SMLTECHREPORT

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An interview with Martin Kastner, R&D Engineer

A new chapter in PET sheet extrusion

SML's new production-scale demonstration line FlexiPET for PET thermoforming sheet has gone into operation at the Technology Centre. The line brings together a completely redesigned machine architecture, SML's new in-house twin-screw extruder for polyester, a fully-automated roll stack, and a brand-new winder - all backed by a new safety concept. Early experience with all these innovations has been gathered – reason enough to take a closer look and ask about the challenges, the highlights, and what comes next. Martin Kastner, R&D Engineer at SML, tells the inside story.



FlexiPET: material and recipe flexibility

Q: The machine concept has been completely redesigned. What drove that decision – and how is it holding up in practice?
Martin: When we started designing the line, our goal was pretty clear: maximum safety, but without making the machine harder to operate. So, we created **safety areas** – basically safety fences that group the machine components that belong together. The result is a concept that fully meets the European safety benchmark, the calender standard. Safety guards mounted directly on machine components, such as the roll stack itself, are no longer necessary. For our customers, that means one **big practical benefit:** the components are much easier to clean and maintain. The haul-off units are integrated into the safety areas with a very simple design, which also helps to reduce maintenance costs. And so far, the concept has proven itself in practice. In fact, it's set to become the standard for every line type in the sheet lines portfolio.

Q: The TSE80 – SML's in-house designed parallel twin-screw extruder – is being used in a PET sheet line for the very first time. How have the first experiences been so far?
Martin: The first tests are very promising. With the TSE80, the line can be started up quickly. Combined with SML's high-performance vacuum degassing, we can even process undried material, which enables **very fast product and recipe changes**. That's really what gives the line its flexibility, just as the name FlexiPET suggests. For customers, this translates directly into shorter changeover times and greater production flexibility. And the TSE80 also makes a big contribution to energy efficiency: we are down to just 0.27 kWh per kilogram.

Q: What's your personal highlight of the line?
Martin: For me, it's the newly developed automation solutions on the roll stack. They can deliver real added value to our customers. One of them is the automatic roll stack start-up process, which enables a safe line start-up in single-operator mode. The other is the software-based collision protection between the flat die and the polishing and cooling rolls of the roll stack.

Q: How does the automatic start-up process work exactly?
Martin: Let me walk you through it. First, the threading fleece – which protects the roll surface from scratches during start-up – is threaded through the roll stack. Then the operator activates the automatic start-up mode on the machine HMI. From there, everything happens on its own: the roll stack moves via servo positioning drives from its park position into the start-up position, the extruders start automatically, the roll gap closes in a defined way, and the roll drives kick in. The operator can simply wait at the exit of the roll stack safety area, take over the film, and pull it through to the winder. Defined contact-force and calendering-gap limits make sure that, during start-up, the rolls cannot be damaged by hard, crystallised plastic melt particles. For the customer, that means a safer, more comfortable start-up with fewer operators – and protection for the most valuable components of the line.

Q: What were the biggest challenges?
Martin: Without a doubt, developing the new W650 winder. The challenge was to build a new standard winder for thermoforming film that is very compact, offers efficient operability, delivers the highest winding quality – and still stays cost-attractive. We decided to develop it from scratch, with an interdisciplinary team spanning process engineering, technical design, and assembly. And thanks to the spirit of innovation and the excellent teamwork that SML stands for, we got it done. Now we can offer customers a winder that combines the best of both worlds: the user-friendliness and quick roll changes of a cantilever winder, combined with the large maximum winding diameters of up to 1,500 mm and roll weights of up to 2,000 kg that you would typically find in A-frame winders.

Q: Looking ahead – what are the next planned development activities?
Martin: The line is a true platform for development activities. Alongside customer trials, demonstration runs, and sample productions, our R&D work is focused on further improvements for operator comfort and maximising line availability. In the near future, for example, we will be installing and testing SML's in-house-developed edge trim and part roll cut with automatic positioning on the line. We are always open to trying new things together with our customers and partners. *(Kas)*



Martin Kastner and the interdisciplinary SML team worked together to successfully implement the new FlexiPET sheet line.

