Computer Aided Design Personal Project
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Modeling the Kettenkrad Sd. kfz2, a WWII German Motorcycle Half-Track

In the summer and fall semester of 2020, we had the opportunity to finish a personal project to recreate the Kettenkrad Sd. kfz2 in the 3-D modeling program, Solidworks. The Kettenkrad is a tracked vehicle that saw service from 1941-1945 on the Eastern front to carry 37mm artillery, infantry, telephone wire drums, and tow aircraft, of which 8,345 were built. To start modeling the Kettenkrad, a 1/35 model produced by Nitto was bought along with calipers to measure parts down to .1 millimeters. Taking the sprue sheets (layers of plastic that the parts came organized on), each part was modelled and categorized into Solidworks accordingly. Although the parts were representative of the Kettenkrad, there were dozens of details, parts, and dimensions that were added or modified to ensure the historical accuracy of the model. (Eg. Track links, rifle stands, front wheel, bottom of hull, etc.) After creating the parts, they were put together in an assembly according to the manual given in the 1/35 model box. Mates were done to the front fork and tracks to create movements that imitate the Kettenkrad in real life. From start to finish, the project collectively took 300 hours to complete and is available to be viewed on Github.

From learning tools and correcting errors in Solidworks to modifying or creating parts from only pictures, there were many challenges that were encountered during the project. One notable feature found on Kettenkrads are the rifle stands mounted on the rear rails to hold rifles such as the Kar98k or Arisaka Type 38. No physical references were included in the model kit, so it was 3-D modeled with only pictures. The front wheel, drive sprocket and track wheels had minimal detail on the tire tread and hubcaps and had to be updated to historical accuracy. Track links were meticulously detailed so that the drive sprocket, road wheels, and all 40 track links would operate together with advanced mechanical mates. There were various additions to the virtual model that were not found in the scaled model, among those include field modifications, parts that were not part of the original Kettenkrad. The majority of these parts include: two rifle stands, two screw mounts for heavy loads and weaponry, one side storage compartment, two front tow hooks, footbrake, foot pedal, handbrake, knee pads, driver instrumentation, underside of hull, and track links. It took considerable effort to cross reference the existing model and pictures to ensure a proper part. It was a challenge to model correctly as there were often few pictures to reference for certain features, such as the driver's compartment and underside of the vehicle.

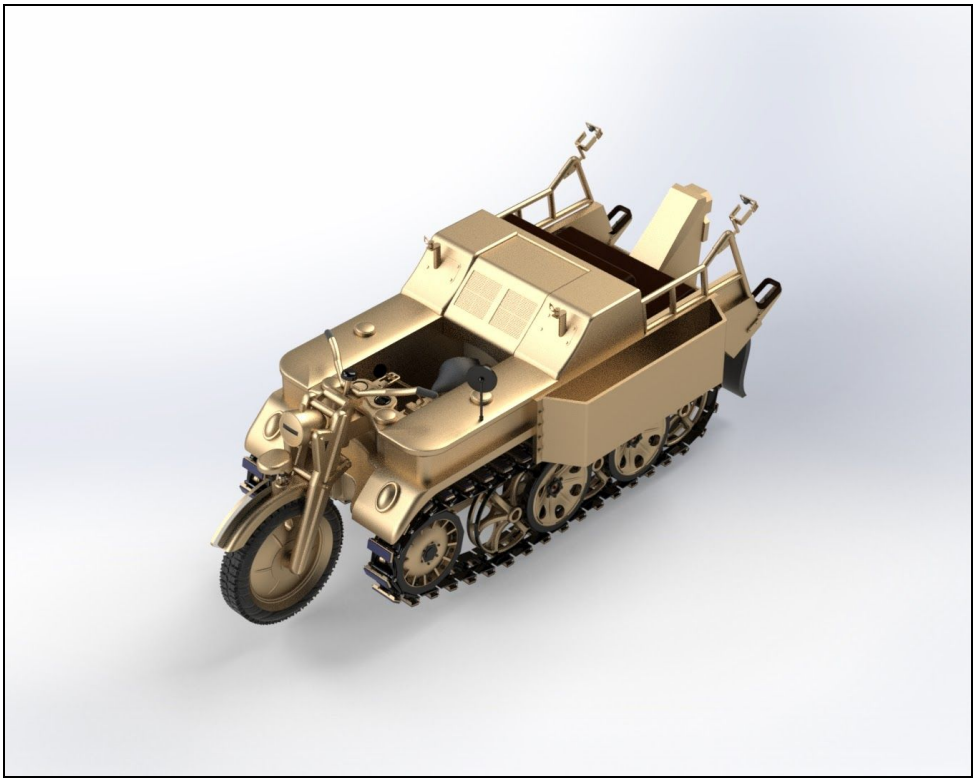
The personal project gave much insight on the different techniques that a professional may use in 3-D modelling. Hard skills in Solidworks such as the correct mating of parts to each other to create realistic movements, great attention to detail, and creation of parts using revolved, lofted or boundary extrusions, were gained throughout the project. In addition, we garnered proficiency in calculating gear ratios, gear to pinion ratios, and recreating these machines in Solidworks. Other qualities such as project management, teamwork, and a heightened passion for engineering and innovation were added to our skillset.

