Brand Protection De La Rue

# The enduring relevance of holography as a security feature platform.

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# The enduring relevance of holography as a security feature platform.

Back in 2003, I gave a presentation at the Holography industries annual conference (formerly known as Holo-pack) entitled ***New approaches to security Holography.*** The theme of the conference sought to address an emerging concern that as holograms and more generally other forms of diffractive OVD's (DOVID's), entered their third decade of exploitation as security devices, that they may struggle to maintain future credibility as a form highly secure public recognition technology.

The purpose of my presentation was to firstly analyse why such a view was gaining traction, factors such as:

– the growing proliferation of dot-matrix origination technology, making the image generating aspects of the technology less proprietary and therefore controlled,
– the use of term 'holography' as an umbrella name for all devices or products showing some form of diffractive iridescence, including of course decorative packaging foil,
– and finally, the complex graphical composition form and optically variability that typified Holograms and DOVID's of that period – seen as a defence against re-origination and simulation by more commercial 'holography'.

Secondly, was to identify a new approach to design of high security holograms which:

– sought to balance the needs of technical sophistication with public recognition,
– sought to place greater emphasis on distinct overt features (greater effect centricity)
– sought to utilise other proprietary capabilities downstream of the origination or mastering process.

Over 16 years have elapsed since this conference and contrary to the expectations of many pundits, the use of holograms and DOVID's as security features has continued to grow in most of the relevant market sectors and indeed within the domain of product authentication it remains the predominant security component.

Whilst I would like to think that my presentation helped catalyse a seed change in industry thinking as regards design and imaging philosophy - important as this is, it would not be sufficient on its own to maintain the continued relevance of holography for a further two decades given the competitive pressure of more recent disruptive technologies based on micro-lens or micro-mirror arrays. Instead the continued growth in the use of holography as a security feature component points to a deeper underlying value proposition which is the inherent versatility across several performance vectors.

The first of these versatility vectors, derives from the inherent compatibility of holography with the graphic arts, in that virtually any artwork shape or size that can be created in vector or bitmap drawing packages or alternatively rendered as a 3D model or object can indeed be recorded as a holographic image.
Since we seek to create or provide optically variable images with a high degree of public appeal, whether that be national icons or emblems that might feature in a Currency hologram or the trademarked artwork that expresses a customer brand in an authentication hologram, then it's clear why graphical versatility is such an important vector.

A second vector of versatility relates to the variety or range of optically variable effects that holographic or diffractive microstructures can generate. If we were to list the various types of optical variable effects such as 3D parallax movement, graphical surface animation, graphical image switching, graphical image morphing, iridescence, colour switching etc. then holographic or diffractive micro-structures are arguably the only current OVD technology platform capable of expressing the majority of these optical effects.

The combination of an almost limitless artwork versatility with a wide pallet of effects makes holography uniquely suited to marrying the needs of strong visual or aesthetic appeal (i.e. public engagement), with provision of secure easily recognised optical image effects (i.e. ergonomic visual perception and authentication) across the different market sectors.

A third vector of versatility relates to application and product type. This derives in part from the typically sub-micron relief amplitude of holographic and diffractive microstructures, which allows them to be incorporated into thin frangible thermoplastic layers which are a necessary aspect of thermal and cold transfer foils, including those whose adhesion and patterning is mediated by digital printing such as UV inkjet or toner transfer.

Alongside this we can add thicker product formats such as labels, laminates (full face patch or stripes) and threads. Finally, we can dispense with a polymeric carrier film and instead directly form the microstructures onto a host document or substrate via UV cast cure replication - this is sometimes referred as hologram printing, though this description is more for analogy than semantic accuracy.

We are most familiar with embossed holograms and DOVID's used within the authentication and decorative domains, being opaque silver metallic due to the application of a reflective coating comprising a few tens of nanometres of vapour deposited Aluminium (within a vacuum chamber), however an important fourth vector of versatility derives from the fact that diffractive micro-structures indeed require only a small difference in refractive index at their relief interface of ≥ 0.5 to provide a readily visible image in reflection.

Such a small index difference can be provided by sub micro coatings of highly transparent materials such as Zinc Sulphide or Titanium Di-Oxide with an index ≥ 2.0 (i.e. HRI coatings), thereby allowing surface relief holograms and DOVID's to be used as transparent overlays to protect variable data and imagery from alteration or substitution - well known examples being in passport bio data pages and ID cards.

Further product versatility derives from the fact that the inclusion of an opaque metallic or transparent metal-oxide layers allows the diffractive micro-structures to be either embedded between or over-coated with transparent organic materials.

A final fifth vector of versatility relates to cost – the replication or embossing of holographic or diffractive microstructures and the physical vapour deposition of Aluminium are inherently economic processes, such that the simplest hot-stamping or label based products can have a very low unit cost (e.g. sub 1 US cent), however in order to provide a higher level of security more specialised manufacturing methods such as high resolution registered de-metallisation, laser ablated serialisation, the incorporation of one or more luminescent materials, dual sided embossing and finally its combination with other more specialised surface relief structures.

This versatility of cost profile is an attribute which has allowed holography and DOVID's in their various forms to span commercial applications such as brand enhancement through to the highest security applications in the Identity and Currency domains.

In summary I have identified 5 vectors of versatility which I believe condition the applicability and relevance of any particular category of OVD technology to different product, customer and market channels – in other words, the aggregate growth potential or scalability of any particular OVD technology.

I have outlined why embossed holograms and DOVID's favourably address each of these 5 vectors and furthermore it is not difficult to conclude from the explanation provided that in aggregate terms they will be bitter fit to these 5 vectors than any other category of OVD technology currently available.

When we then combine this inherent versatility with the engineering capability that has been developed within the industry over the past 3 decades to support the cost-effective replication and application of holograms and DOVID's, then there is a logical basis for presuming that the use of holography as a form of security feature technology will continue to grow and flourish in those markets where a premium overt security feature is required for many years to come.

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