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MOLAB User Report

Project Title: Banqueting House Whitehall Rubens Ceiling Paintings Technical Conservation Research (RUBENS-TCR-BHW)

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Venue: Banqueting House, Whitehall, UK

Report text:

The nine ceiling paintings painted by Peter Paul Rubens and his studio were installed at the Whitehall Banqueting House in 1636. This set of paintings is one of the largest (243 m²) and most complex works by the master surviving in-situ for almost 400 years. Since their creation, the paintings have been removed at least five times and treated about nine times. These interventions included removing the canvases from their original stretchers and marouflaging them onto plywood boards in the beginning of the 20th c., cutting, removal and evacuation of the panels during World War II a major restoration campaign after the war and two subsequent treatments. Historic Royal Palaces' current Banqueting House Whitehall conservation and re-presentation project provided a rare opportunity to carry out a first ever full and systematic technical conservation survey of the Rubens ceiling paintings. The purpose of this scientific long term research project is twofold:

- a. to understand Rubens' technique for creating these nine paintings and study their current state of preservation.
- b. to record evidence of previous interventions and their impact on the condition of the works today as composites of original materials with restoration structures and surface alterations.

During the first phase of this project the nine paintings were documented in high resolution multispectral (visible, ultraviolet and infrared light) imaging. This data combined with material from initial analytical results, previous conditions reports and historic records informed the planning of a comprehensive technical analytical campaign, which took place between March and April 2018 facilitated by scaffold access as the paintings are almost 17 meters above the floor.

During this period eleven scientists from four different Molab teams (French, polish, Greek and Italian) worked at the Banqueting House for one week each using six non-invasive portable instruments. Due to time restrictions the non-invasive analyses were performed on two of the paintings, *The Apotheosis of King James I* and *The Wise Rule of King James I*. Despite challenges such as transporting this specialist and heavy instrumentation onto the scaffold and health and safety measures, the analysis and examination of the paintings was successful. Table 1 summarises details of the analytical methods used by the Molab teams and the technical information collected. The extensive non-invasive examination performed by the Molab was complemented by micro invasive analysis.

Analysis and interpretation of these large data sets in collaboration with the Molab scientists are still in progress however, preliminary results are being summarized below.

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Molab Country	Date	Instrumentation	Paintings	
			Apotheosis	Wise Rule
Italy	9/4/2018-13/4/2018	Reflection mid-FTIR spectroscopy	15 spectra	39 spectra
		X-ray fluorescence (XRF)	85 spot measurements	74 spot measurements
France	5/3/2018-9/3/2018	Intergraded XRD /XRF		18 spectra
		Thermography STIR		65 tiles merged to a composite image
Greece	5/3/2018-9/3/2018	Digital Holographic speckle pattern interferometry (DHSPI)	4 areas examined	10 areas examined
Poland	12/3/2018-16/3/2018	Optical Coherence Tomography (OCT)	44 spots	42 spots

Table 1: Summary of the instrumentation used by the MOLAB teams visiting the Banqueting House during the scaffold period in 2018

Results

Analysis confirmed the presence of materials commonly used by Rubens and his studio, such as lead white, lead-tin yellow, malachite, azurite, or brown and red-brown earths. Vermillion was also used extensively across all paintings, not only on red areas but also in flesh tones or pink and purple areas. OCT analysis demonstrated the use of lakes on the paintings and the condition of areas with impasto. The analytical results indicated also extensive use of smalt on blue, green or purple areas showing discolouration. In addition to smalt degradation, other alterations due to ageing include fading of the organic dyes that now appear transparent, discolouration of pigments and formation of crusts. FTIR analysis results confirmed the presence of degradation products such as lead sulfates and oxalates.

Important information was also revealed regarding the varnish layers. Previous documentation indicated that the two paintings had different varnishes however, FTIR confirmed that Ketone N was used across both of them. Furthermore, OCT analysis results showed that in most of the analysis points at least three varnish layers with variable thickness were present on the surface of *Wise Rule* while, on *Apotheosis*, mostly two layers were present due to previous cleaning. The OCT images also showed delaminations between varnish layers, or paint and varnish layers, causing a blanching effect.

Significant new insights on the structural plywood support were provided through careful study of the STIR images. Furthermore, DHSPI supported the evaluation of possible delaminations between the painting canvas and the substrate layer as well as understanding the formation of cracks over the plywood panel joints

This project is expected to contribute new information to the study of Rubens and his studio practice. The findings will help uncover details for the production of these magnificent paintings and provide scientific evidence on the current condition and stability of the paint layers and the coatings which is paramount to the planning of any future conservation campaign. It is anticipated that the outcomes of this research will be widely communicated through conference presentations, academic peer-reviewed papers, online platforms and the press.

References

Magdalena I., Vlachou-Mogire, C., Pereira-Pardo, L., Sylwestrzak, M., Targowski, P., 2018, Non-invasive survey of pre-restoration condition of the ceiling paintings by Peter Paul Rubens at the Banqueting House Whitehall, London, by means of Optical Coherence Tomography, Paper presented at the LACONA XII Conference, Paris, 10th-14th September 2018