

RESTORATION OF A WAGON

KRIŠJĀNIS RIMŠĀNS

Metalwork restorer-specialist
krisjanis.rimsans@lnvm.lv
National History Museum of Latvia
Pulka Street 8, Riga

Wood restoration:

AIJA GRĪNBERGA
Master restorer of polychrome wood
JĀNIS MENĢELS
Senior master of wood restoration

Research and consultation:

ANASTASIJA SILAVA, INDRA TUŅA
Chemists

Photographs:

JĀNIS PUĶĪTIS, LANDA LAGZDIŅA

INTRODUCTION

A four-wheeled, animal drawn wagon made in the first half of the 20th century from wood with steel braces and fastenings. It was used at Dzelmēs in Mērsrags for agricultural purposes - transporting firewood, stones and reeds from the lake. The wagon is a gift from Ligita Amare and was brought to museum in 2021.

STATE OF THE ITEM BEFORE RESTORATION

The item had a thick layer of various dirt, whereas the hubs of the wheels and parts of the axles, had a thick layer of black grease. Wood had deteriorated and was damaged in many places by the swelling of iron corrosion products. Parts of the wheels - spokes and felloes had been heavily damaged by the influence of moisture, and three bolster stakes had broken off. Metal parts had a thick incrustation of iron corrosion products, which had seriously swelled at contact points with wooden parts.

MATERIALS: IRON/STEEL, WOOD, PAINT
DATED: 20TH CENTURY, FIRST HALF
DIMENSIONS: 230X138X81CM

STRUCTURE OF THE WAGON

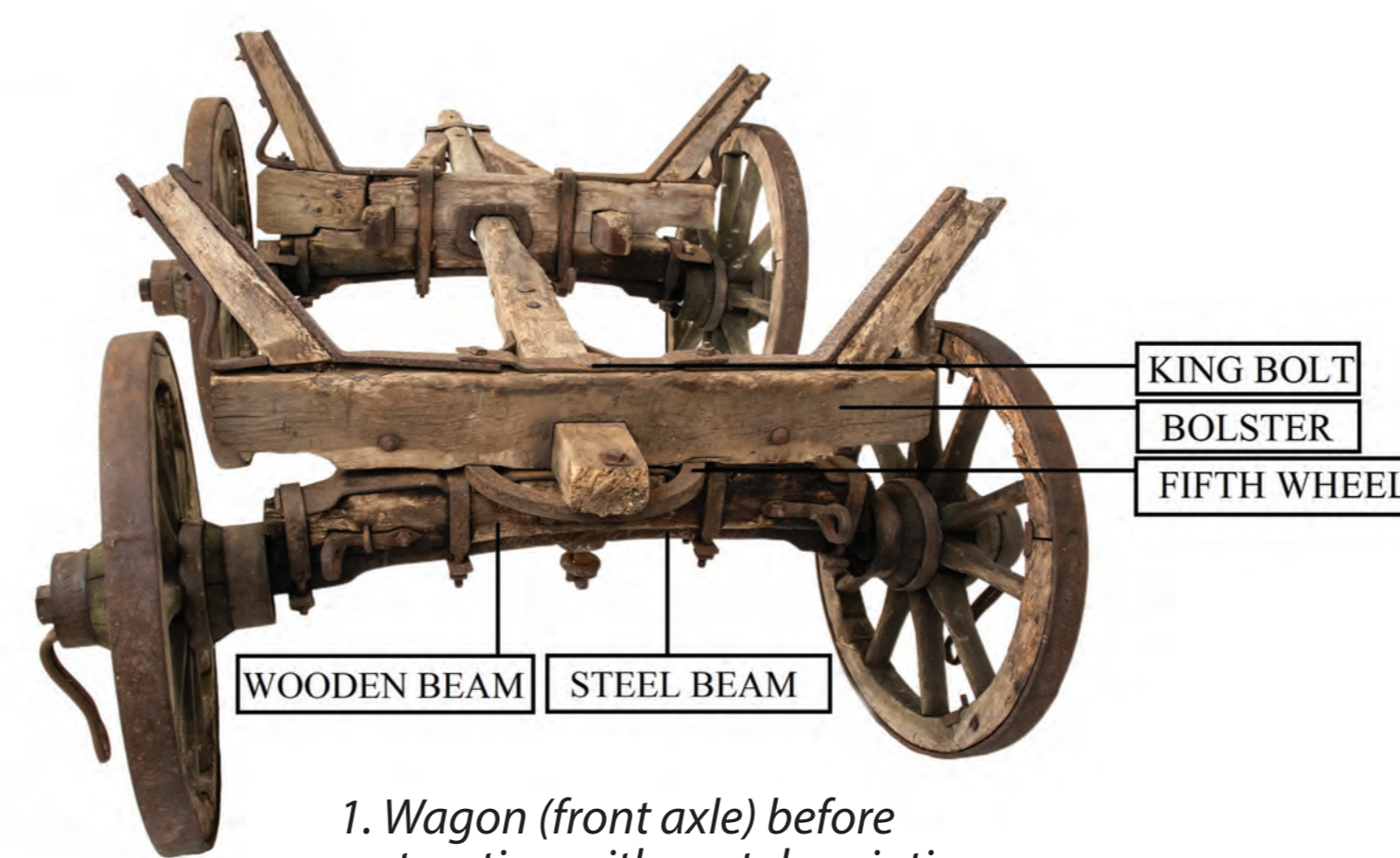
The front axle assembly is composed of a steel beam with a skein at the both ends, where the wheels are attached and fastened with wheel nut. On top of it is a wooden beam with a part of the fifth wheel attached to it. The steel and wooden beams are fastened together with steel U-shaped clips, making the axle. On top of the axle is a bolster. Between the axle and bolster is the fifth wheel. The front axle assembly is locked together with a king bolt. The reach is fixed to the front bolster and fastened with braces.

