PRESS RELEASE

**SEA VISION GROUP BRINGS ARTIFICIAL INTELLIGENCE TO THE WORLD OF COSMETICS**

**Pavia (Italy), February 14, 2023 -** SEA Vision Group will be at the Marchesini Group Beauty stand (A/9PK) at the Cosmopack show in Bologna from 16 to 18 March with a **new Artificial Intelligence technology** applied to the visual inspection of lipsticks.

Ever since its foundation, SEA Vision Group has concentrated its efforts in the field of industrial vision, aiming to improve continually and to overcome the limitations that typically emerge in packaging and automation processes. Lipsticks - some of the most versatile, eclectic products, with complex quality control - pose very specific problems that require innovative solutions to enable their automated inspection.
This new application receives its public presentation at the start of what experts define as “**the year of Artificial Intelligence**”, in which the spread of technologies based on deep learning and neural networks is expected to make a big leap forward in quality terms. Accompanying this development, the **portfolio of algorithms** that underlie the SEA Vision Group software packages will continue to evolve towards new horizons in AI. Today, therefore, we witness the presentation of a still-evolving solution for use in a very dynamic context of great interest, which embraces all aspects of our daily lives.

**Lipsticks: a wonderful product but complex to manufacture**After the successful launch - at Achema 2022 - of its solution for automating pharmaceutical **Line Clearance** processes with the aid of neural algorithms, SEA Vision Group offers visitors to Cosmopack the first glimpse of a new AI-based lipstick inspection system. Through the automation of processes still largely carried out by humans, this solution aims to improve the packaging of a product currently considered one of the **world’s bestselling cosmetics**. The essential ally of all (or almost all) women, lipsticks come in countless colours, finishes, shapes, formulations and combinations, and many of them, especially in the luxury sector, feature logos and sophisticated decorations impressed on the body or tip of the product.

These distinctive styling features - together with the complexity of the industrial process required to perfectly amalgamate the pigments, oils, waxes and emollients in its formula - mean that lipstick is complicated to produce and to verify in terms of product quality. Even today, in spite of all the efforts made during production to prevent and control a whole series of potential defects, some flaws still pass through quality control undetected. This leads to costly reprocessing: in the worst-case scenario, these products make it onto the market, implying serious risks for businesses in terms of **brand reputation**.

*FOCUS: some examples of defects*
Some of the most common defects on the body of the lipstick are:
**- product defects and deformation**: stick diameter and height, shape, tip geometry;
**- burrs and drips**;
**-** **appearance flaws**:surface micro-holes, scratches, chipping, foreign bodies, defects in embossing such as logos or textures engraved or in relief on the body of the lipstick;
**- uneven colour**: streaks, variations in colour.

**The frontier of Artificial Intelligence**
Artificial Intelligence sets out to remedy a large proportion of these potential defects. The SEA Vision Group system (under development by a joint team from SEA Vision Group and ARGO Vision) uses the **semantic segmentation** of the areas of the lipstick (e.g. body, tip, neck, mechanism, etc.) to identify every possible flaw pixel by pixel. This is achieved by classifying areas by categories, each of which is assigned a name or “label”. Each part or area of the image is classified by categories and identified by a colour on the screen to provide the operator with immediate information about the areas being inspected.

The system self-learns how to discern an ever-increasing variety of more and more complex defects, item-by-item. Self-learning takes place both on the basis of proprietary datasets - a mix of real and synthetic images generated with the most advanced **data augmentation** and **neural generation** techniques - and by combining the different models and parameters learnt over time.

These deep learning-based semantic segmentation techniques, now the *de facto* standard in the Artificial Intelligence field, **greatly accelerate the development** of capabilities for the analysis of objects. In other words, the ever-expanding range of scenarios the system can consider enables the system itself to evolve and become more and more precise.

The learning process defines the quality control algorithms and continually evolves to generate new versions of constantly increasing sophistication and autonomy. In this specific issue, the final goal is to generalise the “concept” of lipstick, making the algorithms more

and more specialised in quality control regardless of the product’s possible shape, colour and texture (e.g.: satin, transparent, matt, pearl, glitter, etc.).

“The outstanding feature of this innovation, differentiating it from conventional vision systems, which can only detect defects in images through comparison with models already known at the outset,” explains **Alessandro Ferrari**, CEO of ARGO Vision, “is the system’s ability to learn from past examples and thus autonomously increase its analysis capability, which is more or less what we humans do when we learn from experience.”

All in all, pre-neural technologies proved incapable of identifying, with precision, a whole series of defects and flaws which may arise during lipstick quality control. Today, thanks to AI, it is possible to deliver an even higher quality final product, by preventing imperfections that may affect a user’s perception of a specific brand.

What’s more, at Cosmopack SEA Vision Group will also be presenting a complete hardware and software solution developed to oversee the authenticity of a cosmetic product throughout the supply chain. SEA Vision Group’s **end-to-end serialisation** solution helps beauty industry businesses to combat counterfeiting by providing an innovative technology to protect the brand’s authenticity and guarantee transparency, quality and sustainability.