

## **PRESSURE EQUIPMENT ENGINEERING SERVICES, INC.**

402 WILD PEACH PLACE  
MISSOURI CITY, TX - 77459

**TEL. : (281)-261-4628**

**FAX : (281)-261-4629**

**E-Mail: [Bharat@peesi.com](mailto:Bharat@peesi.com)**

### **FINITE ELEMENTS ANALYSIS OF HYDROSTATIC TEST PLATFORM**

#### **PROBLEM DESCRIPTION:**

The design of a hydrostatic test platform was required for testing upper portion of a large vessel after ASME code repairs were performed for the upper portion of the vessel.

The loading for the platform included dead weight of the vessel, hydrostatic loading, hydrostatic test pressure of 66 psig and wind shear and wind moment. The wind loading was required to be applied in two different directions, namely wind direction parallel to the beam axis and wind direction perpendicular to the beam axis. Several different load cases were to be analyzed with different combinations of wind loading, test weight, max weight, HTP etc.

It was required to perform the design check using finite element analysis for compliance with ASME B&PV Code, Section VIII, Div. -1.

#### **RESULTS:**

The square platform plate (40' x 40') was supported by sixteen (16) steel beams which were further supported by four (4) concrete beams. These sixty-four (64) support zones at the bottom flanges of the support beams were bolted to the concrete beams.

Based on the given design loading, the preliminary sizing of the platform plate and steel support beams was performed. The platform plate, beams and the support zones were modeled using finite element analysis software ANSYS. The appropriate weight, hydrostatic load and HTP pressure loadings were applied to the FEA model.

Based on the FEA results, it was found that the maximum stresses were present in different zones of the platforms and beams for different loading combinations. For all the loading combinations analyzed, the stress analysis results for the hydrostatic test platform were checked against the ASME code, Section VIII, Div.-2, Appendix-4 criteria. The design was certified to be in compliance with ASME B&PV Code, Section VIII, Div. -1.

The attached FEA plots show the model and results for one of the load cases analyzed.

ANSYS

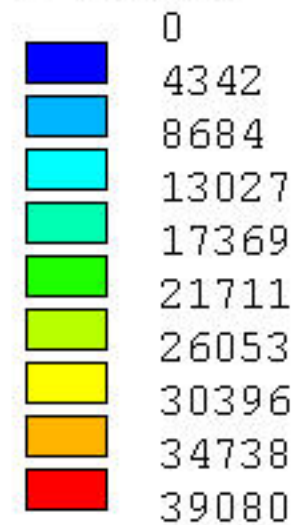
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SMX =39080

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ZV =.664638

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\*YF =-25.23  
\*ZF =-240

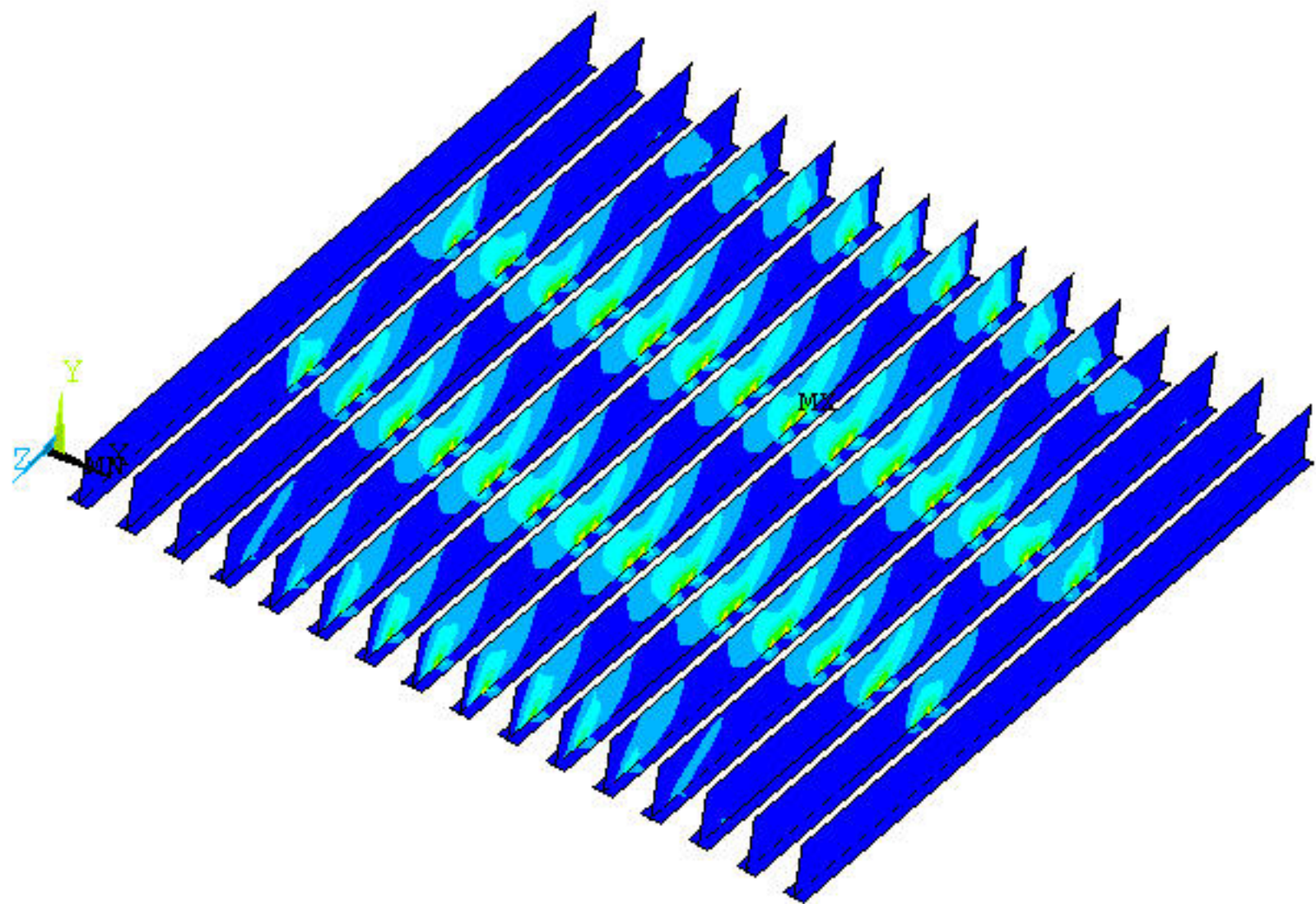
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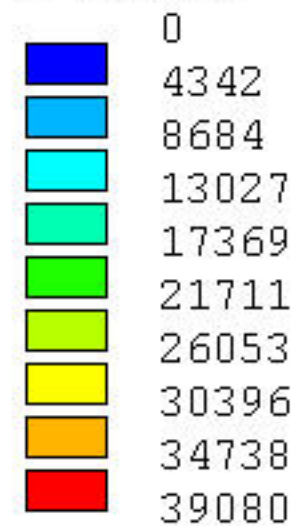




