

XS Dynamis by Fotona: Top-of-the-Line in Skin Resurfacing Treatment Technology

Product Overview

The *XS Dynamis* is the latest Erbium:YAG laser-based, skin resurfacing solution on offer from leading laser manufacturer Fotona. This highly innovative laser workstation represents a complete ablative skin resurfacing solution capable of providing a wide variety of treatment options. Principle treatment modalities range from superficial, light to deep laser peels, from non-ablative, coagulative to fully ablative rejuvenation and from full-field to fractional resurfacing. With computer-controlled *S-Runner* and *F-Runner* scanners in conjunction with new *Turbo* and *V-Smooth* modes, supported by proprietary *Variable Square Pulse (VSP) Technology*, the *XS Dynamis* is the highest performance skin resurfacing workstation available to today.

Why Erbium:YAG Laser?

At the heart of the *XS Dynamis* workstation lies a high performance Erbium:YAG laser; chosen for its inherent high ablation efficiency in skin.

Er:YAG laser is very well absorbed in water; the principle target chromophore in skin resurfacing. This gives it the ability to vaporize skin tissue with very little thermal conduction. In contrast, CO₂ lasers are less ablation efficient due to their lower absorption in water. They therefore unavoidably conduct significant amounts of heat into the tissue. Coagulation will always accompany ablation when using CO₂ lasers. This often entails suboptimal treatment outcomes and an increased risk of undesired effects such as hypopigmentation, persistent erythema and prolonged recovery times.

In addition to the Er:YAG laser's ideal absorption characteristics for skin resurfacing, Fotona's VSP Technology allows the ratio between Er:YAG ablation and coagulation to be varied very accurately from "cold" ablation to non-ablative coagulation. As a result Fotona's Er:YAG laser can be fully optimized to precisely attain the desired clinical outcome.

Full control over the Er:YAG laser's clinical effects and ultimately laser treatment outcome is the *XS Dynamis*' strong point. It offers this by allowing the numerous treatment parameters and modalities to be precisely adjusted and optimized by the practitioner to satisfy therapeutic needs and requirements. This is a benefit common to all Fotona's high performance laser systems.

The *XS Dynamis*' software predicts skin ablation and coagulation depths, based on the selected treatment parameters; a convenience feature and benefit for all *XS Dynamis* owners. This information will assist practitioners to fine-tune procedures and to explore and expand treatment options as new clinical data arises.

The system also incorporates factory pre-set treatment parameters that can be accessed, changed and stored through a simple user interface. This offers convenience, especially when wanting to perform everyday procedures and optimal and safe treatment parameters need to be accessed quickly. The same feature will assist novice laser practitioners to shorten the learning curve and get the most out of the *XS Dynamis*' capabilities, even in the earliest stages of everyday use.



XS Dynamis

Pre-set Treatment Parameters

XS Dynamis *pre-sets* eliminate the need to think strictly in terms of laser treatment parameters. Similarly, ablation and coagulation depths are not required to be estimated, known or selected to micron-level precision to achieve a particular clinical outcome. The XS Dynamis simply requires the practitioner to select one of the clinically-proven pre-sets (e.g. *Medium Peel*) and the system will automatically provide the most optimal treatment parameters and estimate treatment depth.

Full-field to Fractional Resurfacing

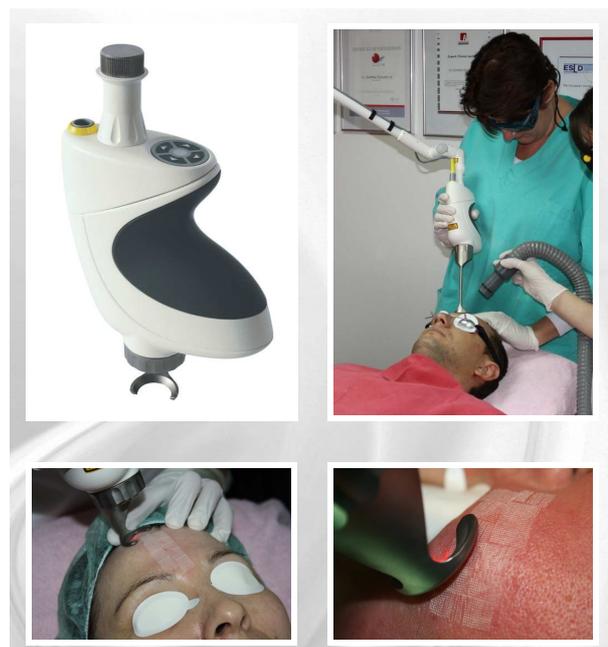
The effects of sun-damage and environmental pollutants take their toll on human skin, causing it to wrinkle, develop sun spots and generally look aged. Fotona Er:YAG skin resurfacing treatments, performed with the XS Dynamis can reverse these effects and restore a healthy, natural look and feel to the skin.

