Revolutionizing Healthcare:

Harnessing the Power of Advanced Manufacturing Technologies

ADDMAN®

Abstract

In this in-depth eBook, we will explore the diverse technology portfolio of ADDMAN and its comprehensive ability to support medical applications across various fields. From Polymer 3D Printing to Metal Additive Manufacturing, Injection Molding to CNC Machining, we will delve into the remarkable capabilities and advancements that are revolutionizing medical manufacturing.

Embracing a Full Range of Technologies for Medical Device Manufacturing

Chapter 1 | page 04

Unlocking the Potential of Polymer 3D Printing

In this chapter, we delve into the world of Polymer 3D Printing and its immense potential in healthcare.

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Redefining Possibilities with Metal Additive Manufacturing

In this chapter, we shift our focus to Metal Additive Manufacturing, and explore cutting-edge materials and advanced processes.

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Unleashing the Power of Injection Molding

In this chapter, we shine the spotlight on Injection Molding as a key player in mass production.

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This chapter uncovers the significance of Class 8 Cleanroom manufacturing in the realm of medical devices.

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Precision Engineering through CNC Machining

In this chapter, we explore the realm of precision engineering through ADDMAN Precision's CNC Machining capabilities.

ADDMAN's Polymer 3D Printing Capabilities Are Powered By

DINSMORE
AN ADDMAN GROUP COMPANY

From Concept to Care: The Game-Changing Advantages of Polymer 3D Printing in Medicine

01

This chapter delves into the principles and advantages of Polymer 3D Printing, uncovering transformative potential and highlighting the remarkable benefits it is bringing to the medical industry.

Polymer 3D Printing has emerged as a game-changing technology in the medical industry, revolutionizing the way we approach patient care, surgical intervention, and medical device development. By harnessing the power of computer-aided design (CAD) software and layer-by-layer additive manufacturing techniques, medical professionals can create intricate anatomical models, surgical guides, and patient-specific implants. This level of precision not only enhances the accuracy of surgical interventions but also enables personalized treatment plans tailored to each patient's unique anatomy.

Enhancing Patient Care through Biocompatible and Medical-Grade Materials

One of the key advantages of Polymer 3D Printing in the medical industry is the ability to utilize a wide range of biocompatible materials. From medical-grade thermoplastics to bioresorbable polymers, these materials offer exceptional compatibility with the human body. This opens up new possibilities for creating implants, prosthetics, and surgical tools that are not only safe and reliable but also seamlessly integrate with the patient's biological systems. The biocompatibility of these materials reduces the risk of rejection and promotes faster healing and recovery.

POLYMER TECHNOLOGIES FOR MEDICAL

Stereolithography (SLA): Uses a laser-cured liquid resin to create precise prints. It is valuable in the medical field for using biocompatible materials, clear resins for improved visualization, patient-specific models, smooth surface finishes, rapid prototyping, customized models for medical devices, biocompatible wearables, and sterilizability.

Multi Jet Fusion (MJF): Is a fast and precise 3D printing ideal for prototyping, product design, and small-scale manufacturing. MJF offers strong mechanical properties, versatile coloring, and compatibility with medical-grade materials. It produces functional prosthetics using durable, lightweight Nylon PA material. MJF prints are isotropic, cost-efficient, and exhibit production-grade material properties.

Fused Deposition Modeling (FDM): Is a fast and cost-effective 3D printing method that uses melted thermoplastic filaments. It is ideal for creating functionally strong prototypes, sterilizable medical devices, biocompatible wearables, and customizable thermoplastics. FDM also helps reduce costs in medical device prototyping.

Polyjet: Enables multi-color prints and models with both rigid and flexible components. While PolyJet prints can be brittle and may require post-processing for a smooth surface, it is valuable in the medical field for patient-specific models, detailed study and planning, practicing procedures, and medical education.

BIOCOMPATIBLE MATERIALS

ABS-M30i

ABS-M30i is a specific type of polymer material designed for 3D printing using the Fused Deposition Modeling (FDM) technology. It is an industrial-grade thermoplastic known as Acrylonitrile Butadiene Styrene (ABS). The "M30i" designation indicates that it is a medical-grade version of ABS. ABS-M30i is specifically formulated to meet the biocompatibility standards required for medical and healthcare applications. It possesses several desirable properties, including high strength, durability, and heat resistance. It is also known for its excellent dimensional stability, allowing for accurate and reliable 3D printed parts.

This material is often used in the production of functional prototypes, end-use medical devices, surgical tools, and other healthcare-related applications. It has been tested and certified for biocompatibility standards such as ISO 10993-1 and USP Class VI, ensuring its safety for contact with the human body.

It's worth noting that ABS-M30i is a proprietary material offered by Stratasys, a leading manufacturer of 3D printing systems. As such, it may be primarily compatible with Stratasys printers or specific FDM systems that support this material.