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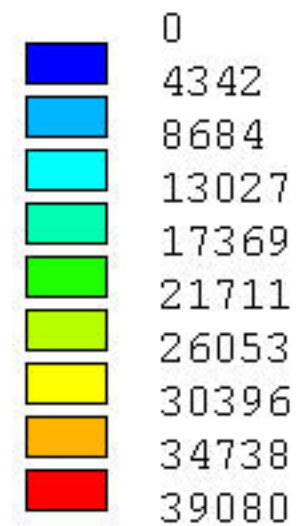


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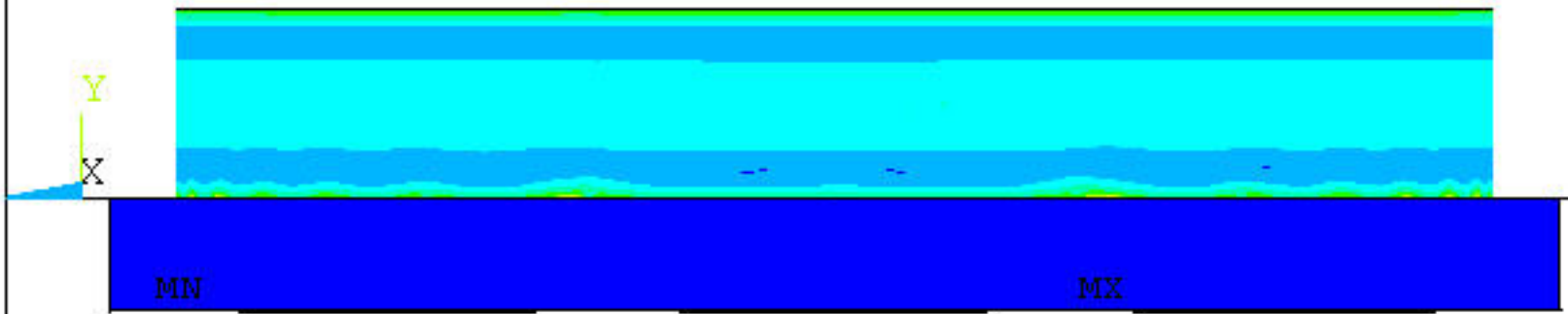


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ANSYS

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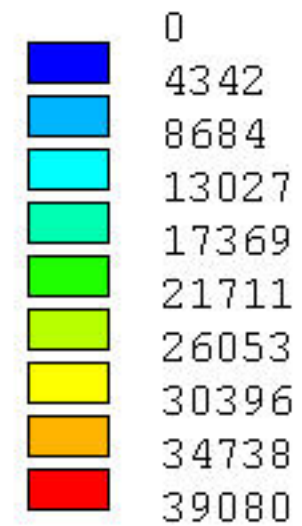
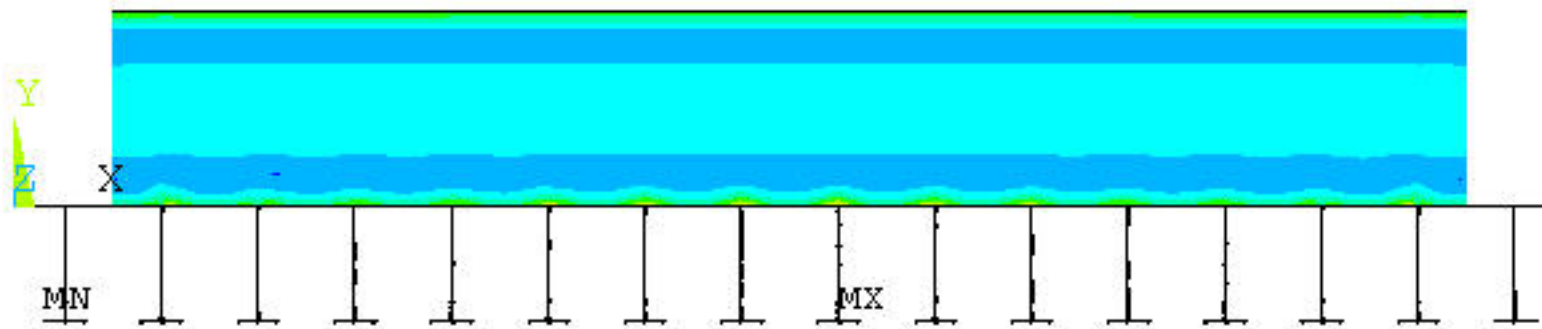
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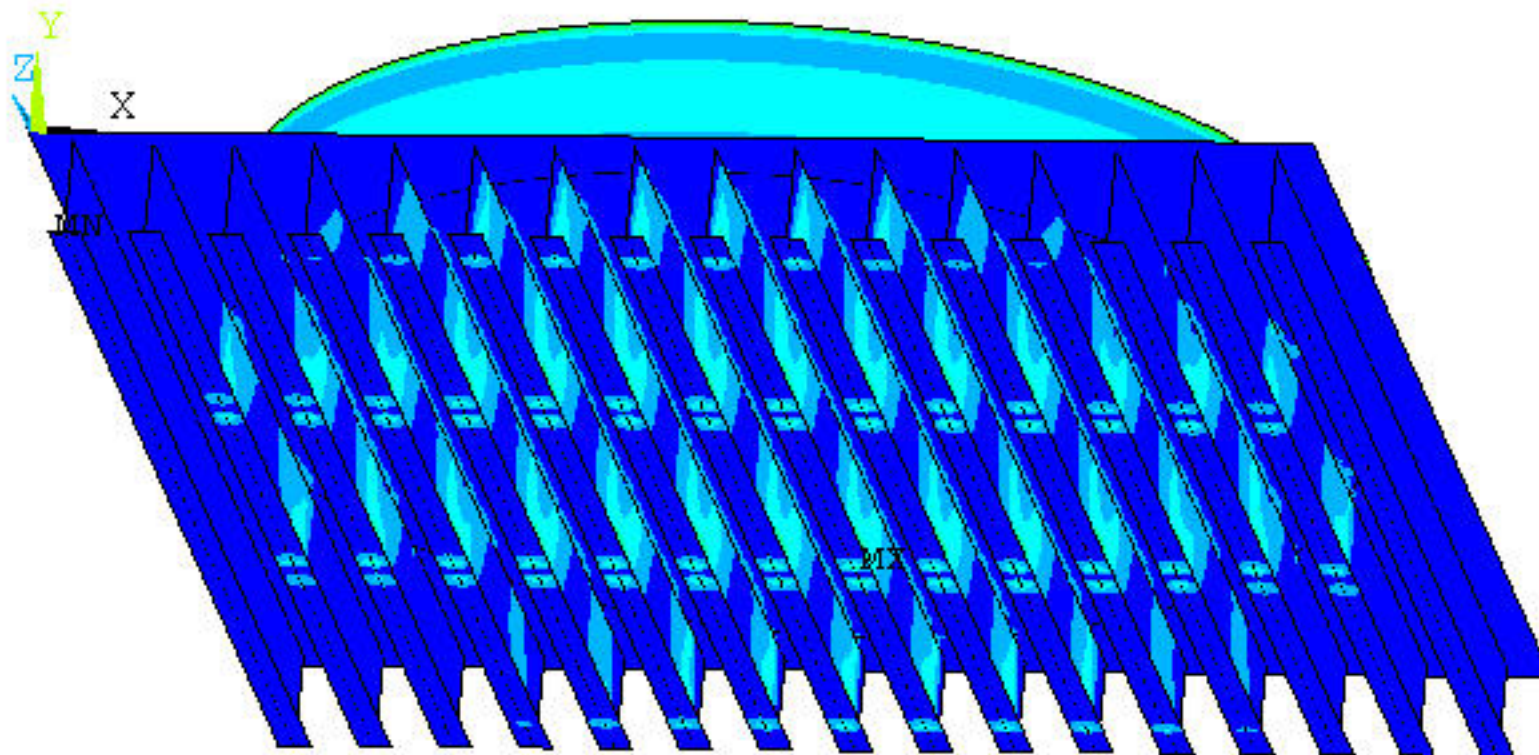


