

**Category**

Best Startup

**Product/Solution Name**

Maestro by Moon Surgical

**Date of Approval**

2022-12-02

**Indications**

ALL soft tissues laparoscopic surgeries. (ie : appendectomies, hernia repairs, cholecystectomies, which are each performed more than 800 000 times per year in the United States)

**Therapeutic Categories**

Minimal Invasive Surgeries: thoracic, abdominal surgeries, bariatric, urology, nephrology, gynecology

Attached Files:

- Moon Surgical website video.mp4

**Background information and need for solution/product**

Moon Surgical based in Paris, France, and San Francisco, California, believes the future of the operating room lies in the hands of the empowered surgeon. By equipping surgeons with complete control, renewed confidence, and technology adaptable to any situation they encounter, Moon Surgical strives to improve efficiency in operating rooms and provide better surgical care for patients

Moon Surgical was founded in 2019 by Prof. Brice Gayet, a renowned Laparoscopic Surgeon in Europe, and was then incubated in 2020 by Sofinnova. Moon Surgical team was formed in 2021. Since, and within just the past 2 years, we have successfully secured 2 rounds of financing (\$31 MM Series A and \$55 MM Series B), as well as being granted with both FDA approval and CE Mark clearance.

The whole Moon surgical team with the support and full confidence of its Board of Director chaired by Fred Moll M.D, is 100% dedicated to its core mission and is now preparing for Maestro Limited Commercial Release expected in 2024.

Moon Surgical is creating an entirely new category of Robotic Surgery with its minimalistic co-manipulation Maestro System, that not only changes the scale at which robotics are used but also improves the bottom line for providers and the quality of care for patients.

## Need for Maestro?

Around 20 million patients undergo soft tissue surgeries annually, BUT only 1,2 million benefit from enhanced minimally invasive approaches such as robotic-assisted surgery. This is because these technologies are seen as too complex, costly, demanding in terms of staff (# headcounts and training), and ultimately too narrow in terms of applications in indications.

At Moon Surgical, our radically new approach breaks through these adoption barriers as we create an entirely new category of robotic assisted surgery. We create value across all stakeholders to change the scale at which robotics are used and improve the bottom line for providers and the quality of care for patients.

With over 50+ interviews of surgeons and healthcare professionals, 54 total cadaver labs completed, and 50 human cases achieved, we are confident that Maestro system is THE solution that meets the needs of patients as well as both healthcare systems (hospitals, ASCs, private clinics) and surgeon's.

## Three categories of needs:

### Needs of the Patient

The Maestro System by Moon Surgical meets the needs of patients by revolutionizing laparoscopy and empowering surgeons with enhanced control and confidence.

The Maestro System's advanced technologies enables surgeons to perform procedures with increased confidence, precision, and efficiency leading to less strain and fatigue (see section Needs of the surgeon) enabling a more stable and accurate surgery for the full benefit of the patient.

This can also result in shorter procedure times, reducing the duration of general anesthesia for patients, as well as reducing the forces applied to the trocars incision, which can lead to hernias, the most frequent complication for laparoscopy, and eventually lowering the risk of complications.

By providing surgeons with complete control, and easy to use and adaptable technology, the Maestro System will enhance accuracy and patient safety and overall surgical outcomes, ensuring a better surgical experience for patients.

By revolutionizing the way surgeries are performed, the Maestro System offers a new level of surgical excellence that can positively impact patients on a global scale.

## Needs of healthcare systems

Healthcare facilities are grappling with numerous challenges, including staff shortages, surgeon retention, rising costs and little to no capital money.

The shortage of healthcare professionals significantly strains operating rooms, resulting in canceled surgeries and extended patient wait times. Moreover, ensuring the retention and happiness of talented surgeons is crucial for the success of healthcare facilities as they are the gateway to both procedure volume and great outcomes.

Traditional robotic platforms amplify these issues. Their complex nature often demands extensive training, limiting the number of surgeons who can proficiently operate them. Additionally, the high costs associated with these systems further burden healthcare budgets. The Maestro System by Moon Surgical addresses these pressing needs.

The Maestro offering is a compelling solution for healthcare facilities, struggling lately with little to no capital money, making the outright acquisition of a new Robotic system virtually impossible. The Maestro offering provides an accessible acquisition model enlarging access to the technology.