BioClear

BioClear is a specific material used in Stereolithography (SLA) 3D printing technology. It is a resin developed by Somos® specifically designed to be shatter-resistant, ensuring that the printed parts remain intact and durable throughout various stages of their lifecycle. This resistance to breaking makes BioClear suitable for shipping, accidental dropping, and even during surgical procedures where delicate handling is required.

It's important to note that while BioClear is suitable for medical applications, it is not intended for use as an implantable material or for direct and prolonged contact with bodily tissues. Its primary application lies in the prototyping and production of medical devices that do not require long-term interaction with the body.

Overall, BioClear provides a valuable solution for creating robust, detailed, and shatter-resistant parts in the field of medical device development and prototyping.

Medical-Grade White Nylon

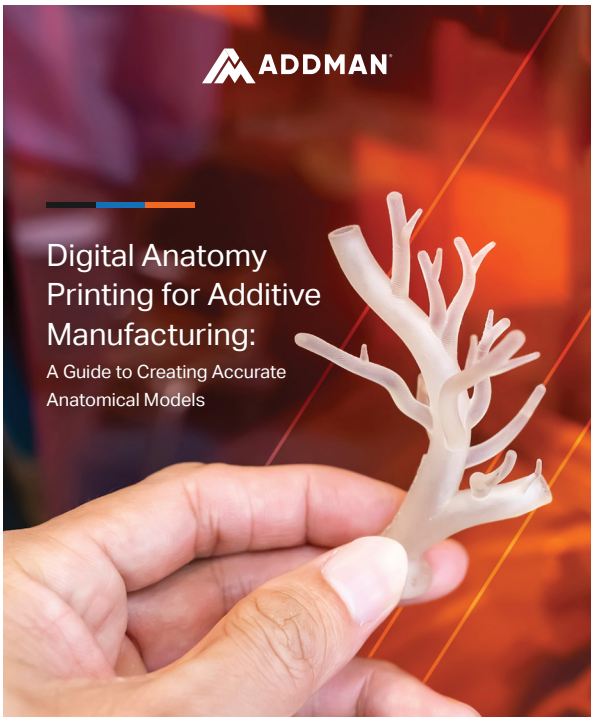
Medical-grade white nylon used in Multi Jet Fusion (MJF) 3D printing technology is a specialized and versatile polymer material widely used in the medical field. It meets stringent regulatory requirements, ensuring safety and effectiveness. This biocompatible material is suitable for direct contact with human tissue and fluids, making it ideal for 3D printing medical devices, prosthetics and surgical tools. It can be easily sterilized, ensuring cleanliness and safety in medical environments. Furthermore, white nylon provides versatile coloring options, allowing for ultimate customization.

In summary, medical-grade white nylon is a valuable material driving innovation and advancements in medicine. Its biocompatibility, durability, and customizable nature make it a reliable choice for creating safe and effective medical devices and implants.

Digital Anatomy Printing Applications

Our Digital Anatomy Printing (DAP) technology revolutionizes the medical field by providing medical professionals with the remarkable opportunity to create precise and accurate anatomical models of human anatomy. With this cutting-edge technology, we offer custom painting and cosmetic structural plating options, enhancing the realism and functionality of the models. Utilizing state-of-the-art polymer 3D printing machines renowned for their ability to produce multi-colored prints with fine resolution and a high-end finish, we can deliver both standard and patient-specific models to meet diverse needs.

The significance of these anatomical models cannot be overstated as they serve numerous crucial purposes in the medical field. Primarily, they serve as invaluable tools for training and preparation, allowing medical professionals to gain hands-on experience with realistic and detailed replicas of human anatomy. These models enable trainees to practice intricate procedures, enhance their understanding of complex anatomical structures, and refine their skills before performing actual surgeries or interventions.



Check out this list of common materials used for Digital Anatomy Printing

Download the eBook

Moreover, these anatomical models play a pivotal role in the diagnosis and treatment of complex medical conditions. Physicians can utilize these models to study and analyze unique patient cases, enabling them to develop more accurate treatment plans. The ability to visualize and interact with patient-specific anatomical structures enhances surgical precision and minimizes risks during complex procedures. This not only leads to improved patient outcomes but also reduces the overall costs and time associated with healthcare delivery.

By combining the power of Digital Anatomy Printing technology with polymer 3D printing capabilities, we offer medical professionals a transformative solution for advancing medical education, surgical planning, and patient care. These anatomical models provide an immersive and realistic experience, fostering innovation, precision, and improved healthcare practices.