There are two approaches to skin resurfacing: full-field and fractional. In full-field resurfacing, the entire surface area of the skin within the laser spot is affected by the laser. The laser beam is scanned across the treatment area and precisely removes a layer of skin. The body will naturally replace the old, aging skin that was removed with a fresh, healthy-looking layer. In terms of depth, treatments can range from superficial, light to deep peels. Light peels are indicated to remove fine lines, sun spots and aged-looking skin; deep peels are applied to improve skin tone and texture and eliminate deep wrinkles, even notoriously hard-to-treat smoker's lines and crow's feet.

In fractional resurfacing the laser affects pinpoint columns of skin within each laser spot, leaving intact, unaffected tissue around each individual micro-spot. This promotes faster healing, while the laser can be allowed to penetrate into the deeper skin layers to initiate concrete collagen remodeling. Fractional laser technology and applications have developed in two distinct phases. First generation fractional technologies and applications are non-ablative modalities and are capable of improving superficial skin imperfections in 4 to 6 treatment sessions. The second generation fractional laser technologies are capable of

providing ablative fractional treatments and are predominantly CO₂ laser technology based. This developmental phase is marked by the ability to induce deep dermal effects with more dramatic effects as a result. The downside of CO₂ laser technology is the inherent risk of excessive thermal damage. The latest, third generation, ablative fractional lasers are based on erbium solid crystal laser technology. This allows practitioners to optimize the ablation versus coagulation ratio, thereby providing control of thermal damage induced in the skin. Fotona XS Dynamis capitalizes on the advantages of both fractional worlds, with the added benefit of being able to control thermal effects. The V-Smooth mode provides non-ablative to minimal ablative fractional modalities, while F-Runner technology offers a deep ablative fractional treatment modality.

The very latest peripheral equipment novelties Fotona has on offer are the S-Runner and F-Runner Er:YAG scanners. Both act as computer-controlled handpieces that automatically scan larger skin surface areas with the Er:YAG laser beam. Scanners' ability to rapidly and evenly deposit laser spots in a fixed pattern, with preset dimensions and spot overlap, are fundamental in procedures that require high levels of uniformity and precision over a large treatment area.



Fotona's entire Er:YAG laser systems range is further complemented by an extensive assortment of high quality, *Titanium* range handpieces. The Titanium R04 and R11 handpieces are used for full-field resurfacing; the Titanium PS01, PS02 and PS03 handpieces for different types of fractional resurfacing modalities, and finally the Titanium R08 provides high-precision, surgical cutting.

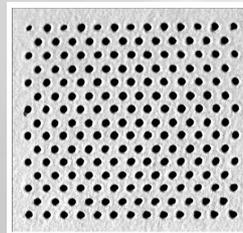
F-Runner – Fractional Resurfacing Scanning Device

The combination of the F-Runner fractional resurfacing scanner with the XS Dynamis' highest performance features is Fotona's solution for achieving excellent resurfacing results within a minimum of downtime. Practitioners using the XS Dynamis agree that the F-Runner is one of the most compelling innovations this newest Fotona system has to offer. Unlike full-field ablation in which the entire skin surface at the treatment site is removed, F-Runner ablates narrow-diameter channels in the skin over only a fraction of the entire treatment area. This treatment modality initiates the body's wound healing response which stimulates fibroblasts to produce new collagen and elastin, while the surrounding, unaffected and intact tissue promotes rapid healing. F-Runner treatment benefits include increased patient comfort, shorter healing times and the ability to tune treatments to range from subtle to dramatic results.