Extrusion lines – engineered to perform



Dear Reader,

Whenever I walk through our Technology Centre, I rarely see empty halls. Somewhere a line is always running, either on an SML internal development project or for a customer specific trial. It is the place in our company where ideas are put to the test. These activities create special value and deliver measurable benefits to our customers. With markets in turmoil, a fast reaction to ever-changing requirements, efficiency, and a proven operational reliability are at the heart of every development.

Our cover story highlights FlexiPET, the latest addition to our Technology Centre. This new production-scale demonstration line for PET sheet extrusion brings together advanced process technology, intelligent automation, and a modern safety concept. Equipped with our in-house developed TSE80 twin-screw extruder, a fully automated roll stack with automatic start-up, and the compact W650 winder, FlexiPET provides an ideal machine concept to produce PET sheet for a wide range of applications.

A year after its market introduction, our XL roll stack has also proven its capabilities in industrial operation. Customers benefit from high productivity, excellent sheet quality, and simplified maintenance, supported by the patented split design that enables faster roll cleaning and reduced downtime.

Beyond PET sheet, we present Cast-MDO technology for fully recyclable MDO-PE and MDO-PP films and higher production capacities at our Austrofil multifilament spinning lines. Our expertise also covers comprehensive solutions for liquid packaging board applications using Triplex coating lines, along with solutions for the easy operation of your stretch film winder's control system.

What connects all of these developments is one clear objective: helping you improve productivity, reduce resource consumption and strengthen your competitiveness in rapidly evolving markets.

I invite you to experience these innovations firsthand at our Technology Centre.

Thank you for your continued trust in SML, and I hope you enjoy reading this.

Yours sincerely,

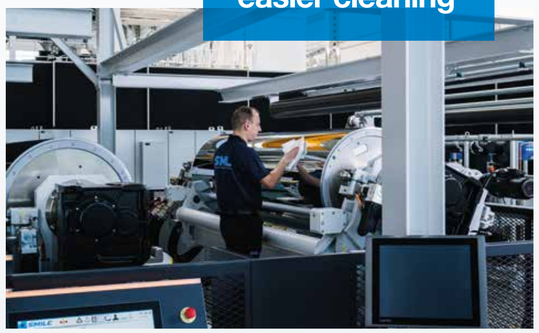
Karl Stöger
Managing Director

Efficiency in PET sheet extrusion

XL roll stack – proven performance in daily production

Better access - easier cleaning

Around a year ago, SML launched the XL roll stack and promised a new benchmark in PET film production. SML is now taking stock — and these promises have been confirmed in practice. The XL roll stack is a genuine game-changer for the efficient production of high-quality PET thermoforming films. The performance data announced at launch have been fully achieved in ongoing operation, and in some cases even exceeded.



PROVEN PERFORMANCE IN DAILY OPERATION

The line reliably produces films with a net width of up to 2,500 mm and a throughput of up to 5,000 kg/h of PET. It also produces high-quality PET films with thicknesses of up to 1,200 µm in large quantities. "*These results confirm what we promised at the market launch,*" explains Alexander Streicher, R&D Engineer at SML.

FAST START-UP, MAXIMUM PRODUCTIVITY

The line can be ramped up from start-up to full production within an extremely short time window, which significantly increases productivity. Combined with the automatic die, the thickness measuring device and the in-house developed winder W2000 XL, the XL roll stack sets new standards for quickly achieving stable product quality.

CONSISTENT FILM QUALITY ACROSS THE ENTIRE WIDTH

Particularly pleasing is the confirmation of consistent film quality across the entire width. This is achieved through a combination of a hydraulic roll and axis crossing: the crowning of the smoothing roll C0 can be adjusted continuously, and the inclination of the axis can be set precisely. As a result, the calendering nip remains perfectly parallel across the entire width — producing film of a quality that meets the high standards required by the packaging industry.

A MILESTONE FOR INLINE-SLIT THERMOFORMING FILM ROLLS

Combined with the in-house developed winder W2000 XL, which can produce up to four webs, the XL roll stack represents a milestone for inline-slit thermoforming film rolls. The winder can also stretch-wrap the rolls directly, so the finished, wrapped film rolls can be transported without picking up additional dirt. This sets a new standard in ready-wrapped thermoforming film rolls and underscores SML's expertise in winding technology. *(Sar)*



PATENTED SPLIT ROLL STACK FOR FAST, EFFORTLESS CLEANING

The patented split roll stack (C0/C1/C2) has also proven its advantages. The separation into a base unit (C0 and C1) and a C2 unit improves access to the roll stack and facilitates careful cleaning and preparation of the roll.
"*The split roll stack reduces roll cleaning times and increases the productivity and efficiency of the line — exactly as announced,*" says Streicher.
Fully automatic operation has also been confirmed. The C2 unit is separated from the base unit and re-docked in a fully automatic process, and the roll stack automatically approaches various working positions. This noticeably reduces downtime.