CASE STUDY

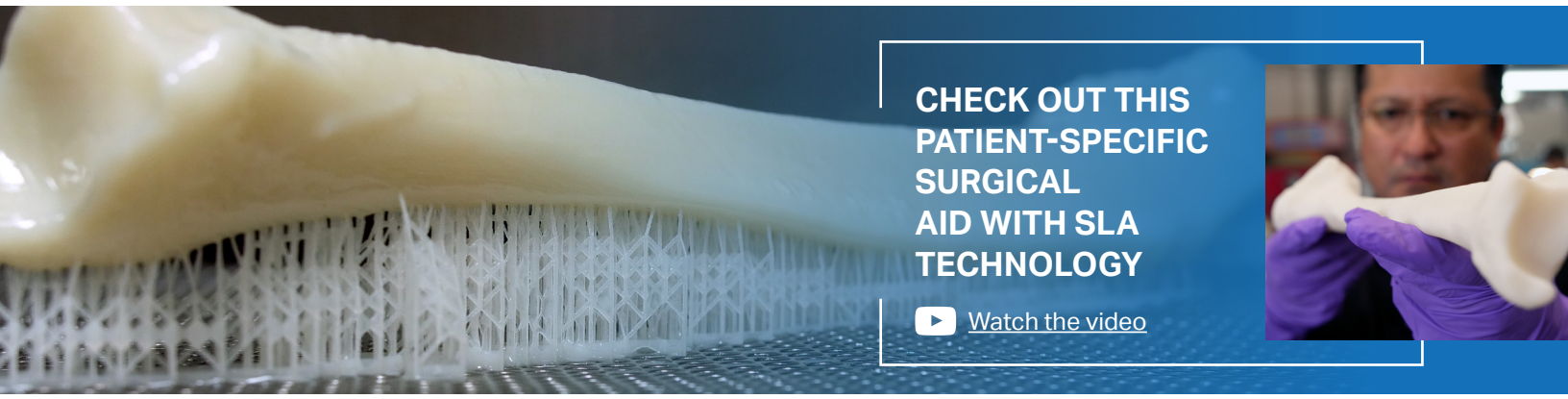
3D Printing Assists in Successful Tibial Deformity Correction at Children's Hospital of Orange County (CHOC)

CUSTOMER: Children's Hospital of Orange County (CHOC)

PRODUCT: 3D Printed Patient-Specific Tibial Model

CHALLENGE:

Moises Campos, an eighteen-year-old patient at CHOC, suffered from a tibial tubercle fracture resulting in a growth arrest below his kneecap and a deformity of the tibia. This deformity severely impacted his mobility, making it difficult for him to walk and run. Correcting the deformity required a complex surgical procedure involving cutting the bone and gradually moving it back to its correct position. The challenge was to ensure precise planning and execution of the surgery due to the complexity of Moises's bone deformity.



SOLUTION:

Dr. Afshin Aminian, medical director at CHOC Children's Orthopedic Institute, collaborated with the team at Dinsmore to create a patient-specific 3D model of Moises's tibia before the surgery. Dinsmore's in-house designers used CT scan data provided by the hospital to convert the bone anatomy into a surface model, which was then 3D printed. The use of a customized 3D model allowed the surgical team to visualize and study the deformity, facilitating accurate pre-surgical planning.

BENEFITS:

Enhanced surgical planning: The 3D model provided a tangible representation of the deformity, enabling the surgical team to better understand and plan for deviations from typical anatomy. This reduced the guesswork during the operation and increased surgical precision.

Improved patient education: The physical model allowed Dr. Aminian to educate Moises and his family about the surgical procedure. It provided a visual aid to explain the steps involved, leading to better patient understanding and confidence.

Smoother execution and better outcomes: The advanced planning facilitated by the 3D model resulted in a smoother and more effective surgical procedure. As a result, Moises experienced a successful surgery that restored his normal gait and function within four months.

Faster recovery and increased quality of life: Thanks to the precise correction of the deformity, Moises was able to return to his normal activities without any restrictions within six months. His confidence improved, and he was excited to participate in activities he had previously avoided, significantly enhancing his quality of life.

Metal Additive Manufacturing: Reshaping Medical Imagination

02

This chapter explores cutting-edge materials and advanced processes used in metal AM, showcasing its potential to revolutionize medical treatments and procedures. From customized implants to patient-specific surgical tools, Metal AM is paving the way for personalized and precise medical interventions.

Metal additive manufacturing is revolutionizing the medical industry by offering customized solutions, improved patient outcomes, and enhanced surgical procedures. From customized implants and advanced surgical instruments to prosthetics and orthotics, Metal AM is transforming healthcare by pushing the boundaries of what is possible. With continued advancements in materials, processes, and research, metal additive manufacturing is set to revolutionize the future of medicine, opening up new possibilities for personalized care and improved patient well-being.