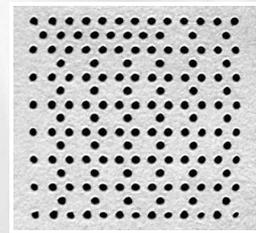
The F-Runner utilizes a fixed, 250 µm spot size and offers a 2% to 60% coverage range. The depth of the ablated micro-channels is variable within a range of <5 µm to 1100 µm, based on the selected VSP Technology-supported treatment parameters. Using Turbo6 settings the scanner can ablate even up to almost 7000 µm into the skin. Clinical experience suggests that the induced new collagen and elastin synthesis increases the turgor and general thickness of the skin. The surrounding unaffected and intact skin promotes rapid healing due to the presence of stem cells and melanocytes in the papillary dermis.



Computer-controlled scanning in combination with ergonomically-adjusted and functional design provide levels of procedure accuracy and uniformity unattainable by any other technological means.



A. Completed, full size F-Runner scan



B. OPTimal scanning regime with F-Runner in progress



C. Rectangular, shape-adjusted, scan area one hour after F-Runner treatment.



D. Rectangular, shape-adjusted, scan area 20 hours after F-Runner treatment.

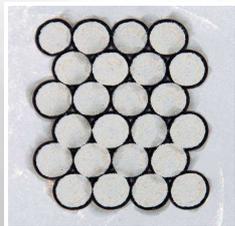
Figure A (above) shows a completed, full scan with the F-Runner scanner. Figure B demonstrates the OPTimal scanning sequence in which neighboring, successive spot deposition is avoided under computer control. This sequence is particularly recommended when performing treatments that require high fluence levels at high repetition rates. The XS Dynamis provides two more scan sequences with the Runner scanners, namely PaRTial and SEquential scanning sequences.

Figures C and D (above) demonstrate typical post-treatment outcomes with the F-Runner. Only a portion of the skin is resurfaced to effectively treat a wide variety of conditions. The intact surrounding skin promotes rapid recovery and thus minimal downtime.

S-Runner – Full-field Ablation Scanning Device

The S-Runner is a computer-controlled scanning solution designed to provide full-field Er:YAG laser skin resurfacing treatments within a scan area that can reach up to 40 x 40 mm or 16 cm². In combination with the XS Dynamis it offers an extraordinary wide variety of treatment options. Within the range of minimal coagulative regimes, treatment modalities can extend from superficial, *Light Peels* to deep resurfacing *Deep Peels* that can reach to depths of 474 µm per scan using Fotona's unique Turbo mode solution. In coagulative regimes, treatment options range from *Non-ablative Thermal* to *Medium Thermal*, with the former benefiting from the exclusive V-Smooth modality and the latter from Turbo mode.

By being able to provide such an extensive choice of therapeutic options, the S-Runner is truly top-class choice for practitioners in full-field ablation procedures.



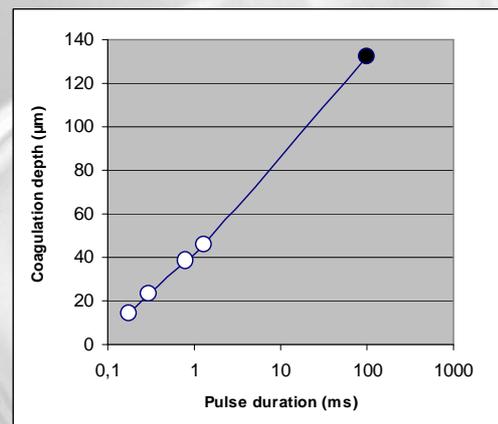
From superficial to deep peels the groundbreaking S-Runner enables practitioners to fine-tune resurfacing treatment to precisely match patient requirements and expectations. Results can be as subtle or dramatic as patients want by being able to perform treatments with superior uniformity and customizable thermal effects.

V-Smooth Technology is one of the technological advancements that distinguishes the S-Runner and XS Dynamis from preceding Fotona Er:YAG laser systems and other resurfacing technologies available on the market today. It allows for extreme skin coverage speeds even at unprecedented and exceedingly long irradiation times (of up to 0.5 s) that are required for effective and controlled skin coagulation. V-Smooth Technology ensures complete accuracy and unparalleled simplicity in irradiating single spots for longer optimal durations; each spot is targeted and irradiated for an optimal time, then the S-Runner moves on to another spot, returning to the initial spot at computer-controlled intervals.

This not only ensures treatment accuracy and efficacy but also safety and comfort of the patient.

