold and either takes the digital file or converts the mold into a digital file with a digital scanner. Third party software is used to perform the design steps that move the teeth to proper alignment through a stepwise, incremental process.
3. The digital file is directed to the Stratasys J700 Dental™ 3D Printer through the GrabCAD Print™ software interface to optimally lay out the arches. This accurate, repeatable process can produce up to 50-60 scans per print tray, depending on geometry.
4. The 3D printed arch goes through a simple support removal process.
5. This clean model is then put on a thermoforming machine where clear plastic polymers are heated and molded over the form. Trimming and removal of the clear aligner from the model after thermoforming is the only step remaining before shipment to the dentist. Arches can be discarded or shipped to the customer with the aligners, based on manufacturer preference.



Intra-oral scan files are generated by the dentist and sent to the dental lab.



Dental labs review patient scan data to optimally lay out patient arches.

Limitations of Existing 3D Printers for Clear Aligner Production

In the past, clear aligner production has relied upon a process that required large capital expenditures, lengthy setup, training and post-processing.

Stereolithography (SLA) is the current technology of choice to produce arches, although the barrier to entry expense is very high. The process is complex and requires lengthy set-up and skilled technicians to maintain and operate. This multi-step process requires curing which can introduce error to the arches while also exposing technicians to toxic resins. Finally, the high initial printer expense can make it difficult to fund without a built-in market prior to purchase, a significant barrier to production organizations. Also, this process is not easily scalable, due to the high cost of procurement.

There has not been a high-volume, cost-effective, easy-to-use, high-quality alternative for the growing clear aligner market – until now.



The J700 Dental Solution

The Stratasys J700 Dental 3D Printer is dedicated to the production of clear aligners; it is the only 3D printing solution optimized for clear aligner production out of the box. This specialized technology enables a stable, turnkey solution alternative to the lengthy setup and calibration of legacy printers, and produces high-quality, accurate, repeatable clear aligners. The J700 Dental does not sacrifice quality to achieve its high output capacity and ability to operate 24/7; it exceeds industry standards for accuracy.

Priced at roughly one-quarter of alternate clear aligner processes, the J700 Dental provides a short payback period and the option to expand as your business grows. Ease-of-use and interconnectivity of the J700 Dental means your lab can be up and running, producing high-quality clear aligners in hours, rather than weeks.

Right out of the box, the J700 Dental's automated initial calibration takes only hours, and requires no specific expertise to begin producing high-quality arches. With Business Insight (BI) technology that determines optimal print configuration, materials levels, and keeps a continuous log of output, operating the J700 Dental is both simple and fast. In a matter of hours, your lab is capable of producing 400 clear aligners per day.



The Stratasys J700 Dental 3D Printer is capable of producing 50-60 arches per print tray.

The J700 Dental Solution

50-60

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The high-speed throughput of the J700 Dental produces clear aligners at a rate of 50-60 clear aligners per setup



The Stratasys J700 Dental 3D Printer is optimized for the production of clear aligners.

The J700 Dental is built on industry-leading Stratasys PolyJet™ technology with high-quality engineering that:

- Creates high-quality arches due to 55-micron layer height on Z axis.
- Mitigates material leakage by employing X-chain protected tubing to ensure that with prolonged use (over 10,000 hours).
- Limits machine down-time and reduces machine issues such as data shift by employing cable strain relief on difficult junctures where cables can deteriorate with prolonged use (over 10,000 hours).
- Ensures optimal print quality through improved support for resin tubes. This standard support configuration means ease of use on different cleaning methods.
- Is optimized for large tray printing.
- Includes an optimally designed head for extended lifetime, ensuring fewer replacements are needed.

The J700 Dental enables large scale, production-grade arches with high reliability and 24/7 usage. The high-speed throughput of the J700 Dental produces clear aligners at a rate of 50-60 clear aligners per setup, depending on geometry, a capacity on par with systems costing three to four times as much. Even with this fast production rate, the J700 Dental produces high-quality models with excellent surface finish that are repeatable and accurate. Patient information gathered via traditional molding process or via intra-oral scanners means your lab will have the high output and efficiency only possible with a completely digital workflow.

Plug-And-Play Technology

The true ease of use of the J700 Dental begins with set-up and calibration, allowing for minimal at-printer setup. Most of the stages can be calibrated automatically and automatic maintenance reminders alert you when recalibration is needed.

With the Stratasys J700 Dental, setup is streamlined so the high throughput of the printer can be optimized right out of the box. The J700 Dental comes equipped with several easy and efficient calibrations:

Accuracy calibration: manual on machine takes roughly two hours, including print time.