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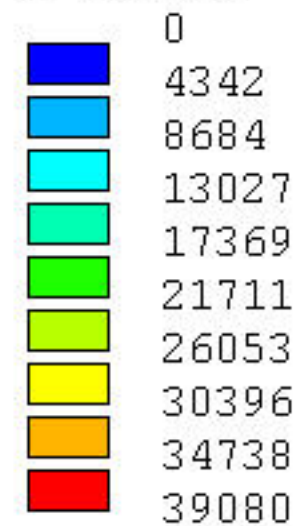
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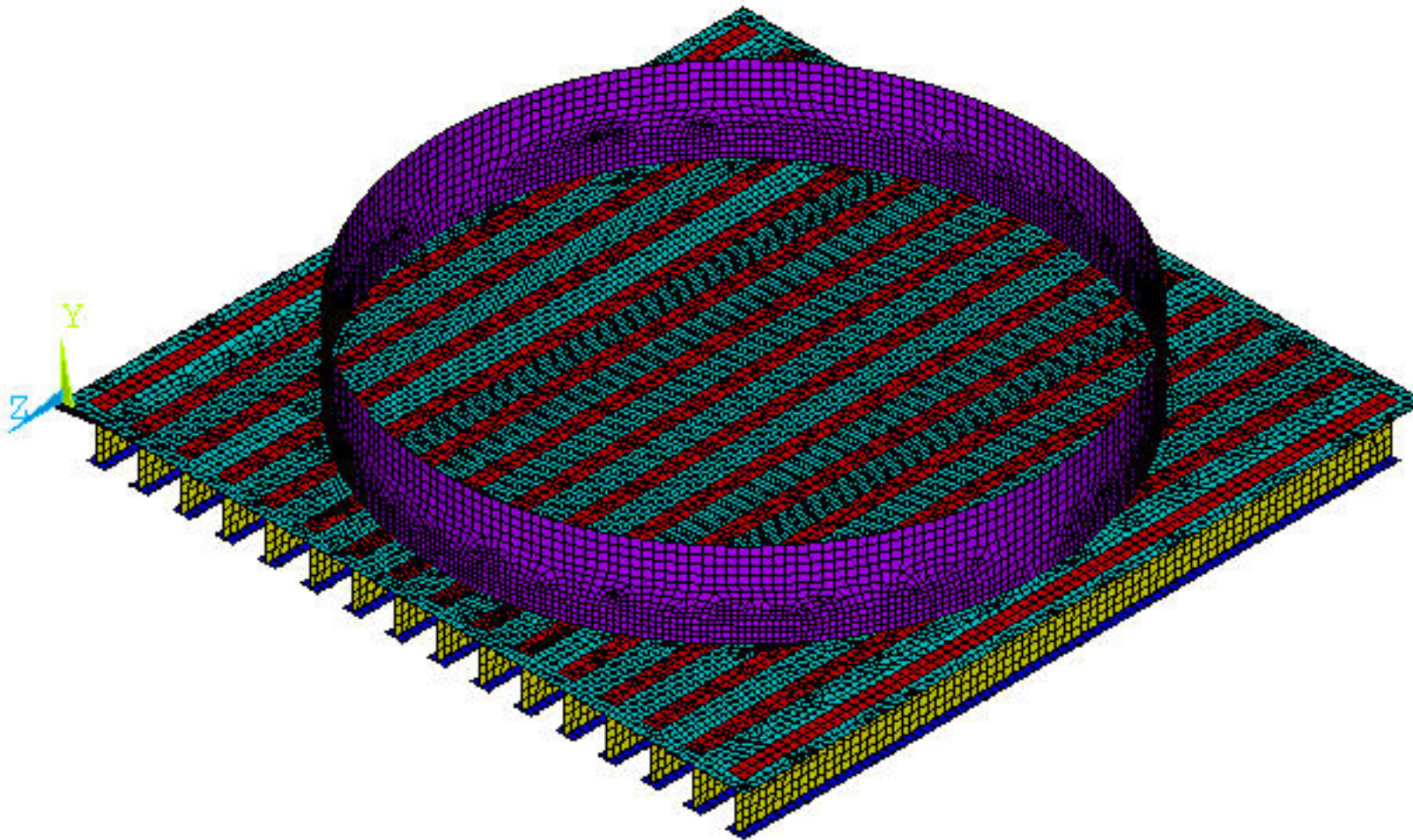
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ANSYS