The final product is in multiple *.stl, .SLDPRT, .SLDASM,* and other files organized on the platform Github. This project is available to be viewed and downloaded in a repository on Github at the following link:

https://github.com/Copehill075/Solidworks-2

The following are pictures of the final product modeled in Solidworks:

[Picture 1 & 2]



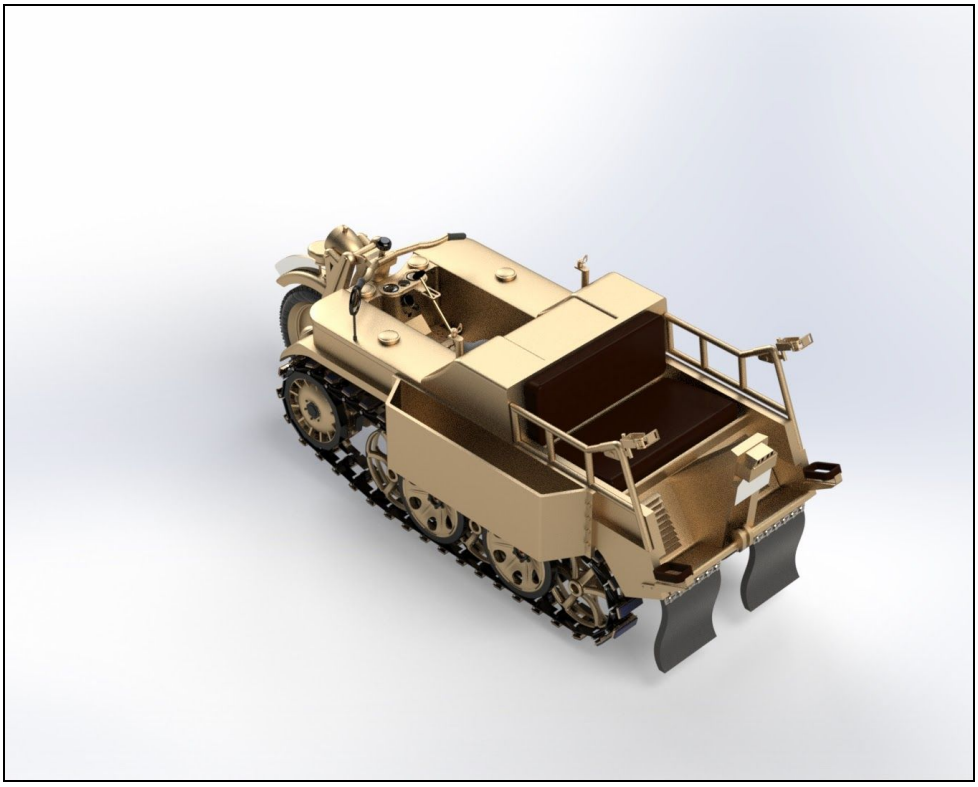


Figure 1 & 2. The isometric views of the Kettenkrad Sd. kfz2

[Picture 3 & 4]