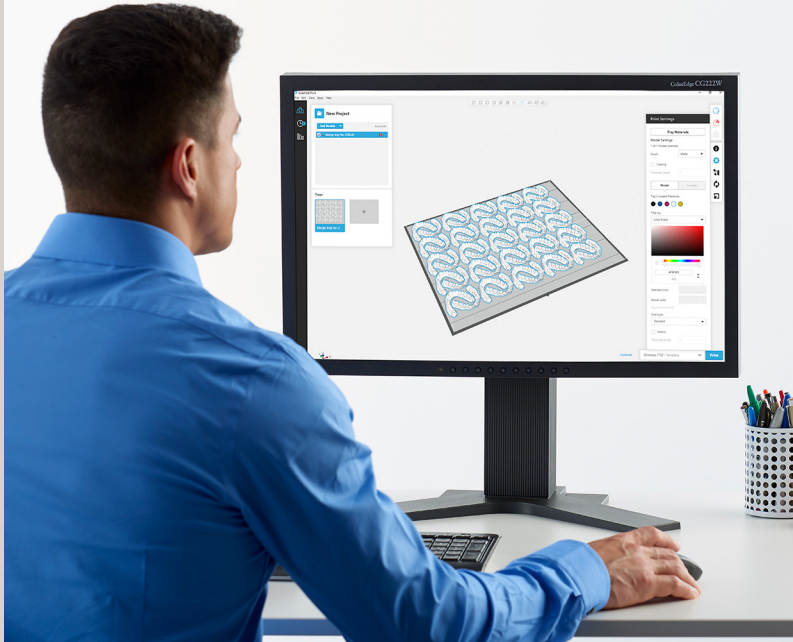
- Simple Accuracy Calibration: manual, partially automated
 - Head Optimization Wizard: fully automated
 - Head replacement: fully automated
 - Optimized head voltages: fully automated
 - UV calibration: fully automated

Quick and easy accuracy calibration with a fluid user interface:

- Parameter Database Editor: double click an application and have ready access to anything related to calibration
 - Replaces editing .ini and other files manually
- Offset Accuracy Test (OAT)
 - Print a 3-pass job
 - Measure wall thickness using a micrometer “three clicks”
 - Input average wall thicknesses into Parameter Database Editor
- With the need for high-volume production of clear aligners to support growing market demand, the J700 Dental was designed and tested for round-the-clock usage without any loss of quality of repeatability.



The J700 Dental is capable of round-the-clock production of up to 400 arches per day.



GrabCAD Print production management software enables a fully digital workflow for arch production.

GRABCAD PRINT

The integration of GrabCAD Print production management software guarantees a simplified, all-digital workflow. Qualification of your print is fast and integration into your existing workflow is effortless. A centralized printer management system means everything from automatic material management to print monitoring can be done remotely, via the Cloud, for truly lights-out manufacturing.

With an optimized program and a slicer for arch and clear aligner production, the J700 Dental has thousands of hours of testing behind its release and offers the highest quality, resolution and accuracy available for clear aligner production. With GrabCAD Print, clear loading symbols on the console mean your lab can always know what stage your process is in. GrabCAD Print enables:

- Optimized scheduling of patient cases.
- Monitoring multiple printers from a centralized console.
- Optimized individual print trays.
- Automatically tracking material consumption and machine utilization thanks to GrabCAD tracking software.
- Installation on the embedded computer and connection via the internet.

- Cloud functionality.
- Queuing, modifying, resuming and restarting jobs from any internet-connected location around the world.
- Live updates – just set up GrabCAD Print to notify you when your job is complete or pauses, to ensure optimal uptime and efficiency.
- Continuous updates to your software with new enhancements which make 3D printing easy.

GrabCAD Print has Business Intelligence that enables:

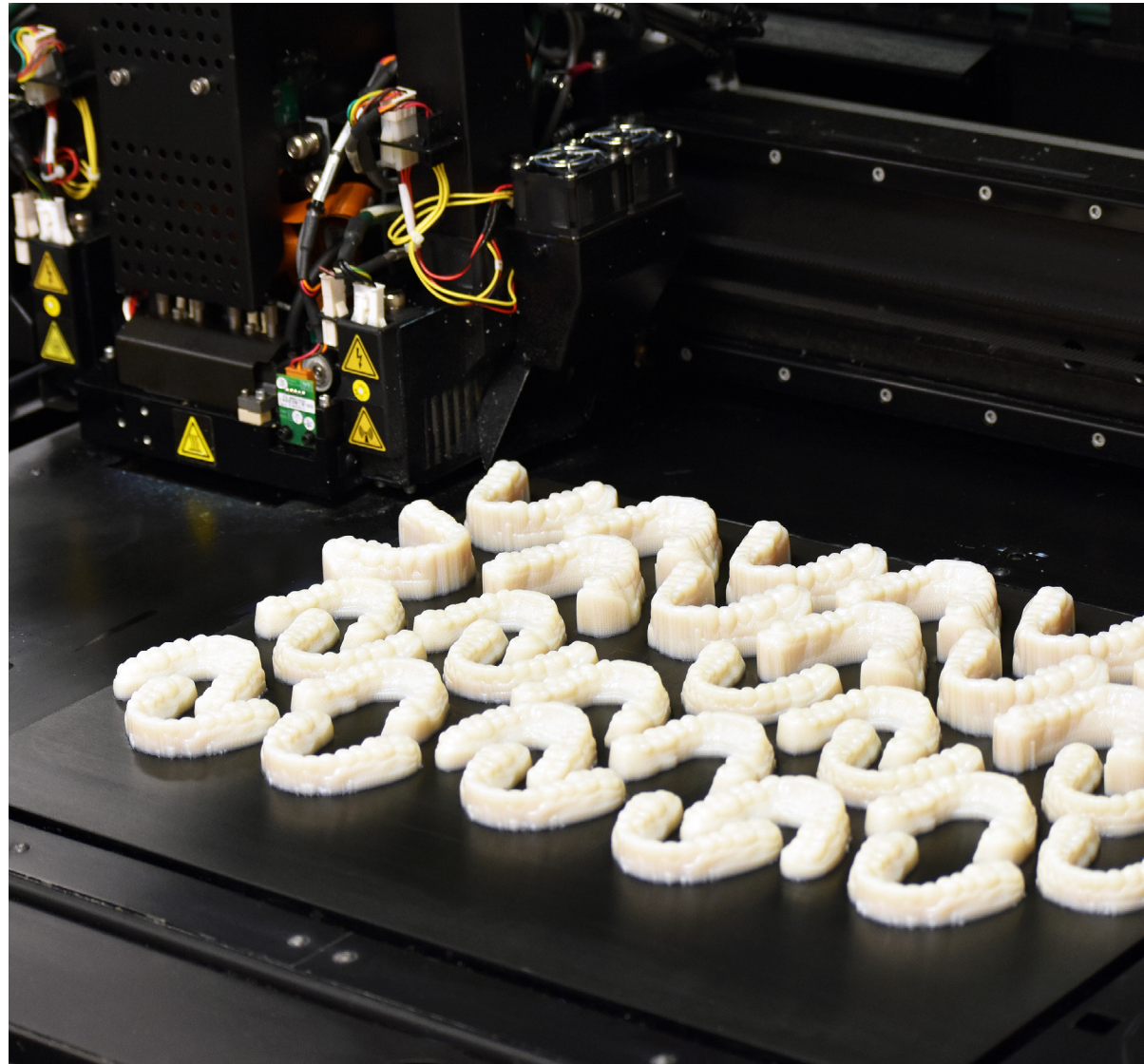
- Machine utilization data.
- Material consumption data.
- Historical information on all print jobs.

Scalability

A particularly winning feature of the J700 Dental is its scalability, which makes it possible to grow production as you increase your customer base. With interconnectivity to any number of printers through one centralized printer and cloud-based interface along with GrabCAD Print software, workflow is easily adjusted by simply adding more printers, regardless of the size of your print lab.

Additionally, GrabCAD Print provides you with the data necessary to understand how you need to scale. Backlog queues generate data to indicate optimal printer flow, ensuring you know exactly when and how many additional printers your lab could utilize.

The ease and information provided by GrabCAD Print makes the J700 Dental easy to install, easy to reorder material, and easy to integrate directly into your current process.



With build trays capable of 3D printing 50-60 arches at a time and interconnectivity through a single source, the J700 Dental ensures your lab can be fully scalable.

Accuracy

Once calibrated, the J700 Dental retains 100 +/- micron accuracy (above industry standard) on models for 3+ months.





Materials

The J700 Dental has been optimized for two materials for clear aligner production, MED670 and SUP705.

Material traceability means you have the ability to track the materials used on each job back to the resin lot and canister. This means you do not have to discard the entire vat if there is contamination, unlike vat-based systems where it is impossible to track which material was used to make a particular tray.



Post-Processing

The J700 Dental easily fits into your lab or manufacturing workflow, with no need to invest in industrial post-processing equipment. This eliminates safety issues and workflow considerations. Also, the lack of post-processing means there is no handling of the uncured models by operators, eliminating the risk of model distortion through secondary post-processing steps. Simply remove support material with any accepted cleaning process. Arches produced by the J700 Dental can be quickly and easily cleaned using a waterjet system.

Conclusion

The Stratasys J700 Dental is the only 3D printer optimized out of the box for clear aligner production, capable of high-output printing with no loss of quality. The process is highly repeatable and easily scalable to ensure the highest productivity for your lab. Powered by GrabCAD Print software, the J700 Dental has cloud-based connectivity and virtually unlimited scalability, all from a single source.

With cloud-based connectivity, scalability and GrabCAD Print software, the Stratasys J700 Dental is fully optimized for clear aligner production.



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