The Maestro's operative assistance and intuitive design effectively tackle the challenges of staff shortages, surgeon retention, and costs. With its streamlined setup process and minimal training requirements, the Maestro System empowers more surgeons to perform laparoscopic procedures with precision and efficiency, optimizing the utilization of existing staff and resources.

By overcoming the limitations posed by staff shortages, healthcare facilities can reduce the number of canceled surgeries and improve patient care and satisfaction.

Furthermore, the Maestro System's cost-effectiveness compared to traditional robotic systems makes it an attractive choice for healthcare facilities seeking to lower operational costs without compromising the quality of surgical procedures.

The Maestro System becomes an invaluable asset by addressing these critical needs, enabling healthcare facilities to enhance their surgical capabilities while improving operational efficiency and strengthening their business.

## Needs of the Surgeon

Surgeons are the cornerstone of any successful surgical procedure, and their needs and well-being are crucial.

Traditional laparoscopy poses significant concerns for surgeons with its ergonomic challenges and high prevalence of musculoskeletal disorders (MSDs). The physical strain and discomfort experienced

during procedures impact their quality of life and potentially compromise surgical outcomes. Surgeons aspire to deliver their patients the best possible care while maintaining their physical health and happiness.

The Maestro System by Moon Surgical addresses these needs by prioritizing surgeon well-being and enhancing their experience in the operating room. With its intuitive and easy-to-use design, the Maestro System allows surgeons to perform procedures with greater confidence, precision, and control. The surgeon may now perform better, whilst leaving the OR earlier.

The Maestro System empowers surgeons to focus on what matters most: delivering optimal patient care by minimizing traditional laparoscopy's physical strain and fatigue. The adaptability and flexibility of the Maestro System enable surgeons to tailor the technology to their specific needs, enhancing their efficiency and effectiveness in the operating room. With the Maestro System, surgeons can experience improved ergonomics, reduced risk of MSDs, and ultimately find greater satisfaction in their surgical practice.

By understanding and addressing the unique needs of surgeons, the Maestro System revolutionizes the laparoscopic surgical experience. It empowers surgeons to excel in their profession while prioritizing their own well-being, resulting in enhanced patient outcomes, improved surgeon satisfaction, and a positive impact on the future of surgical care.

Attached Files:

- Demo video .mp4

### **History of the development of the solution/product**

June 2019 Incorporation of Moon Surgical by Prof Gayet

July 2020 Joining MD Start (Seed round)

January 2021 Moon Surgical team formation

April 2021 Strategic partnership with King's College London

October 2021 Design freeze (Clinical device)

July 2021 FDA Pre-Sub Clinical device

April 2022 First in Human starting

June 2022 Series A- \$33 MM

December 2022 FDA 510(k) granted

January 2023 FDA Pre-Sub Commercial System

April 2023 CE Mark granted

April 2023 Design freeze (Commercial device)

May 2023 First in Human completed: 50 procedures (Europe)

May 2023 Series B - \$55 MM

Sept 2023 (Expected) EU Pilot

Dec 2023 (Expected) US Limited Market Release

Attached Files:

- Part3.pptx

**Why this solution/product is innovative, the broad implications for future research, and/or how it will improve the human condition**

Human Condition Improvement :

When thinking and designing Maestro, our main and continuous focus has been the patient condition and how to give access to the larger number of patients to the latest medical technologies. How to combine benefits of laparoscopy and robotics without the trade-offs.

This is why, not only have we developed an innovative robotic assisted system, BUT we have strived to make Maestro an easy to adopt, easy to use, affordable technology for any laparoscopic procedure, in any operating room, including outpatient departments and ASC's.

In the current healthcare environment, staff is extremely constrained and many OR's are therefore kept shut. With Maestro we are literally enabling OR's to function and surgeries to be performed in a more cost effective and in a lighter staff reliant manner.

The Maestro also addresses the pressing issue of surgeons by reducing the physical and mental strain experienced during surgical procedures. This enhances surgeon well-being and quality of life and helps combat the alarming rates of surgeon burnout. With its focus on reducing fatigue and improving surgeon satisfaction, the Maestro System plays a pivotal role in promoting sustainable surgical practices and ensuring surgeons' long-term success and fulfillment and quality of patient's treatments.

Maestro, an Innovative Robotic Assisted System :

Maestro is a two-arms robotic system capable of holding any laparoscopic instruments.