"The XL roll stack is a prime example of our ability to develop and implement innovative solutions. The fact that the results have been confirmed in practice makes us particularly proud.

Alexander Streicher
R&D Engineer

Cast MDO competence

One line, countless possibilities

MDO unit: Reduced height and improved accessibility

SML's Technology Centre is home to a state-of-the-art Cast MDO demonstration line – and it is a true all-rounder. Whether unstretched film or mono-oriented film is required, this one line covers a broader segment of the cast film market than almost any other.



"*Conventional CPP structure, seven-layer barrier film or ultra-thin mono-oriented film — SML's Cast-MDO technology delivers them in the best quality and with maximum efficiency. And we have the right line parameters for every single product,*" says Elias Mayrhofer, Product Manager at SML. New recipes and new polymer combinations are equally welcome, with SML's process engineers on hand to support development.

CPP AND CPE FILMS – THE VERSATILE BASE FILM

The line produces CPP film in thicknesses from 15 to 250 µm and CPE film from 18 to 150 µm, both offering high transparency and low haze. Typical applications include metallised and laminated packaging for food and non-food products, retort structures, as well as technical and medical films.



CPP film - the versatile base film

BARRIER FILMS – PROTECTION, PERFECTLY TAILORED

Unstretched barrier films from 30 to 250 µm are built around EVOH or PA6. They protect against oxygen, water vapour, odour and UV light, making them a natural choice for highly perishable fresh food such as meat, cheese or fish – with medical packaging as a second major field of application. Since the layer arrangement is freely configurable, the barrier can be tailored precisely to the product.



Barrier films – protection for perishable foodstuffs

Mono-oriented films – the recyclable game changer



MONO-ORIENTED FILMS – THE RECYCLABLE GAME CHANGER

Here is where the line really shines. MDO-PE films from 15 to 80 µm can replace BOPET films, turning a PET/PO structure into a mono-material product ready for recycling. With stiffness above 1,400 MPa in the machine direction, haze below 5 % and excellent flatness, they are ideal for both surface and reverse printing – and equally well suited to metallising.

MDO barrier films from 17 to 40 µm add a thin EVOH layer and achieve oxygen transmission rates of 1 to 5 cm^3/m^2 per day. This makes them ideal for resealable stand-up pouches, flow packs and unlaminated deep-freeze bags. Depending on the structure, the EVOH layer can be positioned either in the middle or on the outside.

MDO-PP films from 15 to 80 µm offer straight tear behaviour and good thermal resistance and open up a world of applications: easy-tear pouch film, label film, carrier handles, tear tapes, adhesive tapes and cable insulation.

ADJUSTABLE STRETCHING GAP

With the newly installed Cast MDO line, SML has taken its MDO technology a step further, enabling stretching ratios of up to 1:10 and a stretching gap that can be adjusted to suit the product. The basis for this performance is an extended temperature profile that can be controlled in fine steps: five preheating rollers, two stretching rollers, five annealing rollers and one cooling roller, each individually driven and temperature-controlled up to 160 °C.

SYNERGY SOLUTION ON BOARD - SHORTER CHANGEOVER TIMES

Automapping aligns the die bolts and measuring positions automatically - without any operator input and without manual mapping at product change. Film Width Adjustment sets the film width via the motorised internal deckling system, while edge pinning, trim knives and suction pipes follow the adjustment steplessly. The result: shorter changeovers, less start-up waste and greater safety. And every setting is documented in bitWise, so your proven set-up is ready for the next production run.