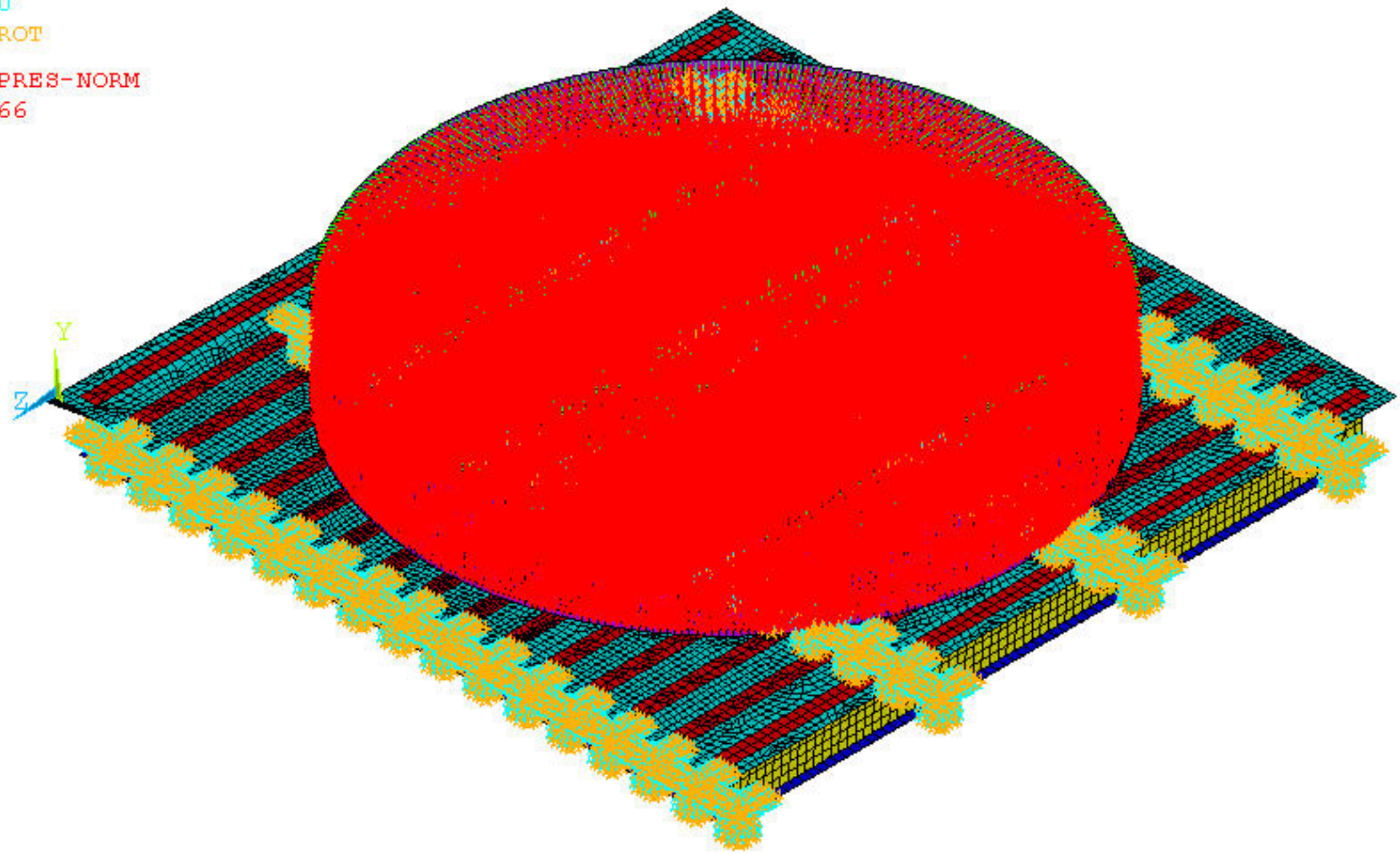
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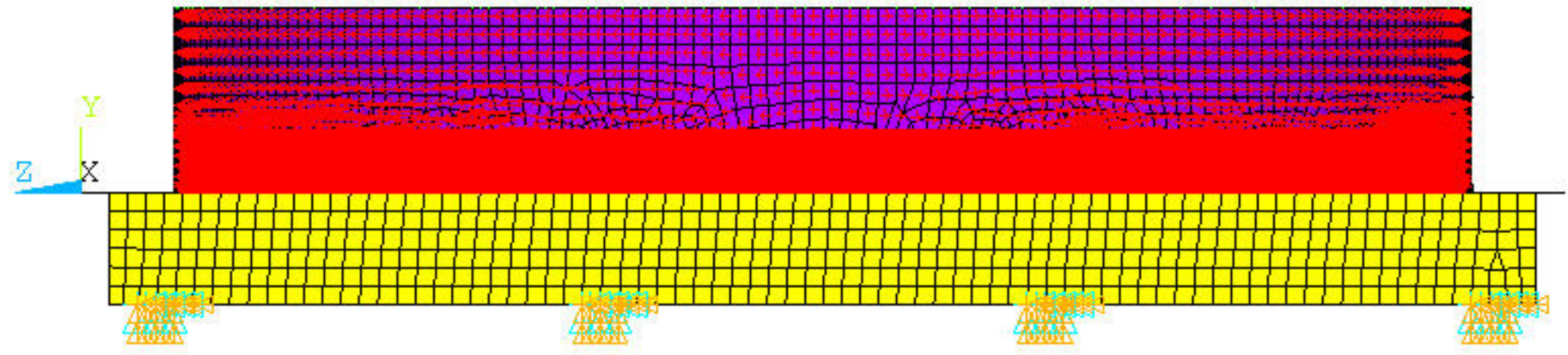
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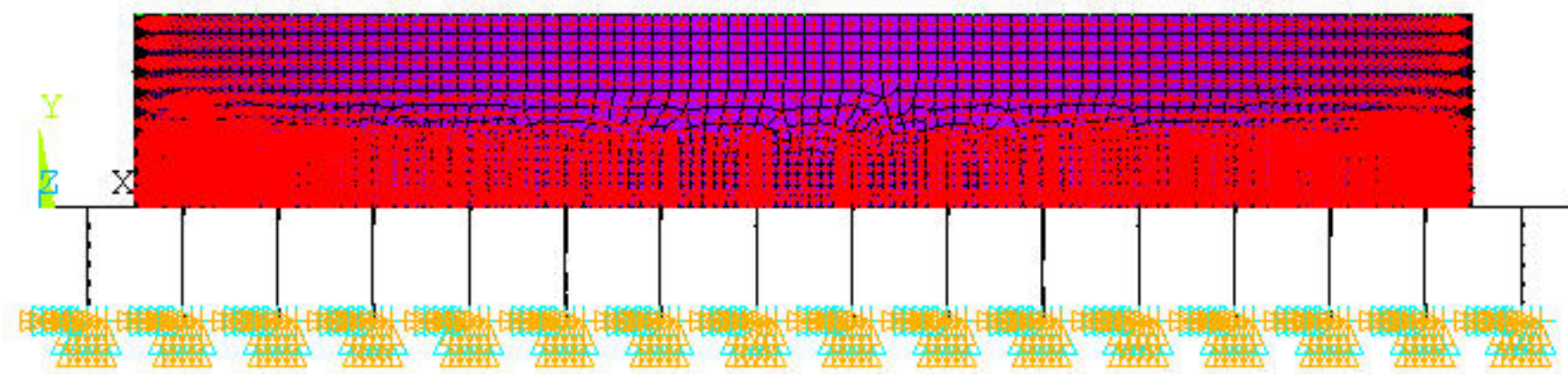
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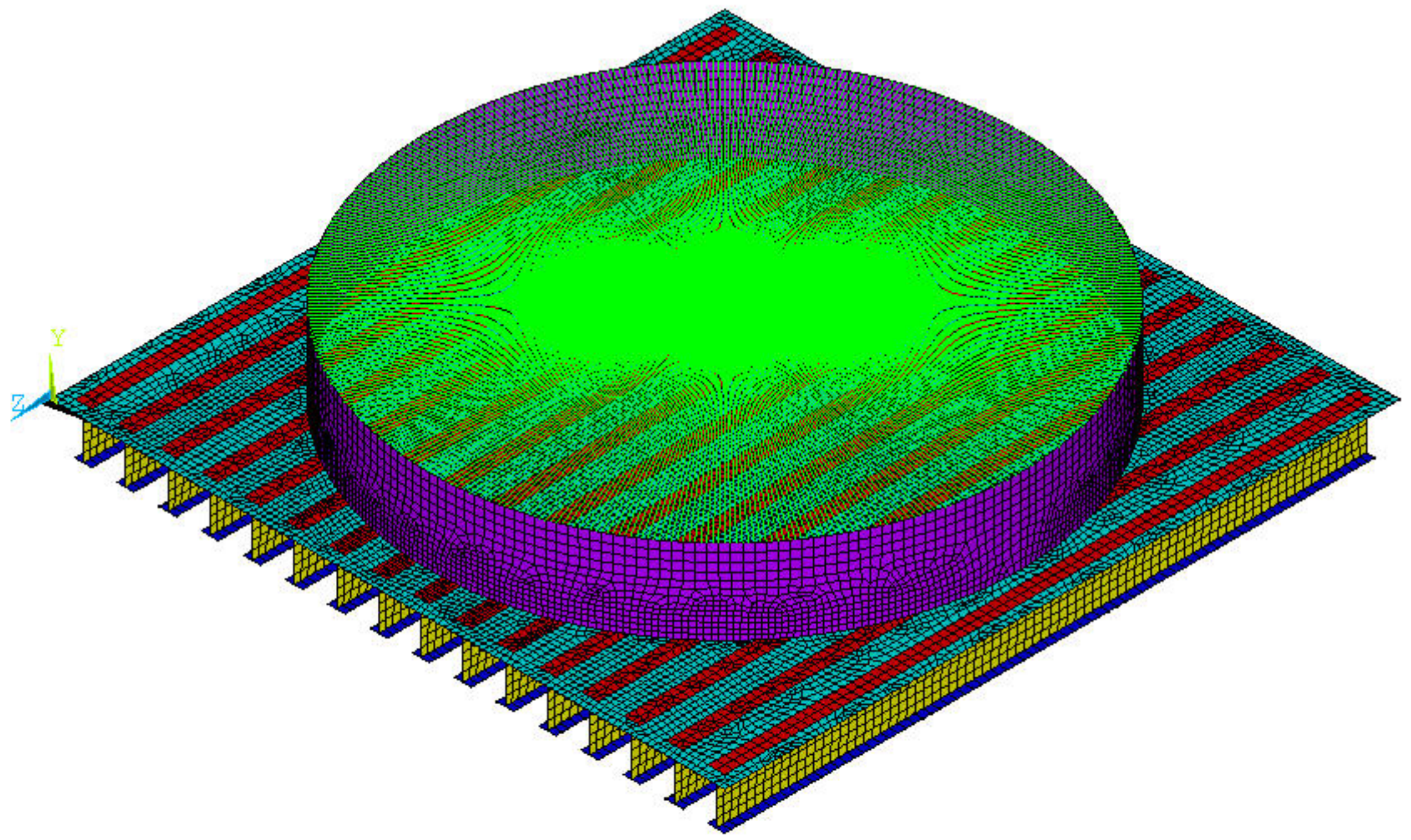