Metal Additive Biocompatible Materials

Metal AM employs a range of biocompatible materials suitable for medical applications. Titanium and its alloys, such as Ti6Al4V, are widely used due to their excellent biocompatibility, strength, and corrosion resistance. Cobalt-chromium (Co-Cr) alloys are commonly employed for dental and orthopedic applications, as they offer high strength, wear resistance, and biocompatibility. Stainless steel is also utilized for various medical devices due to its affordability, corrosion resistance, and sterilizability. These materials, combined with the design freedom provided by Metal AM, enable the production of medical devices that meet stringent performance and safety standards.

METAL TECHNOLOGY FOR MEDICAL

Laser Powder Bed Fusion (LPBF):

Laser Powder Bed Fusion (LPBF), also known as Selective Laser Melting (SLM) or Direct Metal Laser Sintering (DMLS), is an additive manufacturing process that uses a laser to selectively melt and fuse metal powder particles layer by layer, creating three-dimensional metal parts. This process enables the production of intricate surgical tools, orthopedic implants, and customized prosthetics. LPBF offers design freedom, exceptional part density, and shorter production times, making it a valuable alternative in medical manufacturing.

Knee implant image courtsey of SLM Solutions

Acetabular Cup image courtsey of EOS

BIOCOMPATIBLE MATERIALS

Titanium Alloys

Titanium and its alloys are widely used in medical applications due to their excellent biocompatibility, high strength-to-weight ratio, and corrosion resistance. Metal AM processes, such as selective laser melting (SLM) or electron beam melting (EBM), can fabricate complex titanium implants and surgical tools with precise geometries and mechanical properties. Titanium-based materials ensure long-lasting implants that promote successful osseointegration.

Cobalt-Chromium (Co-Cr) Alloys

Co-Cr alloys possess high strength, wear resistance, and biocompatibility, making them ideal for dental and orthopedic applications. Metal AM processes allow the production of Co-Cr components with intricate structures, ensuring excellent fit and function. From dental crowns and bridges to orthopedic implants, Co-Cr alloys offer superior mechanical performance and longevity.

Stainless Steel

Stainless steel, renowned for its strength, corrosion resistance, and affordability, finds extensive use in medical devices. Metal AM techniques enable the fabrication of stainless steel components, such as surgical instruments and orthopedic implants, with intricate designs and tailored features. The versatility and biocompatibility of stainless steel make it a valuable material in the medical field.

Benefits of Metal Additive Manufacturing in the Medical Industry

Design Freedom and Complex Geometries:
Metal AM offers unparalleled design freedom, allowing the production of complex geometries that were previously difficult or impossible to achieve using traditional manufacturing methods. This capability is particularly beneficial in the medical industry, where customized implants, surgical instruments, and medical devices are required to fit unique patient anatomies. Additive manufacturing enables the creation of patient-specific designs, optimizing functionality and improving patient outcomes.

Process Qualification and Control:
Metal AM processes, such as selective laser melting (SLM) and electron beam melting (EBM), can be qualified and controlled to ensure consistent and reliable production. Through process validation and optimization, manufacturers can establish and maintain quality standards. This level of control is crucial in the medical industry, where safety, performance, and regulatory compliance are critical.

Rapid Prototyping and Iterative Design:
Metal AM enables rapid prototyping and iterative design cycles, reducing product development time and costs. Medical device designers can quickly create prototypes, test them, and make design iterations based on feedback, leading to more refined and optimized designs. This process helps streamline product development, resulting in faster time-to-market for medical innovations.

Patient-Specific Solutions:
Metal AM enables the production of patient-specific solutions in the medical industry. By utilizing medical imaging data, such as CT or MRI scans, customized implants, surgical guides, and prosthetics can be designed and manufactured to precisely match the patient's anatomy. Patient-specific solutions promote better fit, reduce complications, and improve overall treatment outcomes.

03

This chapter examines the world of Plastic Injection Molding and its profound impact on efficient and cost-effective medical device production. We explore the remarkable capabilities of this technique, which enables the manufacturing of high-quality, high-volume consumables, intricate medical equipment, and reliable packaging solutions.

Injection Molding: Precision in Mass Production

Plastic Injection Molding, with its remarkable capabilities, has become the go-to technology for producing high-quality, high-volume consumables in the medical field. ADDMAN, leveraging precise mold creation and advanced materials, utilizes Injection Molding to manufacture essential items like syringes, vials, and IV components. This ensures consistent quality, accuracy, and reliability in critical medical consumables, meeting the increasing demand for sterile and dependable products around the world.

Designing Intricate and Durable Medical Equipment:

Injection Molding enables the design and production of intricate and durable medical equipment that meet the stringent requirements of the healthcare industry. ADDMAN's expertise in this area enables the complex medical devices with exceptional to be developed with precision and reliability. From surgical instruments to diagnostic tools, Injection Molding facilitates volume production of intricate components and assemblies to deliver the functionality, durability, and performance, collectively. These advancements contribute to improved patient care and better treatment outcomes.