Most of laparoscopic procedures are four trocars/ four arms ones. The surgical assistant role (typically holding the scope and retractor) is a critical one as the intervention cannot be done without them.

As healthcare staff shortages and retentions issues are more and more acute, the reliance of surgeons to their surgical assistant becomes critical and a genuine challenge to maintain high standard and efficiency of care in high volume laparoscopic procedures.

The Maestro system has been designed to reduce this reliance by equipping the surgeon with an extra set of arms and hands capable of holding any laparoscopic instruments.

The Maestro system's approach is innovative versus other soft tissue robots as it allows surgeons to still operate next to the patient while empowering surgeons with the complete control over all the instruments, a more stable visibility, an increased precision, without changing the usual workflow in the OR nor the surgical technique or the instrumentation.

The Maestro's design allows for easy and fast adoption by all laparoscopic surgeons in all OR settings, in all healthcare facilities for almost all laparoscopic indications.

Increasing efficiency by enlarging and facilitating possibilities of use:

1. Easy, fast, safe and adaptable Maestro's setup in the OR:

The versatility of Maestro's positioning and its optimized footprint are fitting all types of laparoscopic procedures and all types of OR's settings. The Maestro's cart's footprint is indeed matching the one of an assistant.

The adaptability of Maestro via an AI powered cart positioning guidance feature reduces the risk of collision and releases the need for specific trained OR staff to maneuver Maestro.

The pre-programmed personalized user profiles based on type of procedures and surgeons' preferences streamline and ease each specific surgeon setup.

2. Short learning curve (1 to 2 surgeries) at surgeons and OR staff level while gaining capabilities, control and efficiencies.

Great adaptability leading to a fast-learning curve as we paid attention to allow for the same OR workflow, same surgical technique, same laparoscopic instruments, same OR's setup while increasing surgeons own's capabilities:

An easy- to-use connection of Maestro's robotic arms with any off-the-shelf preferred laparoscopic instruments and scopes thanks to the unique universal instrument couplers' design.

An easy-to-use co-manipulation, transparency, gravity compensation, seamless lock and unlock mechanism allowing positioning of the robotic arms and instruments by the surgeon himself to the optimized location at the optimized angle at the right time. When the surgeon simply lets the arms go, they lock in position and hold the position as long as desired.

3. A more efficient surgical flow thanks to the sensors/ automatic/ anticipating/ seamless motion of Maestro arms.

A more fluid surgical flow with fewer "Stops /repositioning/ Go's" thanks to an automatic motion of the scope following the tip of the instrument (AI Motion assisted Scope control feature).

In conclusion, Product Innovation is a continuous focus at Moon Surgical, 12 patents have been filed, 4 have been granted and we have signed strategic partnerships with King's College London to develop Machine Learning for Computer Assisted Surgery, as well as with NVIDIA.

Innovative business model : easing market access to reach all MIS patients at hospitals, clinics and ASC's :

Today most laparoscopies, including hernia repairs, cholecystectomy, and hysterectomies are performed in outpatient settings. Maestro's efficiency allows these outpatient settings such as Hospital Outpatient Departments and Ambulatory Surgery Centers to draw more of the laparoscopic surgical volume they desire.

To achieve this, however, the technology needs to also have a business model that supports adoption in these facilities, which have no to little cash money.

We've evolved our offering from the razor / razor blade model, which typically requires multi-million-dollar upfront investment, to a simplistic subscription model.

Under this model, facilities from regional hospitals and standalone surgery centers to name brand institutions have access to the Maestro System. With significantly reduced startup costs, and reliable ongoing costs, facilities have improved abilities to manage their expenses.

To deploy a Maestro System in their facility, an onboarding fee is paid the covers shipment, installation, both staff and surgeon training, and supplies are provided for 2 months of procedures. A monthly fee is charged based on the configuration and volume of procedures in which the system is used. The result is flexible pricing to fit the needs of the facility.

The existing reimbursement codes cover the usage of Maestro that is already available to laparoscopic interventions.

Attached Files:

- Part4.pptx

**Please provide appropriate references (ie Pubmed links)**

You will find attached 2 documents:

1. A publication recently submitted to "Surgical endoscopy" about our First in Human study, currently under review
2. The poster of the study that was presented in April at SAGES Montreal.

Attached Files:

- MOONFIHpaperVFinal.pdf