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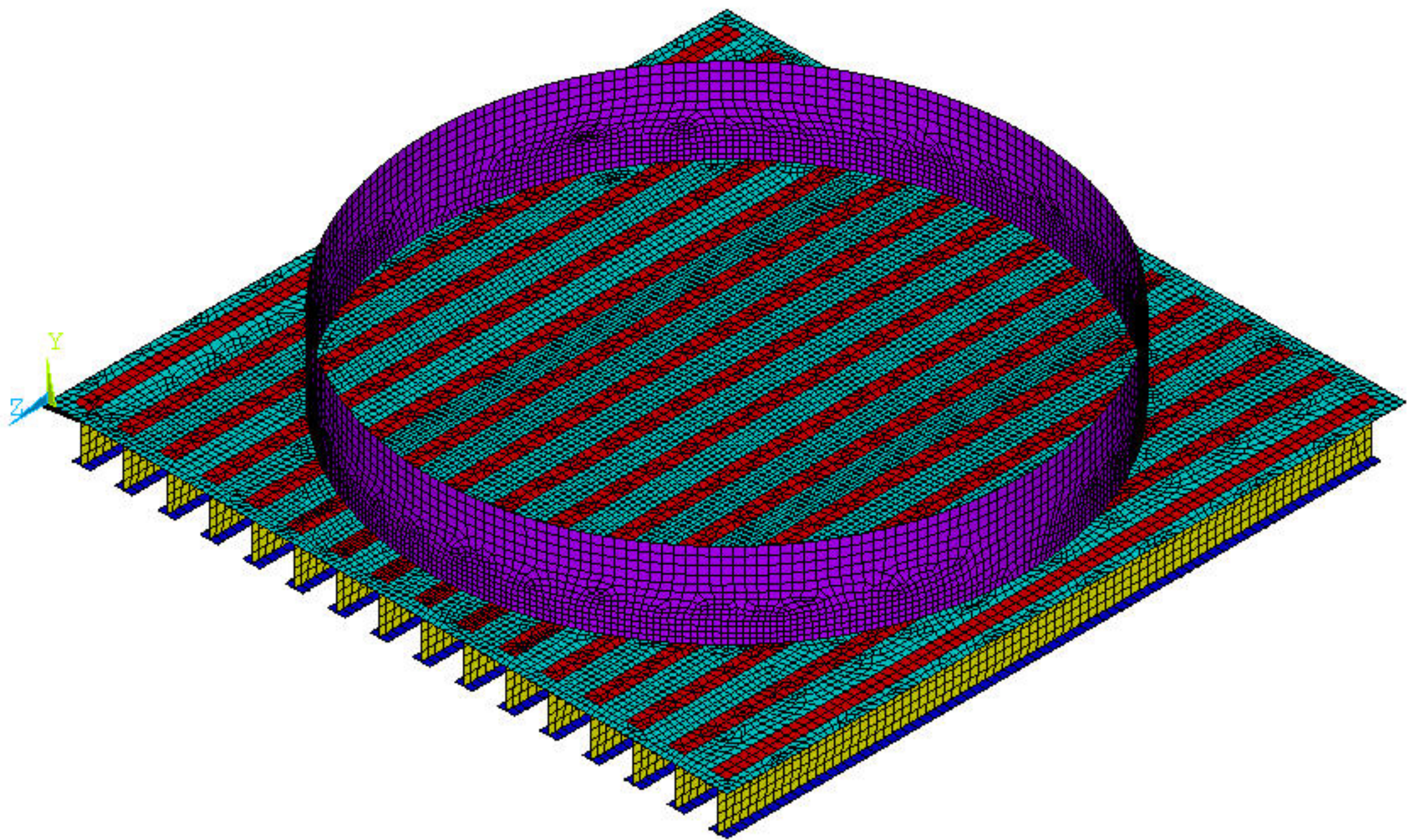