PUT YOUR CAST FILM IDEA TO THE TEST

The industrial-scale Cast-MDO line is at your disposal: For trials, product development and sample production. Whether you are entering cast film production for the first time or redesigning an existing structure for recyclability, the Cast-MDO line at SML's Technology Centre in Redlham has the equipment, the technology and the expertise to make it happen. *(Mel)*

SML Cast MDO

Factbox: Cast-MDO technology

- **Maximum flexibility** in film production for a wide range of applications
- **Tailored film properties** - precise control over mechanical and optical characteristics
- **Superior film flatness** for optimal surface and reverse printing quality
- **Downgauging potential** - material savings without compromising film quality

Austrofil HT – More output, less energy

New HO-LT extrusion system for Austrofil HT spinning lines

SML's multifilament spinning line, Austrofil HT, has long been supplied with a 75 mm extruder delivering up to 160 kg/h as standard. Now, the newly developed HO-LT (high output – low temperature) extrusion system for PP yarn production takes things a step further: outputs of 200 kg/h and beyond — with lower power consumption.

HOW THE HO-LT EXTRUDER WORKS

The HO-LT (high output – low temperature) is a high-speed extruder with a 45 mm screw. Its specially designed screw and barrel reduce external heating requirements by almost 20% when processing PP granules at around 200 kg/h. Thanks to the higher screw speeds and more compact design, residence time drops significantly compared to the 75 mm extruder. The result: lower melt temperatures, which in turn improve the mechanical properties of the yarn and reduce the cooling power needed for quenching. Energy efficiency, in short, is built into the concept.

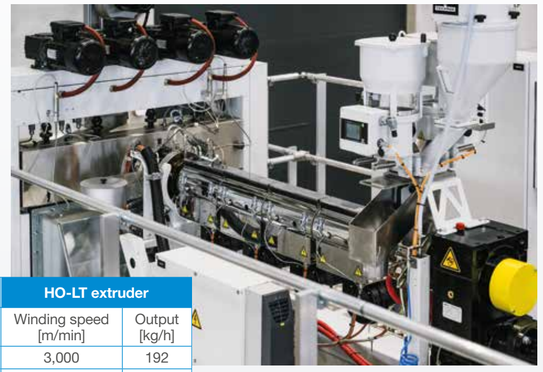
BEYOND ESTABLISHED OUTPUT LIMITS

The conventional 75/28 extrusion system tops out at 160 kg/h. The HO-LT extruder was developed precisely to overcome this limit. In the past, sustaining high line outputs across most titres simply wasn't possible. With the new extrusion system, that's no longer a constraint.

PRODUCTION EXAMPLES AT A GLANCE

The table below shows a few production examples that highlight the HO-LT's enhanced output:

	75/28 extruder		HO-LT extruder	
Titre [den]	Winding speed [m/min]	Output [kg/h]	Winding speed [m/min]	Output [kg/h]
600	2,400	153	3,000	192
800	1,800	154	2,350	201
1,200	2,400	153	3,000	192
1,500	1,900	152	2,500	200
3,500	1,600	150	2,150	201



The Austrofil HT line with HO-LT extruder is now available for trials and demonstrations at SML's Technology Centre. *(Dab)*



> With the HO-LT, we've turned a long-standing bottleneck into a real advantage. Our customers can now push their Austrofil HT lines well beyond 200 kg/h — and do it with noticeably less energy.
>
> **Stefan Dambauer**
> Product Manager Spinning Technology

SML TechCentre

Where ideas become reality

At SML, innovation doesn't start at a drawing board – it begins on site, right in the field. The SML Technology Centre is where that happens: a 3,000 m² competence centre for extrusion technology. It is a place to test polymers and recipes without limits.

The real advantage, however, lies in the decades of experience and the in-depth process expertise of our process engineers. Working closely with our customers, they turn ideas into solutions on site.



Why use SML's Technology Centre?

- **See what you buy** – industrial-scale lines under real production conditions
- **Develop fast and cost-efficiently** – no interruption of your own production, saving costs and time
- **Rely on experience and competence** – benefit from the in-depth expertise of our process engineers

Triplex coating & laminating lines

Speed, flexibility and the right fit for every customer

In recent years, SML has further strengthened its position as a premium supplier of extrusion coating and laminating lines for aseptic packaging. SML's Triplex lines for Liquid Packaging Board – successfully installed at customer sites and running up to 600 m/min – continue to set new benchmarks, and development toward even higher speeds is already underway.

SPEED AS A COMPETITIVE ADVANTAGE

The Liquid Packaging Board (LPB) market is growing continuously, with even conservative market research institutes forecasting annual global growth of 4–5 %. To meet rising demand, new systems need to be installed and line speeds increased.