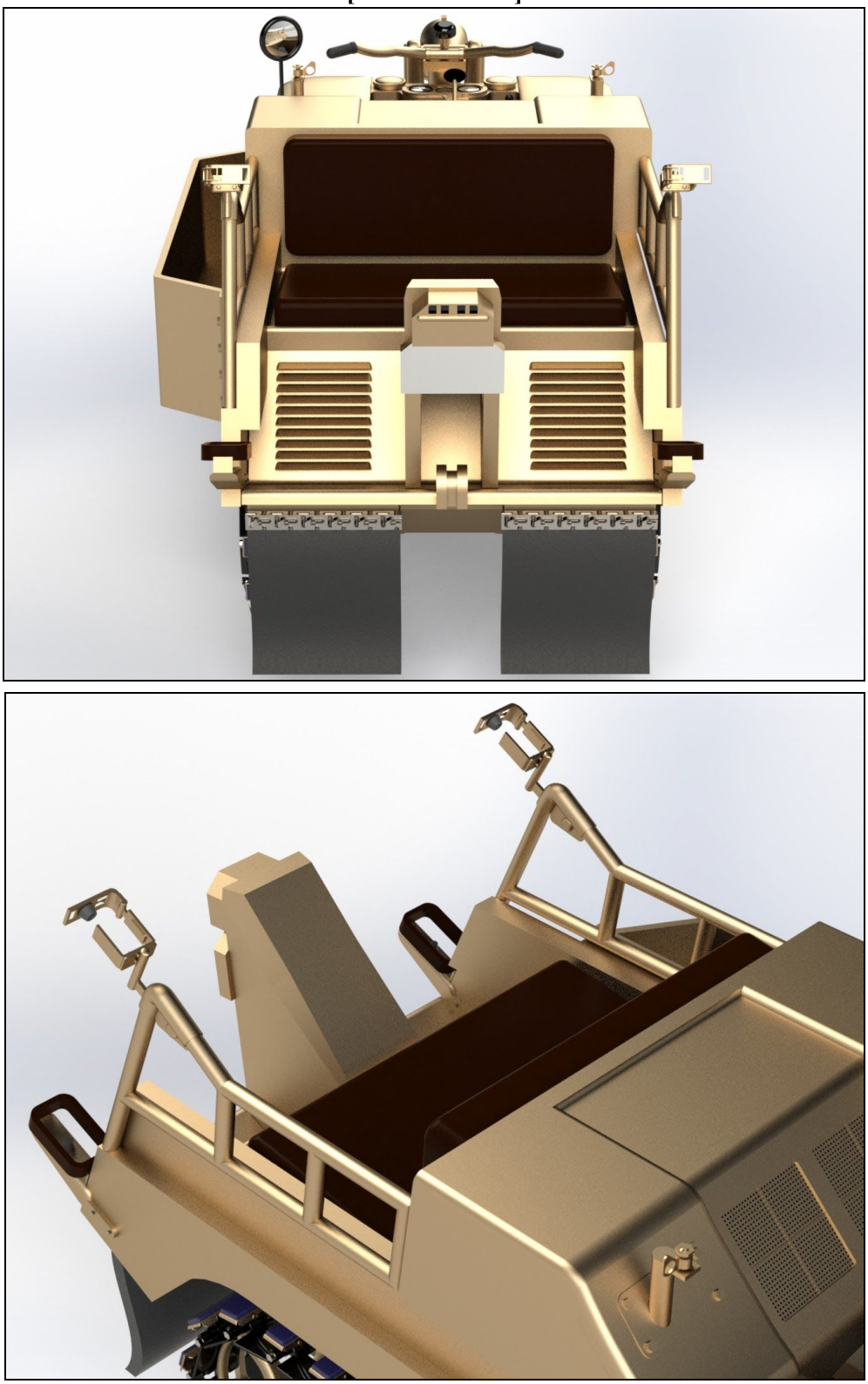


Figure 3 & 4. The passenger seat views of the Kettenkrad Sd. kfz2.