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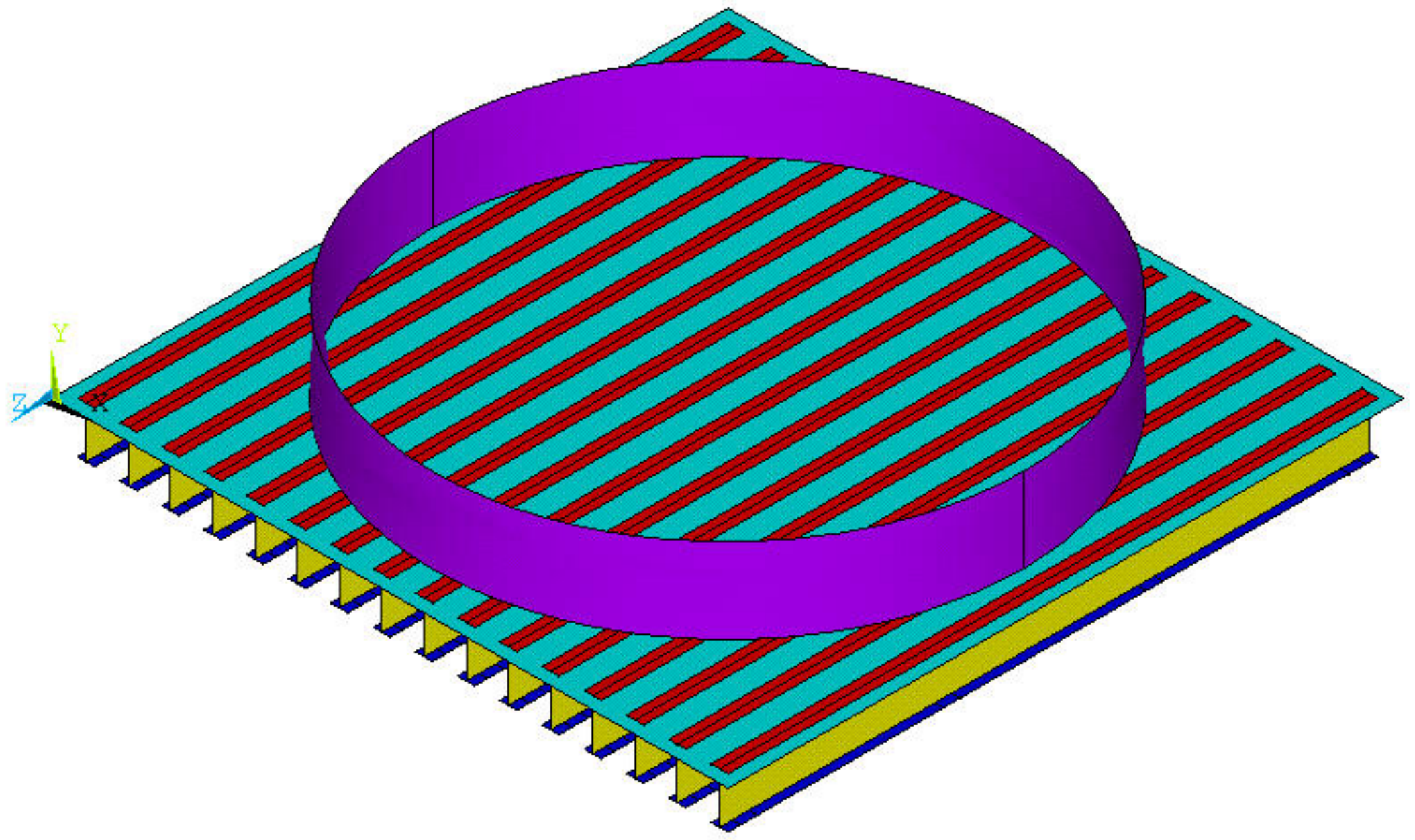


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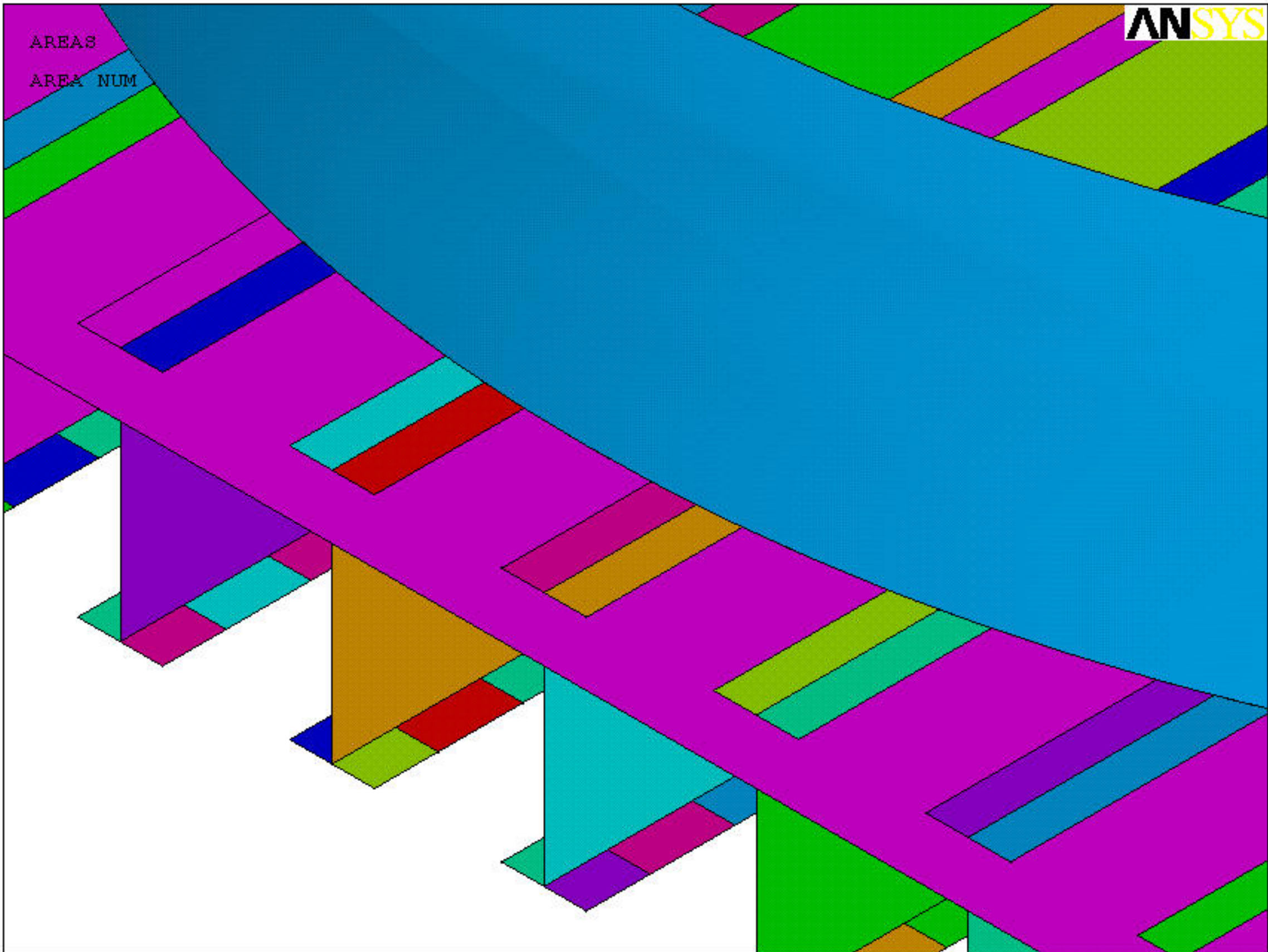


