VSP®
Virtual Surgical Planning

3D SYSTEMS®
Virtual Surgical Planning

VSP provides surgeons with clear 3D visualization of a patient's anatomy to develop a surgical plan prior to entering the operating room. In addition to a detailed case report, patient-specific surgical guides, models and instruments are designed and 3D printed for use within the sterile field.

Surgical planning results in reduced time in the operating room and improved outcomes that benefit both patients and surgeons.

Peer-reviewed journal articles substantiate the clinical benefits of VSP's efficient workflow that result in enhanced confidence and accuracy.

COMMON APPLICATIONS

- Orthognathic surgical planning with 3D printed intermediate and final splints (VSP Orthognathics).
- Mandibular or maxillary reconstruction with free flaps and full jaw reconstruction (VSP Reconstruction).
- Trauma reduction surgery with repositioning guides and / or augmented DICOM data for navigation assistance (VSP Trauma).
- Distraction osteogenesis planning includes vector positioning and distractor placement (VSP Distraction).

VSP PROCESSES

1. Medical imaging data is prepared for the webmeeting.
2. Surgical planning webmeeting takes place between the surgeon and 3D Systems engineers.
3. Patient-specific disposable instruments (splints, guides) are designed.
4. Instrument design is reviewed on a detailed case report and approved by surgeon.
5. 3D printed models, guides and templates for the case are manufactured and shipped.
6. Models, guides and templates are used in surgery.
Virtual Surgical Planning - improving lives with personalized care.

VSP Reconstruction

VSP Reconstruction provides an enhanced view that reveals the complexities of a case before entering the operating room.

Example VSP Reconstruction deliverables include:

- Reconstructed model of the anatomy showing the proposed post-operative outcome with graft in place.
- Patient specific resection guide(s) for the maxila and/or mandible, to allow accurate transfer of the digital plan.
- Graft osteotomy guide for the donor site that contains precise osteotomies to create closing wedges, if needed.
- Metal instrument(s) that fit into the resection or osteotomy guides to provide for more accurate osteotomies and eliminate debris.

Patient-specific hardware options

Fibula osteotomy guide

Mandible resection guide

JAW IN A DAY®

The Jaw in a Day procedure utilizes state-of-the-art digital CAD/CAM technology to create a personalized surgical plan and design patient specific instruments for a single-stage dental rehabilitation. Placement of a provisional dental prosthesis eliminates the need for multiple surgeries, and enables patients to emerge after a single surgery with a full jaw reconstruction including dental rehabilitation.

This process shortens procedure time, streamlines treatment, reduces operating costs and allows patients the convenience of a single surgery.
VSP Cranial

3D Systems’ VSP Cranial product applies proven and FDA-cleared virtual surgical planning techniques to craniofacial cases, especially procedures related to craniosynostosis and cases that require cranial vault distraction.

Building on the success of the renowned VSP service, VSP Cranial delivers improved surgical outcomes to surgeons by supplying the digital tools, 3D printed surgical guides and access to the expertise surgeons need to apply precision to craniofacial surgery.

Features:

- Online web meetings between 3D Systems Healthcare experts and the surgeon for planning of complex osteotomies
- Accurate pre-surgical visualization of cuts and movements
- Real-time comparison to select age-matched normative anatomical contour
- Personalized marking and positioning guides for realization of digital plan
- Provision of images, measurements, precision 3D printed models, marking and positioning guides

VSP Trauma

Surgeons benefit from the improved visualization and 3D understanding provided by VSP Trauma. These time sensitive, complex cases utilize a combination of models, guides, templates and digital images to support the virtual plan. Example VSP Trauma deliverables include:

- Digitally reduced, perfected or mirrored anatomical models for a more simplified approach to reduction.
- Custom osteotomy and positioning guides.
- Occlusal-based positioning splints.

VSP Distraction

The 3D anatomy visualization provided in a VSP distraction session reveals underlying tooth roots and nerves to optimize device position. This customized plan is used to:

- Determine the placement of osteotomies.
- Identify a distraction vector plan.
- Create templates to guide device placement.
- Facilitate pre-operative hardware setup.
VSP Orthognathics

Healthcare providers are transitioning from traditional model block surgery to a more accurate and anatomically based personalized surgical method.

VSP Orthognathics accurately integrates bony anatomy from CT/CBCT data with occlusal data from high resolution scans to fabricate splints, guides, and other tools via 3D printing.

**SPLINT AND GUIDE DESIGN**

- Patient presents with Class III malocclusion. Surgical planning to include a mandibular setback and LeFort I advancement.
- High resolution scans of the occlusal surfaces are integrated with the CT/CBCT data.
- Accurate osteotomy simulation tailored to clinical requirements.
- Real time 3D bony movement and cephalometric analysis.
- Post-operative surgical result shows balanced facial proportions.

Customized to your patient, a range of splints and guides are available to accurately cut and position anatomy.
Getting Started
Contact us to learn more about Virtual Surgical Planning at vsp@3dsystems.com or +1 720 643 1001. An interactive orientation is available to experience planning a case.

Peer Reviewed Journal Articles
Would you like to learn more about how VSP has impacted clinical care? A large group of peer reviewed journal articles substantiate the uses of VSP products. Visit www.3dsystems.com for a complete bibliography.

3D Printing Technology
3D Systems offers a broad range of 3D printer technologies and materials. Virtual Surgical Planning uses Stereolithography (SLA) for the versatility, accuracy and ISO 10993 tested biocompatible materials. VSP materials allow for sterilization for use in the operating room and <30 day intra-oral splints.

Healthcare Solutions
3D Systems is a pioneer for healthcare solutions that improve outcomes which benefit both patients and surgeons. Our global team works with customers to help navigate technologies and provide support for surgical planning, training, device design, personalized medical technologies and 3D printing. We are dedicated to helping medical professionals train for, plan and practice complex medical procedures to achieve better patient outcomes.

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