[Picture 5 & 6]

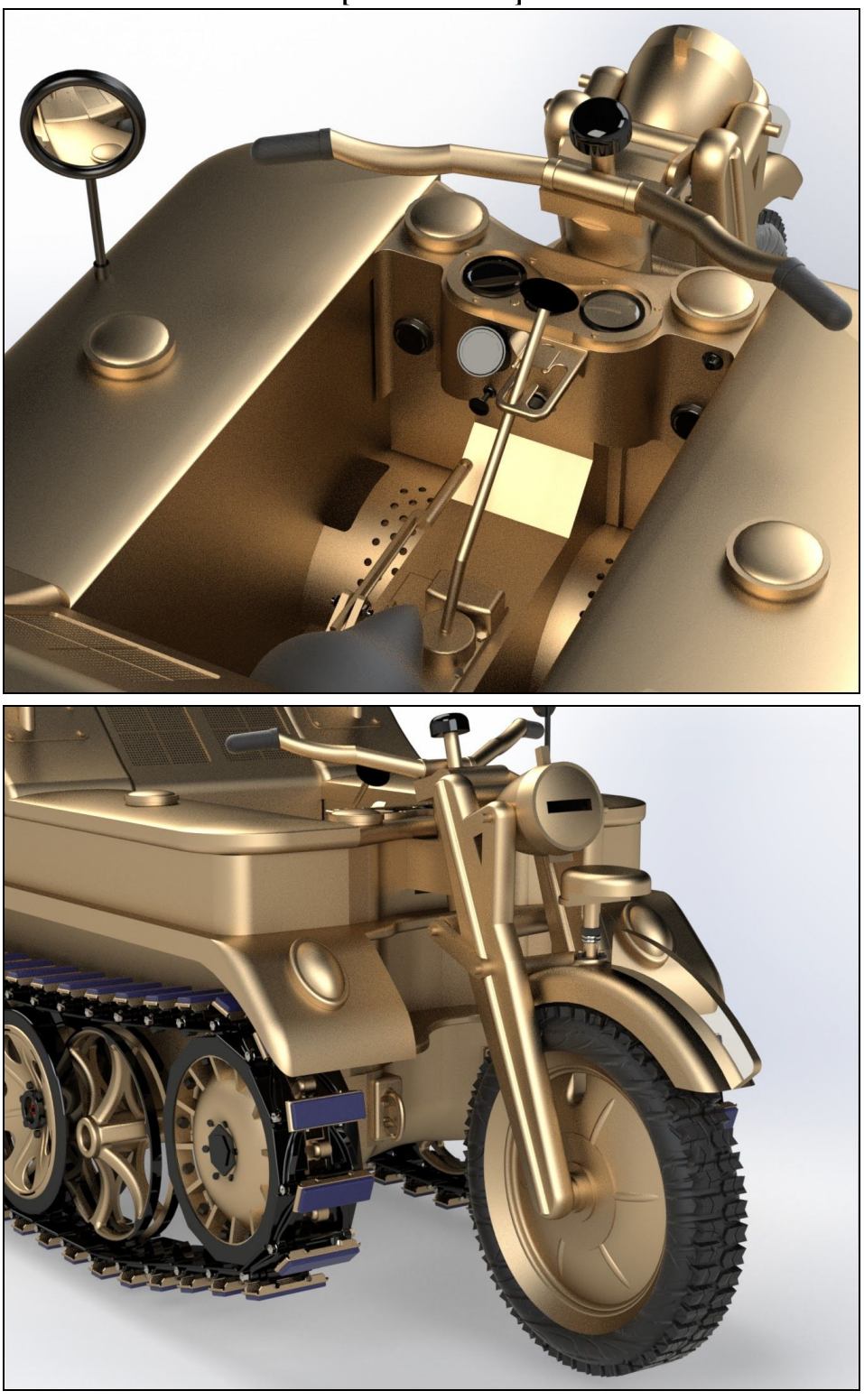


Figure 5 & 6. The driver view of the Kettenkrad Sd. kfz2.