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AREAS  
AREA NUM

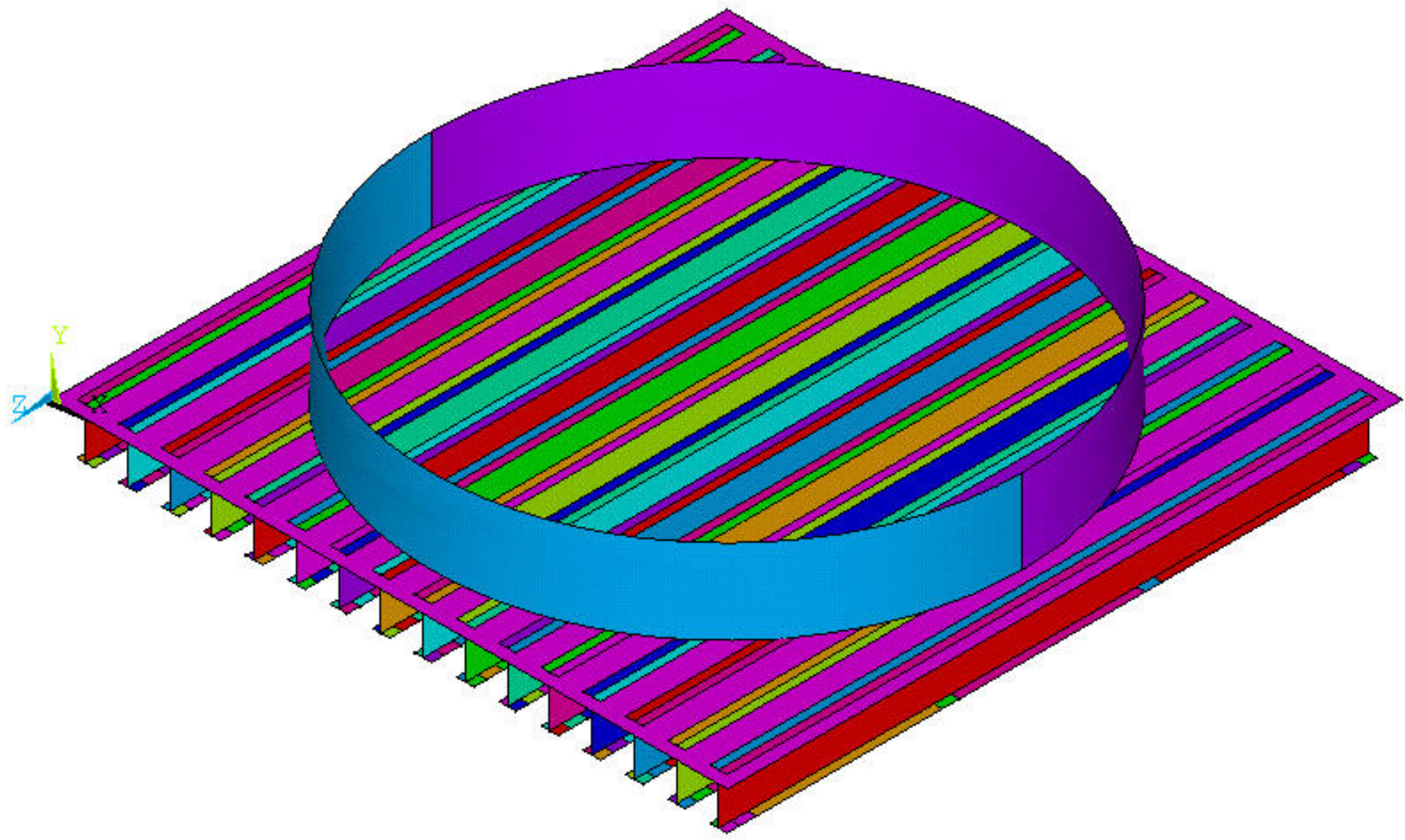




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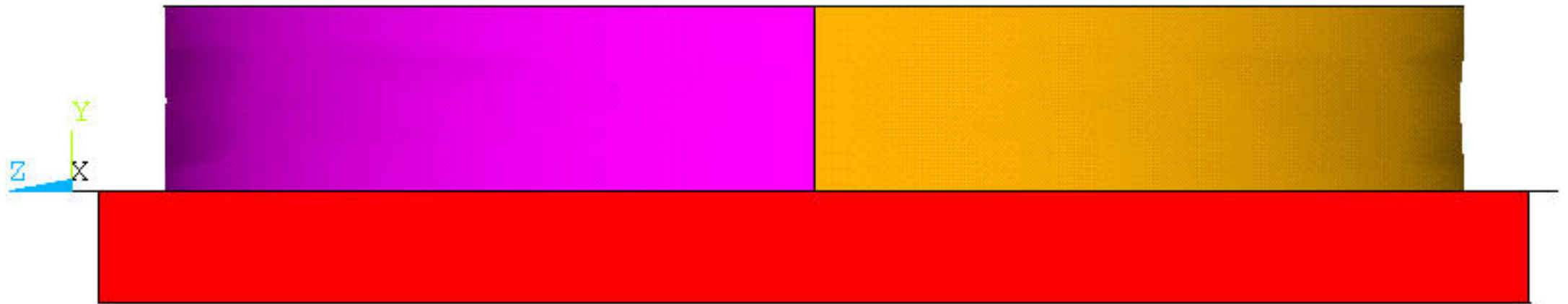
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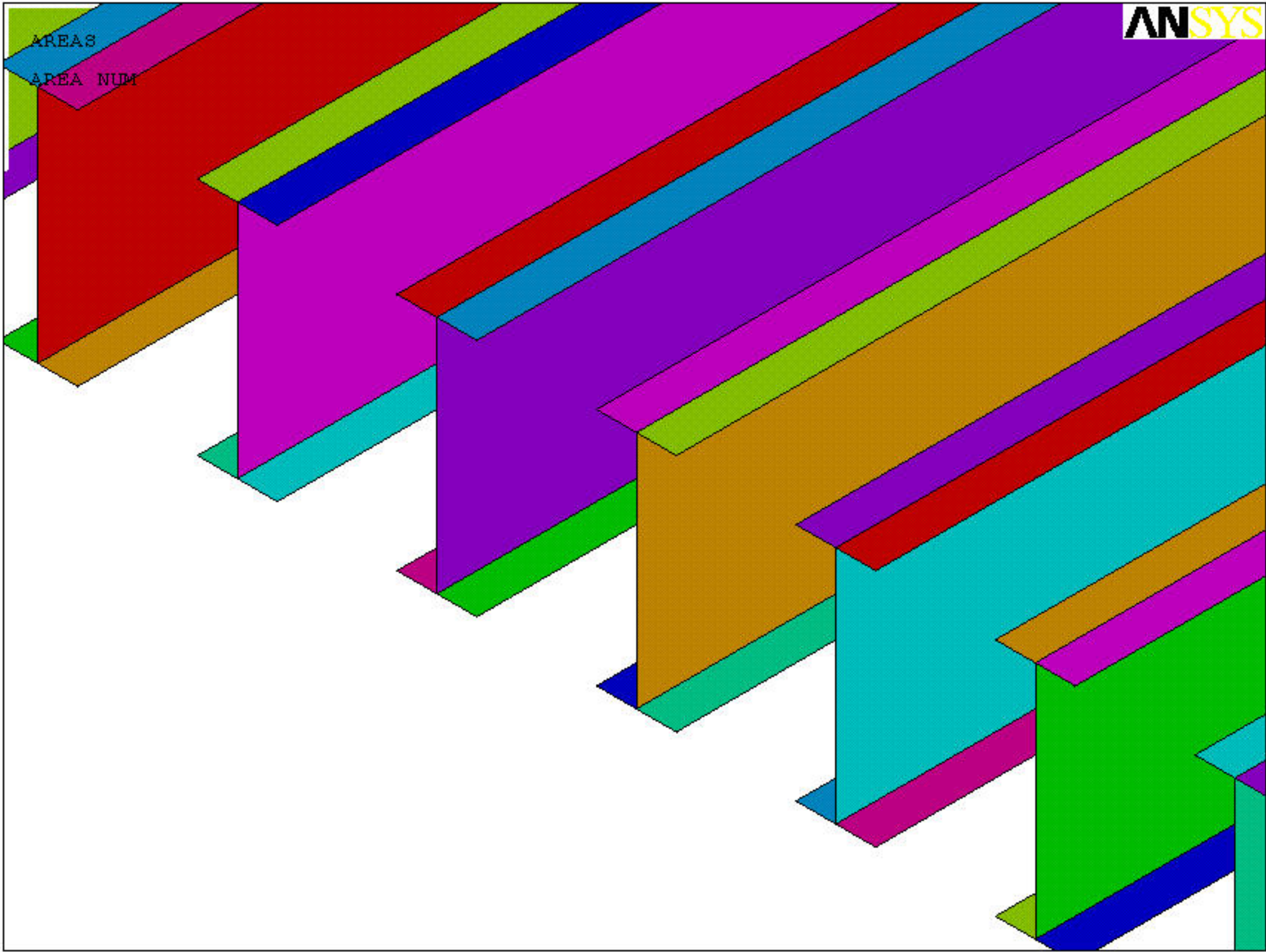