V-Smooth Technology – New Long Pulse for High-Speed Coagulation

V-Smooth (stands for Variable Smooth) is a novel treatment modality and the latest addition to the existing and acclaimed SMOOTH mode high coagulation, minimally ablative skin rejuvenation treatments. It must be understood that *coagulation* as a term in this context refers to a thermal effect in the skin which induces collagen remodeling in the skin; it is a widely used expression in the laser industry. V-Smooth is based on exclusive and specially-developed scanning speed enhancing technology that is unique to the S-Runner Er:YAG scanners. Contrary to the 250 ms, fixed pulse duration of conventional SMOOTH mode, V-Smooth features a variable pulse durations in the 100 ms to 500 ms range. This leads to an extended and variable coagulation depth range that the practitioner can use to fine-tune treatments.



The above graph demonstrates how the maximum coagulation depth using 100 ms V-Smooth (dark), compares to conventional pulse duration modes (white).

The fluence values that can be reached using V-Smooth are not only limited to being able to provide sub-ablative treatments. V-Smooth enables ablative and deep coagulative treatments (e.g. *Thermal Peel*) within a single scan.

VSP Technology to Control Ablation and Coagulation

Fotona's proprietary VSP Technology delivers laser energy in computer-controlled sequences of laser pulses with an approximated square shape. Each pulse has a clearly defined pulsewidth, T_p , and pulse energy of E_p . Throughout laser system operation each

individual pulse's energy level is checked and controlled using Energy Feedback Control (EFC) Technology, ensuring that the output energy is exactly that needed for efficient and effective treatment.

Ablation and *coagulation* are two distinct physical mechanisms through which pulsed Er:YAG lasers can affect the treated skin.

Why Optimize Ablation and Coagulation?

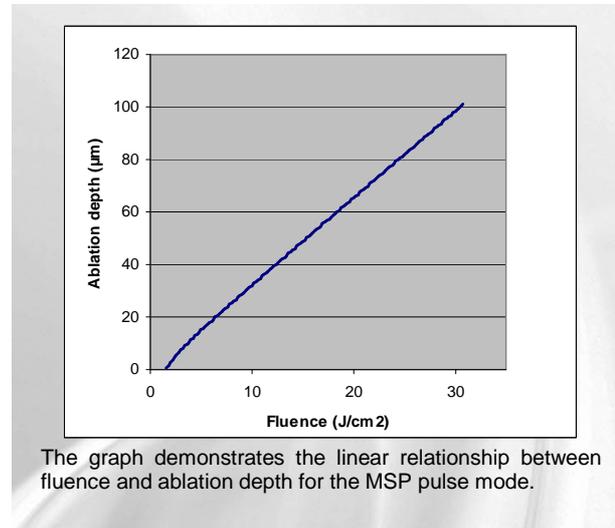
Ideal clinical results require an optimal balance of deep ablation and thermal coagulation. Moderate coagulation is needed to minimize bleeding during procedures, yet at the same time excessive thermal coagulation will increase healing times and related risk of complications. In order to maximize results and keep downtime to a minimum, the ideal laser system for skin resurfacing and rejuvenation treatments should thus offer adjustable ratios of ablation with controlled thermal coagulation.

The basic laser treatment parameters that influence ablation and coagulation are laser *fluence* and *pulsewidth*. Fluence is the amount of energy that is delivered to a treated skin surface area and is measured in Joules per square centimeter (J/cm^2). Pulsewidth, often also called pulse duration, refers to the temporal length of a laser pulse; the time during which the laser actually emits.

A definite advantage of the XS Dynamis is that the practitioner does not need to be preoccupied with exactly defining laser fluence and pulsewidth when setting treatment parameters. Fotona has incorporated factory pre-set treatment parameters into the XS Dynamis. An ingenious software solution automatically calculates the expected ablation and coagulation depths for the selected pre-sets.

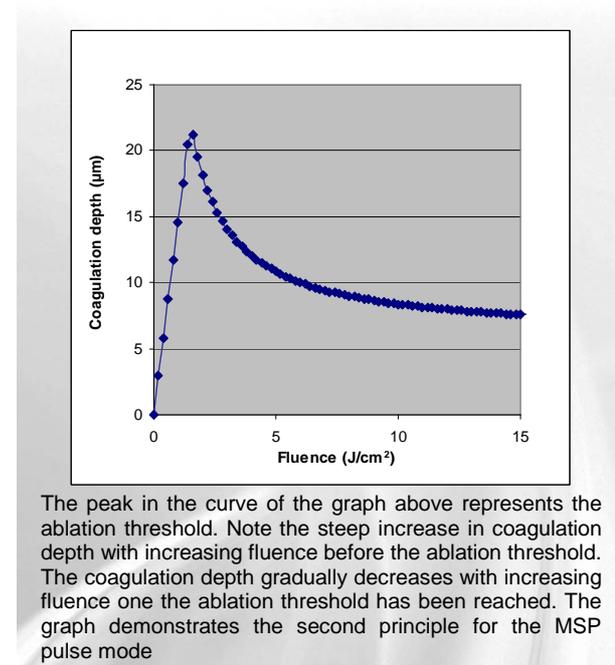
To further fine-tune treatments three fundamental principles should be taken into account:

Firstly, there is a threshold for laser ablation below which skin ablation is minimal. Above the ablation threshold, the ablation depth will increase almost linearly with the selected laser fluence. In practice this means that when any fluence value is doubled, the ablation depth will double.



The graph demonstrates the linear relationship between fluence and ablation depth for the MSP pulse mode.

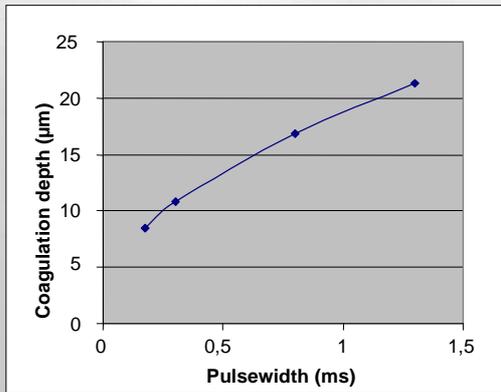
Secondly, below the ablation threshold, coagulation depth increases with the laser fluence. Above the ablation threshold, the coagulation depth decreases.



The peak in the curve of the graph above represents the ablation threshold. Note the steep increase in coagulation depth with increasing fluence before the ablation threshold. The coagulation depth gradually decreases with increasing fluence one the ablation threshold has been reached. The graph demonstrates the second principle for the MSP pulse mode

The last principle states that the coagulation depth is higher for longer pulse duration. In other words, the coagulation depth increases

when selecting the longer VSP Technology pulsewidth modes.



The graph illustrates the relationship between coagulation depth and pulsewidth at settings that will ablate to 30 microns deep into the skin.

Unprecedented Treatment Options Range

The XS Dynamis offers practitioners a virtually unlimited range of treatment options based on its ability to provide an exceptional range of ablation and coagulation depths.

Ablation range: <5 to 6,696 micrometer

Coagulation range: <5 to 130 micrometer

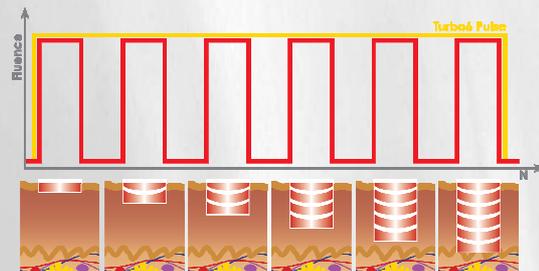
An important technical feature of the XS Dynamis that contributes to the practitioner's ability to define and control treatment outcome is the range of VSP Technology-supported pulsewidth modes. The XS Dynamis offers five VSP Technology modes: MSP (100 µs), SP (300 µs), LP (600 µs), VLP (1000 µs) and XLP (1500 µs). This standard range is further enhanced with unique, treatment-specialized modes, which are: Turbo mode to augment ablation and, Smooth and V-Smooth to expand coagulation options. The system's highest performance characteristics ensure that it's Er:YAG laser can provide an extraordinary laser fluence range of 0.13 J/cm² to 300 J/cm².

The pulsewidth and fluence ranges combined, ensure the XS Dynamis' groundbreaking <5 to 6,696 µm ablation range and <5 to 130 µm coagulation range.

Turbo Mode Enhances Ablation



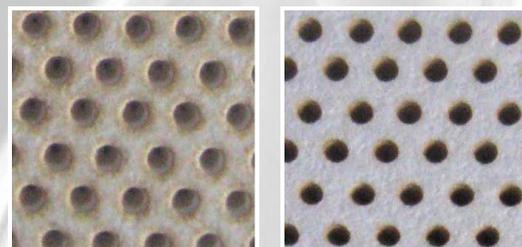
Turbo mode is another technological feature that distinguishes this latest Fotona Er:YAG laser system from any other system available on the market today. In this mode a "turbo" sequence of identical pulses is emitted onto the same treatment spot on the skin. Its aim is to enhance both ablation depth and at the same time create micro-channels in the skin that have a more accurately and sharply pronounced contour along the micro-channels' circumference.