[Picture 7]

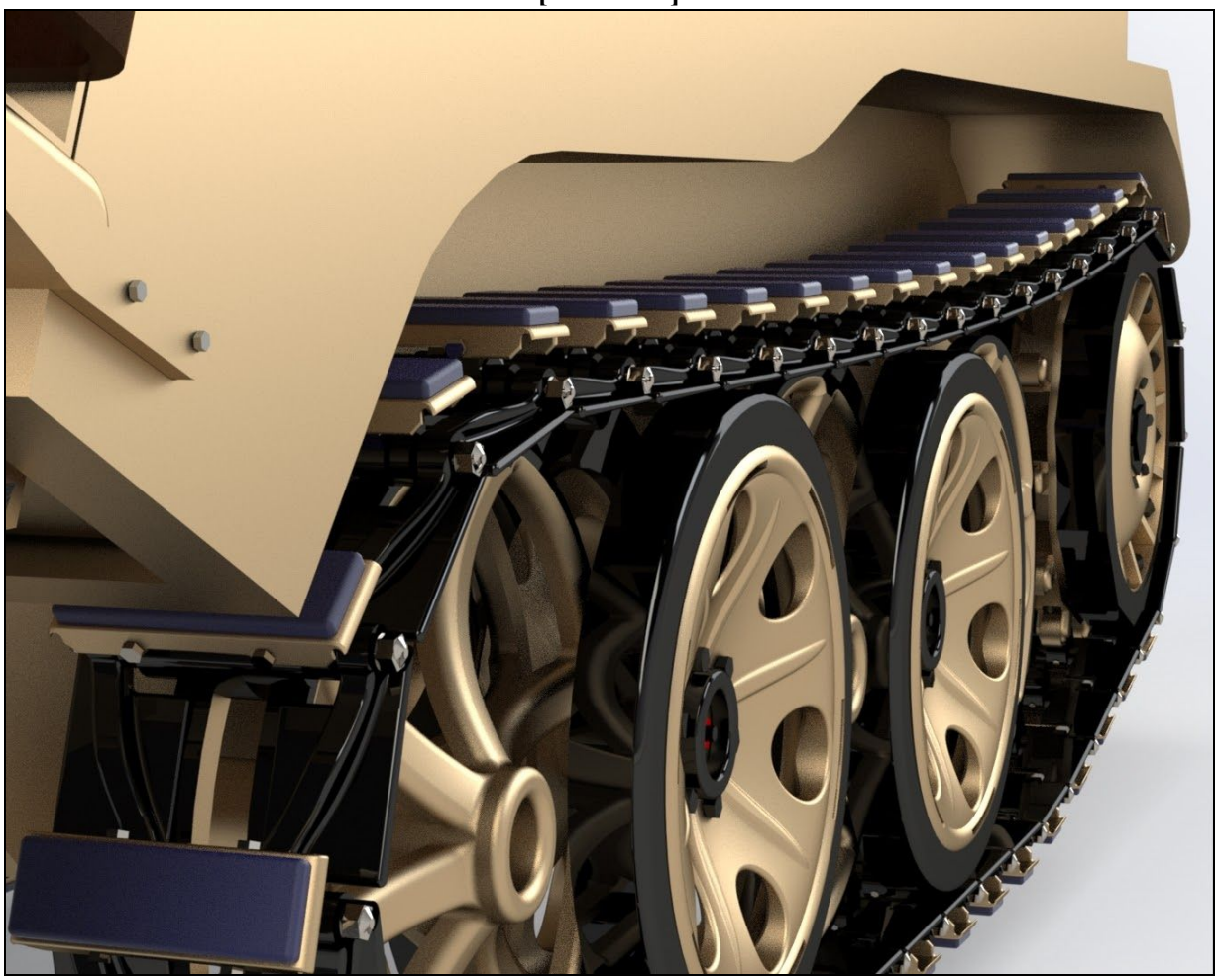


Figure 7. The track view of the Kettenkrad Sd. kfz2.