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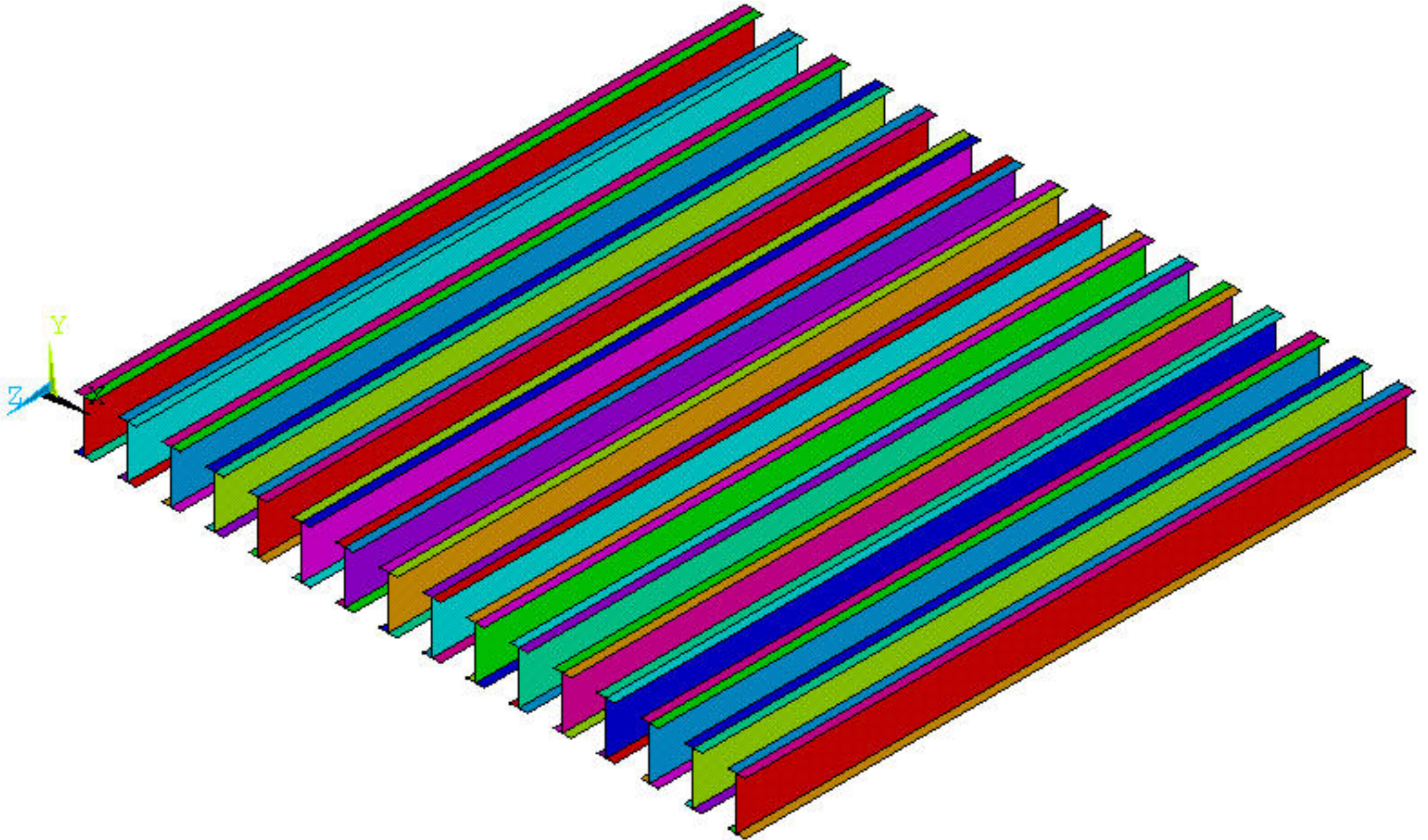




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AREAS

AREA NUM



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AREAS

AREA NUM