Rear axle assembly is made similarly with a steel and a wooden beams that are fastened together. The bolster sits on top of the wooden beam and is held together with all the other parts by U-shaped clips. A hole in the centre of the rear axle assembly houses the reach, which connects two axles. Between the wooden beam and bolster, there are two hounds placed and fastened with braces. At the ends of the hounds are reach plates that secure the hounds and the reach together. On top of the bolsters, there are four fixed stakes reinforced with steel braces.

Most of the bolt screws and square nuts are wrought iron, but some are foundry-made hex bolts screws and hex nuts. A layer of fragmented brown paint has been preserved on the wooden and metal parts.



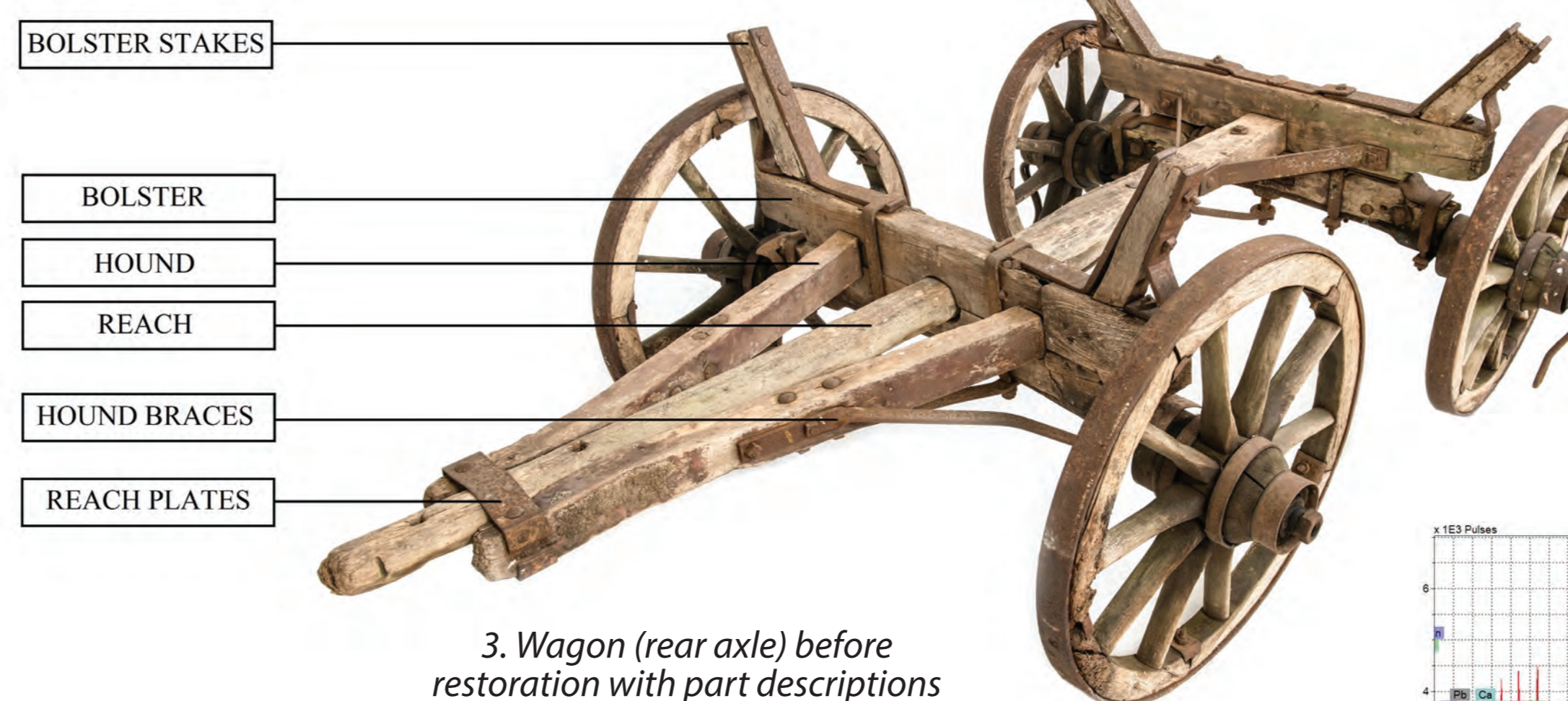
13. Wagon before restoration



1. Wagon (front axle) before restoration with part descriptions



5. Rear wheel before restoration

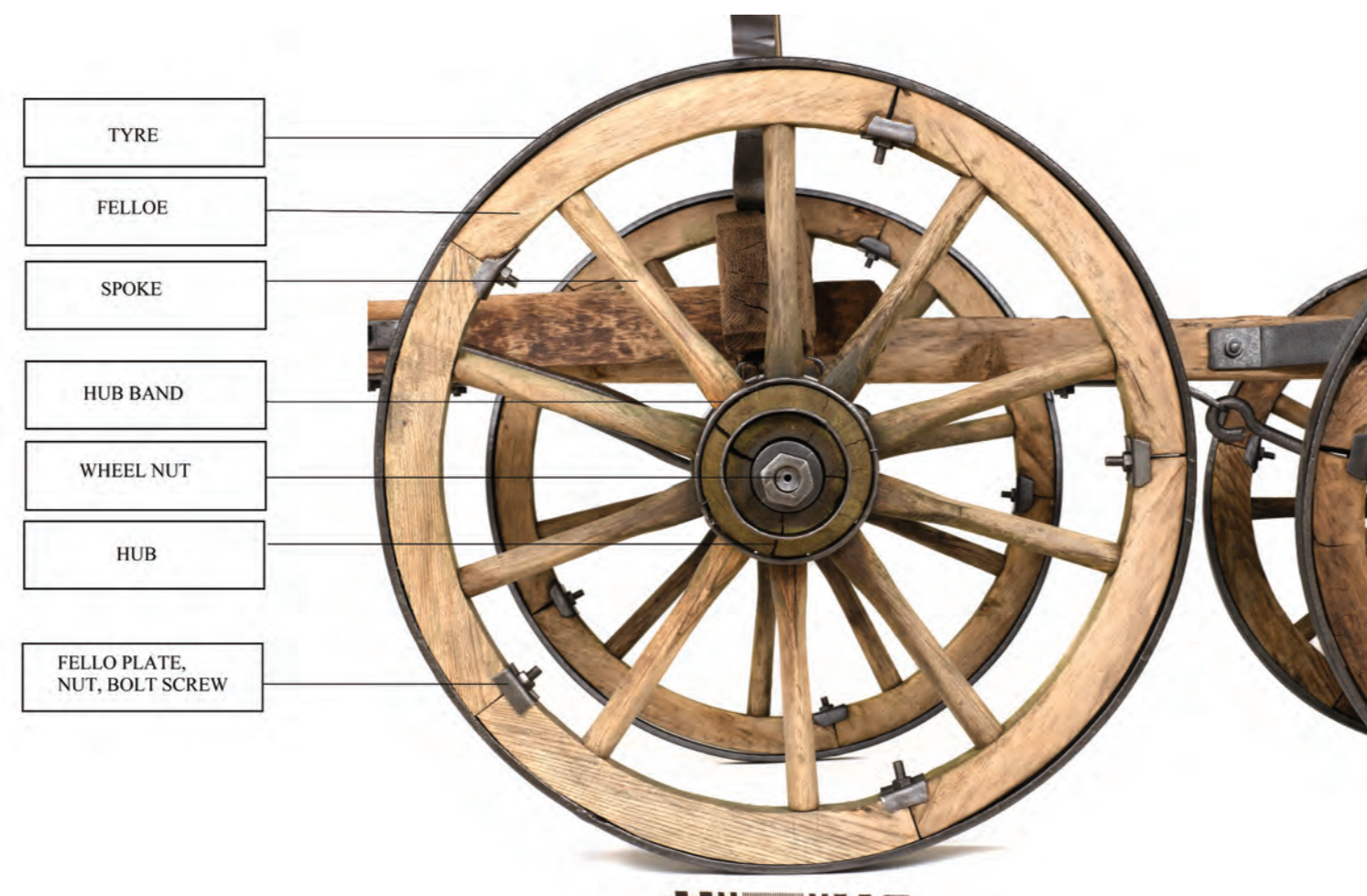


3. Wagon (rear axle) before restoration with part descriptions

STRUCTURE OF THE WHEEL

The hub, which is reinforced with four steel bands, is located in the centre of the wheel. Inside the hub is a metal sleeve or "boxing". Spokes are attached to the hub and the felloes. The assembly of felloes makes a wheel rim. A flat steel tyre covers the rim and is fastened to it with bolt screws, felloe plates, and nuts.