In LPB production, line speed is a decisive lever for efficiency. What matters most, however, is that it fits the customer's specific requirements.

A SML Triplex line combines equipment from multiple suppliers. The key to achieving the required high-speed performance lies in the smooth interaction of these high-quality components. Every element of the line – from extrusion and unwinding to the laminator and the winder – is engineered to work together seamlessly. Our in-house developed line control system SMILE is what makes this combination so smooth and effective. And because the components are perfectly matched, we can adapt the line flexibly to each customer's requirements.



THE ENTIRE LOGISTICS CHAIN MUST KEEP PACE

High line speed alone is not enough – the speed of the line must be matched by the speed of the entire logistics chain. Customers must adapt all upstream processes, such as printing, die-cutting and creasing, as well as downstream steps such as slitting, doctoring and packaging, to the line speed. Only then can material jams before or after the line be avoided.

OUTLOOK

Work is already underway on a further increase in line speed. Our goal is to push the limits of what is possible in extrusion coating even higher – while always ensuring that the entire line, including the surrounding logistics, keeps pace. With this combination of machine engineering, process understanding and logistics expertise, SML delivers not just fast lines, but complete solutions. *(Horn)*

Expertise in turnkey solutions



Austrofil VERTEX POY multifilament spinning

High-performance spinning of fine-denier filaments

SML introduces a new POY unit, integrated into the Austrofil VERTEX spinning line. It is a powerful solution for producing high-quality microfilaments from PET. The VERTEX spinning line is specifically optimised for fine deniers with a dpf ≤ 1, making it ideal for applications in textiles – wherever consistent quality and maximum precision are required.

MORE OUTPUT, LESS SPACE

The VERTEX combines a compact, straightforward design with real production gains. Its space-saving construction reduces the footprint in the plant and simplifies and accelerates setup – while production speeds are significantly higher than previous solutions. The result: greater output and excellent yarn quality, without compromising on the final product. "*Whether for lightweight automotive textiles or high-end apparel fabrics, the VERTEX delivers the reliability and performance that today's demanding applications call for,*" says Thomas Pucher, Product Manager Spinning Technology.

NEW SPIN FINISH APPLICATION SYSTEM FOR SUPERIOR YARN UNIFORMITY

A key highlight is the newly developed oil application system. The optimised applicator ensures uniform, precise spin finish application – a critical factor for yarn evenness and processability, especially at the finest deniers. The result is consistently high-quality yarn with excellent running behaviour in downstream processes.

TEST IT FIRST AT THE SML TECHNOLOGY CENTRE

The VERTEX spinning line featuring the new POY unit is now available for trials at SML's Technology Centre. Customers can test the system under real production conditions and experience its performance first-hand – from process stability at high speeds to outstanding yarn quality. *(Puh)*





Visual operator assistance for stretch film winders

Understand complexity, operate your line with confidence

Modern winders in cast stretch film lines are highly automated systems with complex, interlinked processes. This is exactly where SML's in-house software Visual Operator Assistance (VOA) comes in. It makes line operation as simple and intuitive as possible – through a fully visual, modular representation of every unit, right on the HMI.

UNDERSTAND INSTEAD OF SEARCH

VOA explains how the entire winder works through images rather than long texts. Every actuator and sensor in the winder is fully integrated and displayed in its correct target position. Whether experienced or new to the line, operators quickly gain a clear picture of the whole system and understand how the individual components work together.

FAST IN THE EVENT OF A FAULT

When faults occur, they are displayed visually, and fault analysis is carried out step by step in a highly logical manner. Analysing step chains is effortless. Key functions and processes are visually supported, enabling fast problem-solving without lengthy searches through documentation – noticeably reducing downtime and boosting productivity.

ALL INFORMATION, ONE SYSTEM

All information is bundled directly in the HMI – from the overview down to the last detail. Operators are automatically guided from the top display level to the individual component, including direct visual safety instructions.