As the diagram above demonstrates, Turbo mode laser pulses consist of individual pulses stacked into one virtual pulse. The number of individual pulses can be varied from two, Turbo2, to six, Turbo6.

In terms of providing advantages in ablation depth, research has shown that Turbo pulses of the same cumulative energy as a single pulse penetrate deeper into the skin. This difference in ablation depth ability is reported to become more pronounced as the applied energy is increased.

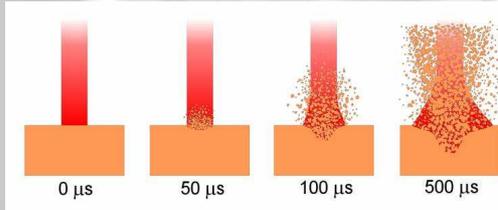
Research has also shown that the contours of the micro-channels created by ablation are more pronounced and sharper when using Turbo pulses, compared to equivalent energy single pulses, as clearly demonstrated in the images below.



The images above clearly show the distinct differences in micro-channel contour sharpness

between equivalent energy single pulses (left) and Turbo pulses (right). Both scans were conducted using the F-Runner scanner with equivalent settings.

The difference in micro-channel sharpness is reportedly caused by scattering of high energy single pulses due to the formation and screening effect of tissue debris as illustrated below.



In single, high energy pulses the scattered laser beam irradiates the tissue surrounding the micro-channel. Although the scattered beam is sub-ablative, it will create thermal effects in the micro-channel surroundings of which the therapeutic effects or benefits cannot be defined or controlled. The scattering effect and loss of sharp micro-channel contour definition become more pronounced with more aggressive ablation settings since the debris cloud will be bigger.

By stacking, lower energy pulses in extremely short intervals in one Turbo pulse the aforementioned ablation-limiting effects are avoided and more defined, and precise micro-channels are created.

In conclusion, Turbo mode generates deeper, more accurately defined micro-channels. It allows the practitioner to capitalize on the most useful laser energy ranges provided by the XS Dynamis. The ability to control treatment parameters in this way finally enables practitioners to adopt a "less is more" strategy in treatments.

Factory Pre-set Treatment Parameters

VSP Technology offers XS Dynamis owners the unique ability to tune its Er:YAG laser to different tissue conditions and at the same time to the desired clinical outcome and/or patient's expectations. The technology also plays an instrumental role in being able to combine ablation and thermal coagulation in the same procedure. This will for example provide the ability to plane down wrinkles externally, while internally stimulating the dermal collagen matrix to tighten and restore the skin's elasticity for a natural-looking effect. In this sense VSP Technology is a crucial feature to ensure that with the XS Dynamis, the practitioner has the most versatile and widest array of possible treatment options in skin resurfacing at hand. Regardless of body area,

skin type, patient requirements, the XS Dynamis' treatment range allows the practitioner to treat all.

Primary indications for XS Dynamis resurfacing treatments are:

- Mild to deep wrinkles
- Persistent, deep peri-oral and ocular wrinkles
- Acne, post-traumatic and surgical scarring
- Actinic keratosis
- Benign pigmented lesions
- Skin laxity in all body areas; including the upper and lower eyelids
- Aging skin with deteriorating tone and texture

The XS Dynamis includes pre-set parameters for treatment modalities to treat the most common indications. For the practitioner this eliminates the need to think in terms of laser parameters, nor do ablation/coagulation depths need to be selected in order to achieve an optimal clinical outcome. It is as easy as simple selecting one of the clinically proven treatment modalities on the XS Dynamis screen. The XS Dynamis' treatment intelligence software does all the calculations automatically, so that more attention can be given to optimizing the treatment and performing the procedure. The factory pre-sets can be further fine-tuned, or even completely overridden, and stored to suite the practitioner's needs. The XS Dynamis offers eight factory pre-set treatment modalities for each type of laser action: Pulse (manual treatment application with handpieces), S-Runner (full-field ablation scanning) and F-Runner (fractional resurfacing scanning)

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