Ensuring Safe and Reliable Packaging Solutions

The significance of Injection Molding extends to the realm of safe and reliable packaging solutions. In the medical industry, maintaining product sterility, stability, and protection is paramount. This need is addressed by producing packaging components that meet the highest standards of quality and safety. Whether it's vial caps or blister packs, Injection Molding enables the creation of packaging solutions that ensure the safe delivery and preservation of life-saving medications and medical supplies.

Supporting Rapid Prototyping and Iterative Design Processes

Furthermore, Injection Molding supports rapid prototyping and iterative design processes in medical device development. ADDMAN's expertise allows for quick and cost-effective production of prototype parts and iterations. This capability accelerates the development cycle, enabling medical device manufacturers to validate designs, refine product iterations, and drive innovation. Injection Molding empowers agility and continuous improvement in the medical industry, propelling advancements in patient care and medical technology.

ISO 13485:2016 Certification

We are ISO 13485:2016 certified, ensuring that our manufacturing processes meet the highest standards for medical device components and sub-assemblies. We accommodate various qualifications and standards, including first article inspections, custom sampling plans, PPAP, material traceability, and production control plans, to ensure product quality and regulatory compliance.

VERIFIED CO_2 NEUTRAL

The HARBEC facility achieved Carbon Neutrality in 2013 with the adoption of ISO 50001.

VERIFIED NEUTRAL

Since 2015, HARBEC has been water neutral through implementing various water conservation strategies.

CASE STUDY

Agile Mold Development: Accelerating Production While Adapting to Design Uncertainties

CUSTOMER: Drummond Scientific Company

PRODUCT: Lateral Flow Assay Cassette Quick-Turn Molds

Adapting to evolving design requirements while maintaining fast-paced production schedules.

Preparing for production ramp-up alongside design revisions.

Adapting to evolving design requirements.

CHALLENGE:

Drummond Scientific Company's fast-paced production requirements and design uncertainties posed significant challenges. With limited time for prototyping, the parts needed to be production quality from the start. Additionally, as the design evolved and lessons were learned, part revisions became necessary. HARBEC needed to align its mold production with these changing requirements while maintaining efficiency and readiness for production scaling.

SOLUTION:

The culmination of these four phases brings forth a comprehensive solution that optimizes the entire production process.

PHASE 1: By modifying part geometry, the mold is able to be machined effectively without compromising integrity.

PHASE 2: Quick-turn aluminum molds allow for flexibility in accommodating design changes while maintaining uninterrupted production.

PHASE 3: Aluminum-inserted MUD units with advanced features, contributed to improved part quality, enhanced mold durability, and overall optimized performance.

PHASE 4: The final production mold, with its steel full-frame design, multi-cavity, hot runner system, and comprehensive cooling provisions, represents the pinnacle of a production-ready configuration, poised for large-scale manufacturing. These four phases combine to deliver a robust and efficient solution, ensuring high-quality production, adaptability to design changes, and seamless high-volume manufacturing capabilities.

BENEFITS:

Accelerated Time-to-Market: Meeting demanding time-to-market constraints by simultaneously producing production-quality parts and preparing for full-scale production with mold adaptability.

Constant Product Flow: Maintaining production excellence through HARBEC's parallel path approach, despite part revisions.

Prototyping for Interim Production: Providing production-quality prototype molds for interim production, allowing the customer to test and validate designs while scaling up volume production capacities.

04 The Cleanroom Advantage: Unlocking the Benefits of Class 8 Manufacturing

In this chapter, we study the importance of Class 8 Cleanroom manufacturing and packaging for medical devices. Explore how these controlled environments ensure product integrity, regulatory compliance, and patient safety. Discover the role of Class 8 Cleanrooms in elevating quality, mitigating contamination risks, and advancing medical device manufacturing practices.

Class 8 Cleanroom manufacturing refers to a controlled environment that meets specific cleanliness standards defined by ISO 14644-1. In a Class 8 Cleanroom, the concentration of airborne particles is meticulously monitored, ensuring a highly sanitary and controlled space for manufacturing processes. For medical device manufacturing, Class 8 Cleanrooms play a critical role in maintaining product integrity and patient safety.

Here are a few reasons why Class 8 Cleanroom manufacturing is important:

Contamination Control: Medical devices require a pristine manufacturing environment to prevent contamination by particulates, microorganisms, or other foreign substances. Our Class 8 Cleanroom provides a controlled atmosphere with minimized airborne particles, reducing the risk of contamination and maintaining the sterility and quality of the devices. Our decentralized approach keeps manufacturing presses outside the cleanroom, enabling maintenance without disrupting assembly or production.

