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Spectral Imaging of Dutch Gilt Leather for Improved Conservation Strategies

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Gilt leather was one of the most fashionable and costly types of wall hangings in the Western world in the 16th to 18th centuries. Despite its appearance, it is not real gold that creates the golden shine, but typically a silver leaf which is coated with an orange-brown lacquer to obtain a golden lustre. Gilt leather has its origins in North-Africa, and the technique was widely practiced in Southern Europe through the middle ages and Renaissance. By the mid-17th century Dutch gilt leather had a similar fame to Delftware and Dutch paintings. Despite this only a small fraction of the large amounts of gilt leather wall hangings produced in Europe has been preserved. Gilt leather is a layered composite of organic and inorganic materials, including leather, animal glue, silver leaf, varnish, oil paint – materials which fall within different conservation disciplines. The aging of gilt leather is characterized by the specific degradations of each of the applied materials, and the possible interactions between them. Some common conservation treatments practiced in the past, such as oiling the leather, have negative side effects, such as gloss and colour change (darkening) and stiffening of the support. Furthermore, most of the surviving gilt leather decorative sections show traces of surface cleaning, such as abrasion, re-varnishing or the application of other protective coatings.

Hyperspectral imaging has a wide range of applications in astronomy, biology, chemistry, medicine and quality control. Within the domain of art history, archaeology and conservation, hyperspectral imaging has been used since the 1990's, mostly for the examination of paintings and manuscripts. It has proved a successful tool for revealing things that are invisible to the naked eye, for example varnish layers, overpaints or underdrawings. In this study the research team investigated a collection of gilt leather objects at SRAL (Stichting Restauratie Atelier Limburg, Maastricht) using an imaging monochromator IMSPECTOR V10E (Specim©, spatial resolution 1300 pixels, wavelength range 400-1000 nm, bandwidth 2.8nm). Scanning of selected case study objects was performed with an automated 3D scanning platform, developed at TU Delft. The objective lens enabled imaging of an approximately 100 mm of field of view. The sample was illuminated by 3 tungsten lamps (30W Halogen) at a 45° angle to avoid specular reflections and to ensure that only diffuse scattering caused by the surface roughness and scattering centres underneath the surface were recorded by the camera. The technique is non-invasive and non-destructive to the studied object.

The data was recorded in February 2016 and is currently being analysed using the TIPP software platform, developed at TU Delft. This software platform includes algorithms to perform filtering and un-mixing of hyperspectral data cubes, along with memory management for large data sets and tools for data visualization. Data processing will be performed within the next months, with the objective of mapping areas of surface chemical degradation or change in composition due to earlier conservation treatments. Results will be included in the full paper.