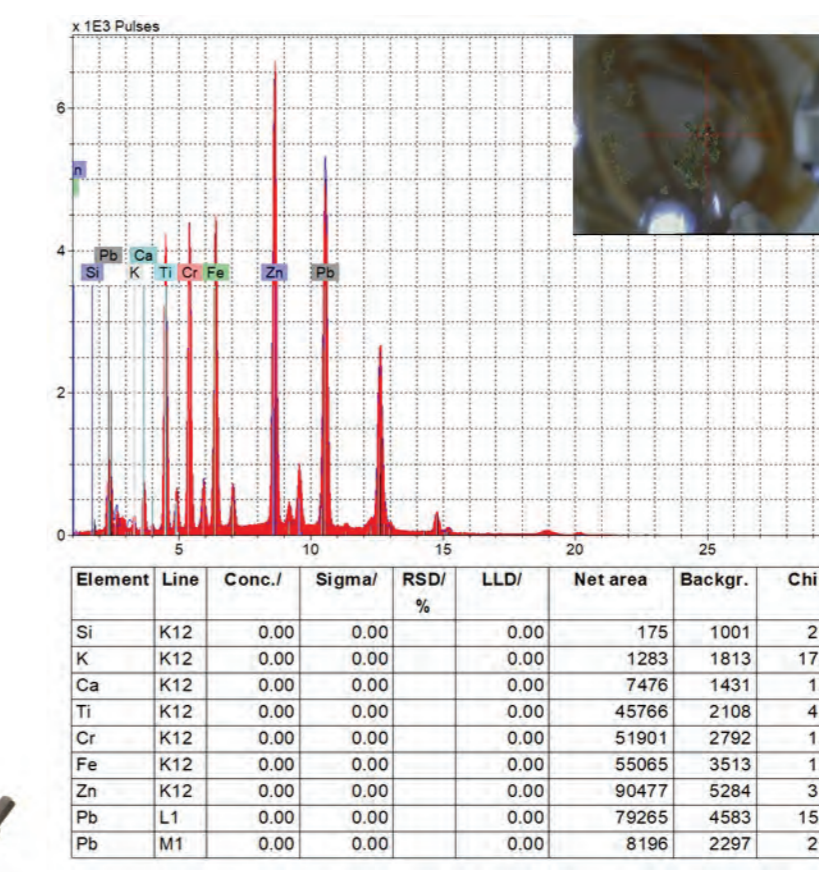
A layer of green paint has been preserved on the wooden parts of the wheels, which initially was considered to be a growth of biological origin.



6. Rear wheel after restoration with part descriptions



2. Wagon (front axle) after restoration



12. XRF analysis of green colour substance

RESEARCH

A layer of green colour substance was found on the surface of the wheels. It was problematic to conclude whether the green colour substance layer is a layer of paint or biological origin material (e.g. algae). During examination in the NHML laboratory, it was determined that green colour substance layer is a mixture of two pigments - yellow pigments and iron-containing green pigment. Using XRF analysis, additionally were found zinc, lead, chrome and titanium.

RESTORATION OF METAL PARTS

Dismantling the item was difficult as the bolt screws, and nuts were heavily rusted together. Some of the bolts were moving freely due to the wood's deterioration, but some were heavily layered with the wood due to iron corrosion product swelling. The metal parts were mainly cleaned in an electrolytic bath. Parts that could not be dismantled or were too large for an electrolytic bath were cleaned with acid complex compresses (30 % H₃PO₄, 10 % HNO₃, 15 % H₂SO₄). The smallest components - nails, individual bolts, nuts, and washers - were cleaned electrochemically in zinc granules with a 10% NaOH solution. The threads on some screws were restored. Metal parts were passivated with a 20 % tannic acid solution and waxed with 10 % Cosmolid H-80 microcrystalline wax.

RESTORATION OF WOODEN PARTS

Restoration of the wooden parts was undertaken by NHML restorers - Aija Grinberga, a master restorer of polychrome wood, and Jānis Menģels, a senior master of wood restoration.

The layers of dirt were cleaned from the wooden parts and the wood was disinfected and consolidated.

Badly damaged wooden parts were restored and stained to match the surrounding wood.



10. Front axle assembly (left side) before restoration



8. Front axle assembly before restoration



4. Wagon (rear axle) after restoration



11. Front axle assembly (right side) after restoration



9. Front axle assembly after restoration



7. Front wheel during restoration