Regulatory Compliance: Medical devices are subject to stringent regulatory requirements, including cleanliness standards. Manufacturing in a Class 8 Cleanroom helps medical device companies meet and adhere to these strict regulatory guidelines, ensuring compliance and facilitating successful audits and certifications.

Product Quality and Consistency: Cleanroom manufacturing ensures a consistent and controlled production environment, minimizing variations that could impact the quality and performance of medical devices. By maintaining a controlled atmosphere, Class 8 Cleanrooms help optimize manufacturing processes, leading to consistent and reliable product output.

Patient Safety: Medical devices directly impact patient care and safety. Cleanroom manufacturing helps mitigate the risk of device-associated infections and ensures that devices are manufactured in an environment that minimizes potential contaminants. This ultimately contributes to patient safety and reduces the chances of adverse events.

Improved Product Longevity: Medical devices often require a long lifespan with optimal performance. Manufacturing in a Class 8 Cleanroom helps reduce the introduction of impurities during the production process, improving the longevity and functionality of the devices.

05

This chapter explores the transformative potential of CNC machining in medical device production. We delve into the remarkable capabilities of this technique, which enables the creation of intricate devices.

Precision Engineering for Medical Applications: Exploring the Capabilities of CNC Machining

The synergies between 3D Printing and CNC Machining are crucial in medical device manufacturing. Machining complements printed parts (metal or polymer) that require higher tolerance treatment areas. CNC machining creates intricate internal structures, precise shapes, and desired surface finishes, ensuring optimal functionality. Micro-machining achieves exceptional precision for miniature medical devices, microfluidic systems, and surgical instruments, meeting sub-micron tolerances.

Intricate Internal Structures:

CNC machining allows for the creation of intricate internal structures within medical devices. This capability is particularly important for implants and devices that require channels, cavities, or complex pathways for fluid flow, such as drug delivery systems or microfluidic devices. CNC machines with multi-axis capabilities can precisely carve out these internal structures from a plethora of materials, ensuring optimal functionality and performance of the medical device.

Intricate Shapes:

With CNC machining, intricate shapes can be effortlessly machined, enabling the production of medical devices with unique contours and forms. This is especially crucial for implants or surgical instruments that need to conform to complex anatomical structures or provide precise fit and function. CNC machines, guided by advanced software and tooling, can accurately reproduce intricate shapes, ensuring the desired outcome in terms of aesthetics, functionality, and patient comfort.

Intricate Surface Finishes:

CNC machining is vital for achieving intricate surface finishes on medical devices, especially implants. The quality of the surface finish affects smoothness, biocompatibility, and tissue interaction. Customized finishes improve biocompatibility, osseointegration, and reduce friction. CNC machines also excel in achieving high tolerance outcomes for interacting parts, making them valuable in applications like remote surgical robotics, where precise and seamless movement is crucial.

Micro-Machining:

Micro-machining, a specialized technique within CNC machining, achieves sub-micron tolerances for the production of miniature medical devices, microfluidic systems, and surgical instruments. The ability to achieve such precise tolerances is crucial in the development of advanced medical solutions, where intricate details and miniaturization are necessary. This advanced computer-controlled process allows for exceptional precision, enabling components to be manufactured within the most demanding criteria.

BIOCOMPATIBLE MATERIALS

Titanium Alloys:

Titanium alloys have revolutionized medical implant technology, finding widespread use in orthopedics, dentistry, and spinal surgery. Renowned for their exceptional biocompatibility, corrosion resistance, and fatigue strength, titanium alloys offer patients the benefits of longevity, reliability, and improved quality of life. CNC machining further enhances the versatility of titanium alloys, enabling the production of lightweight and robust medical devices. Explore the remarkable capabilities of CNC machining in processing titanium alloys and discover how it contributes to the advancement of medical implant solutions.

Stainless Steel:

Stainless steel is a critical material in the medical field, with widespread applications in surgical instruments, orthopedic implants, and medical equipment. Its exceptional strength, corrosion resistance, and ease of cleaning are paramount in ensuring the reliability, longevity, and safety of medical devices. Stainless steel's versatility lies in its ability to withstand rigorous sterilization processes, resist pitting and staining, and maintain compatibility with medical environments. Its mechanical properties, including strength and ductility, contribute to the performance and durability of surgical instruments, implants, and medical equipment. CNC machining effectively processes stainless steel, enabling the production of durable and hygienic medical devices that meet the stringent requirements of the medical industry. In some cases, precision secondary CNC machining is performed on parts originally printed in Stainless Steel.