REMOTE SUPPORT INCLUDED

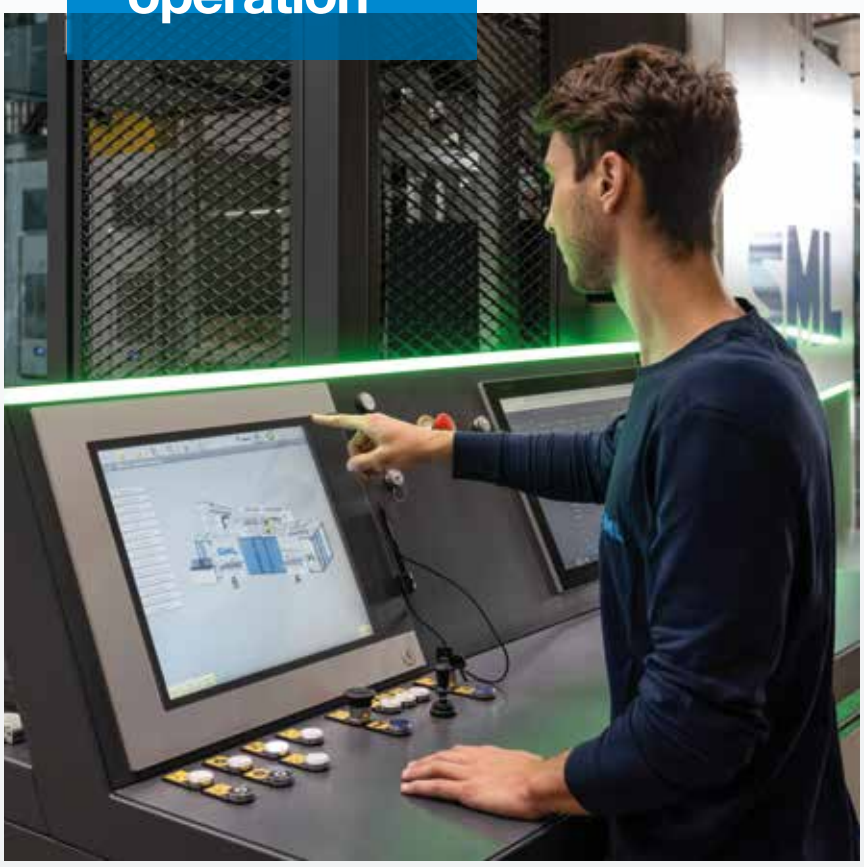
VOA enables fast remote support: thanks to the live representation of the winder, experts can support the operator from afar and resolve issues quickly.

EASY ONBOARDING, LESS TURNOVER

In times of high staff turnover, VOA makes it significantly easier for new employees to get started. Even without prior training, they quickly find their way around and gain confidence in operation. Maintenance also benefits: service technicians are actively supported and relieved by the visual assistance.

VOA takes the complexity out of line operation – for easier onboarding, simpler maintenance and greater safety in production. *(Kir)*

Simple and intuitive operation



Forecast 2027:

SMLTechCentre

Full cast stretch film line portfolio at SML Technology Centre

In 2027, SML will showcase a complete range of industrial-scale stretch film lines. This gives customers the opportunity to test materials, formulations and products under real production conditions – before investing in their own line, ensuring the right decision from the outset. *(Krb)*

- **MiniCast – 1.5 m line concept, 3-up: single turret winder for ultra-short film tail**
  The MiniCast is the entry line into industrial-scale stretch film production. Its single turret winder for ultra-short film tail keeps changeover waste to a minimum. Smaller production runs become efficient
- **EcoCompact – 2 m line concept, 4-up: high-speed even on 2-inch cores**
  The EcoCompact sets the benchmark for production flexibility. High-speed production of 2-inch film rolls combined with an extremely short cycle time maximises output per hour.
- **SmartCast Infinity – 3 m line concept, 6-up: inline pre-stretch unit included**
  The SmartCast Infinity integrates an inline pre-stretch unit into the production process, delivering ready-to-sell pre-stretched hand rolls.
- **PowerCast Nano101 – 4 m line concept, 8-up: nanolayer feedblock**
  The PowerCast Nano101 integrates a nanolayer feedblock for up to 101 layers. This unprecedented layer count offers greater flexibility in raw material choice for the highest properties.

> "All SML stretch film lines are designed for the demands of modern stretch film production. The installed demo lines allow trial results to be transferred to subsequent mass production.
>
> **Thomas Rauscher**
> Product Manager Stretch Film Lines

Extrusion lines –
engineered to perform

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SML
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