Cobalt-Chromium Alloys:

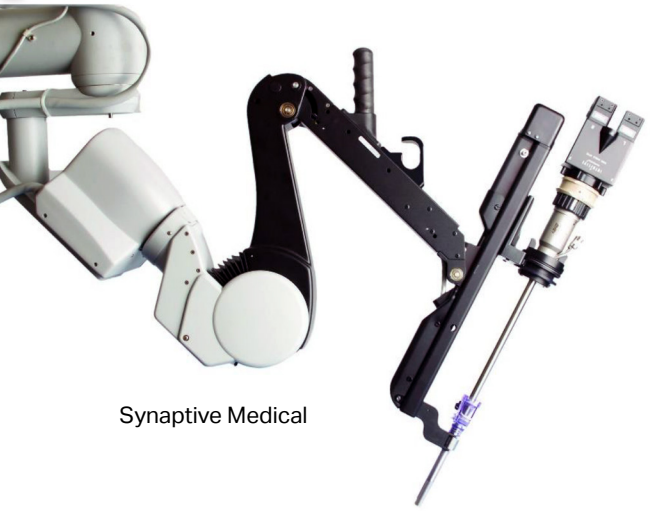
Cobalt-chromium alloys, such as Co-Cr-Mo and Co-Cr-W alloys, are widely esteemed in the medical domain due to their exceptional mechanical properties. They possess remarkable strength, wear resistance, and biocompatibility, making them highly suitable for various medical applications. Through the employment of CNC machining, these alloys can be effectively processed, enabling the precise fabrication of medical devices capable of enduring rigorous conditions. In the realm of dental prosthetics, orthopedic implants, and cardiovascular devices, cobalt-chromium alloys play a crucial role, offering outstanding mechanical properties that contribute to prolonged efficacy and enhanced patient outcomes.

Surgical Robotics

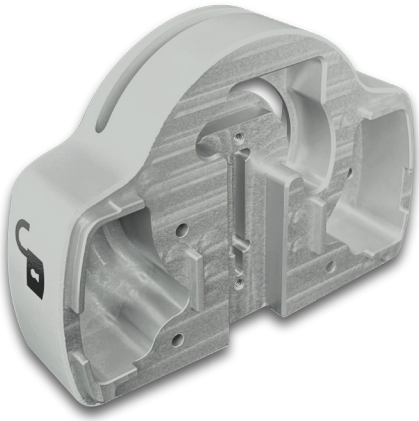
Materials: Titanium & Magnesium

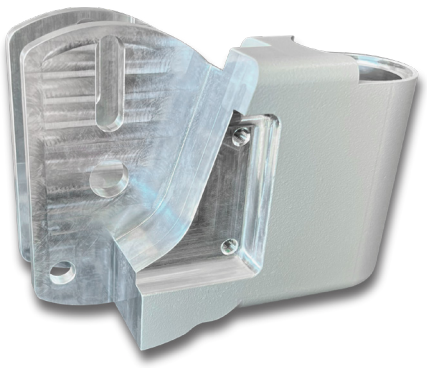
Secondary Processes: Bead blast, powder coat, anodize, laser etching, assembly

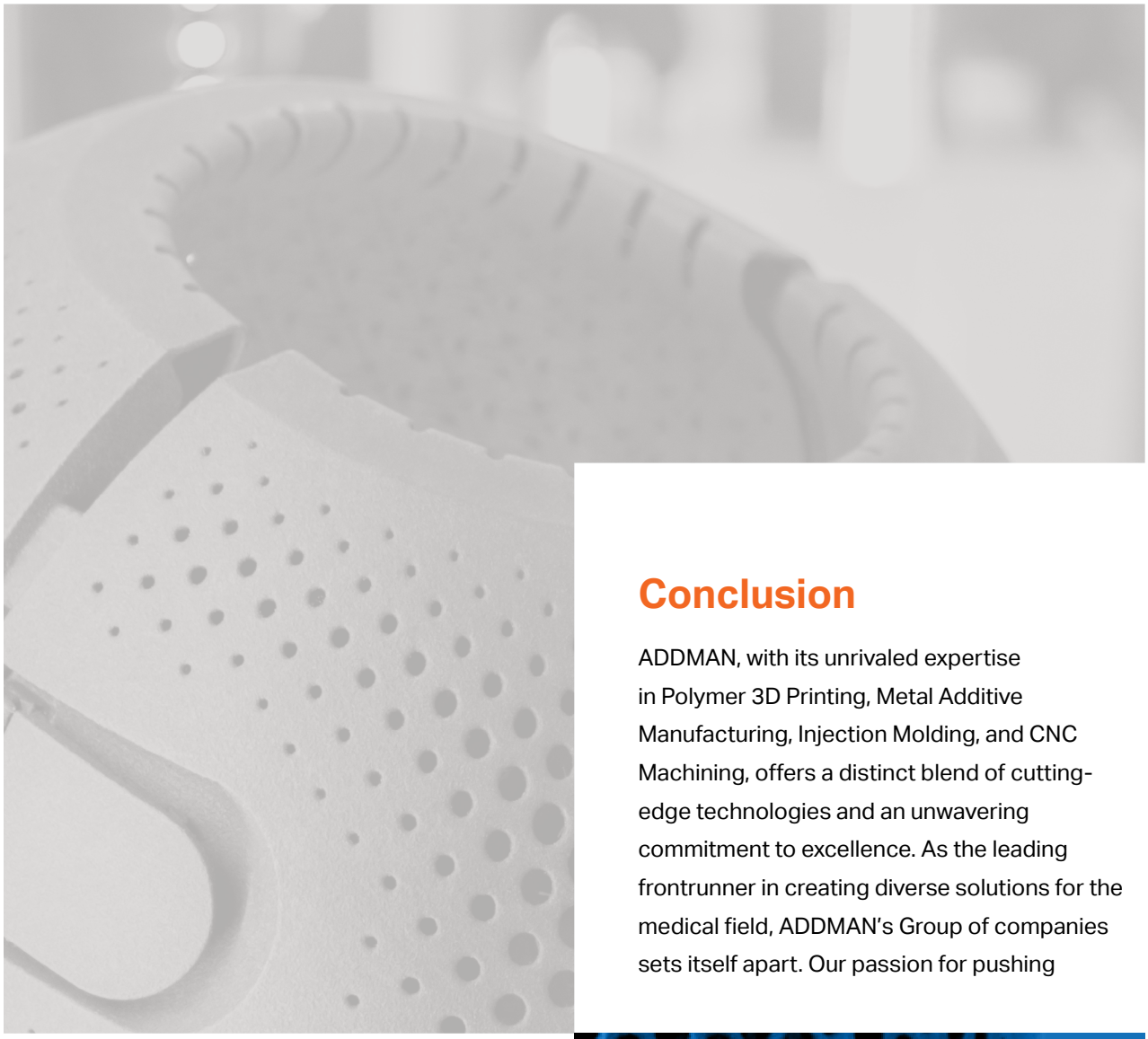
Applications: Brain, Urology, Bronchoscopy, Other



Synaptive Medical

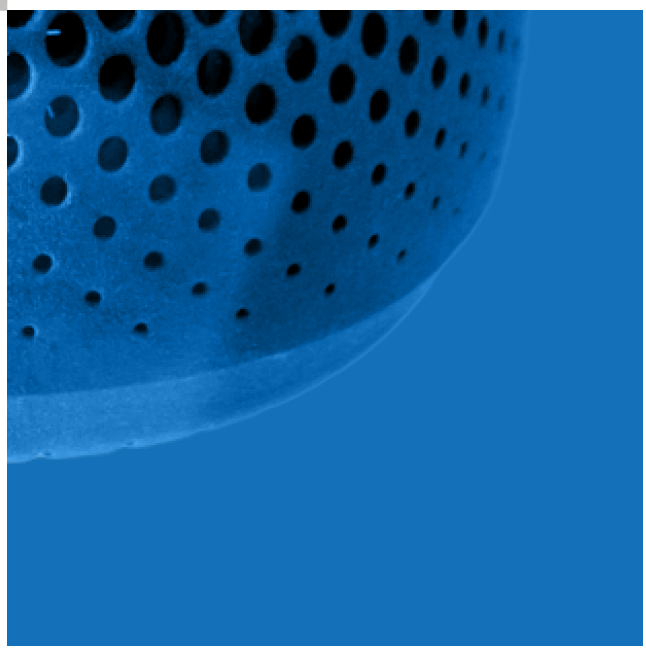






Conclusion

ADDMAN, with its unrivaled expertise in Polymer 3D Printing, Metal Additive Manufacturing, Injection Molding, and CNC Machining, offers a distinct blend of cutting-edge technologies and an unwavering commitment to excellence. As the leading frontrunner in creating diverse solutions for the medical field, ADDMAN's Group of companies sets itself apart. Our passion for pushing boundaries, unwavering focus on precision and customization, and a proven track record of delivering exceptional results make ADDMAN a trusted partner for healthcare professionals and researchers alike. Choosing ADDMAN opens the doors to limitless possibilities, transformative advancements, and a future where imagination merges with reality to elevate patient care and shape the healthcare landscape.



Revolutionize Your Healthcare Solutions with ADDMAN

At ADDMAN, we are committed to excellence in every aspect of our business. We strive to provide the highest-quality products and services, ensuring that your journey towards efficient and effective medical device production is a success.

If you're ready to take your manufacturing process to the next level, trust ADDMAN to help you achieve your goals.

Contact us today to learn more.
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