

Empowering Designer Using Data Analytics



Objective

To empower designer by developing Data analytics driven solution to shorten design lifecycle and total product development cost.

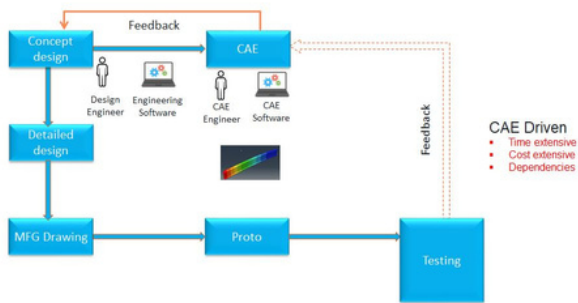
Current Process

The mechanical product design is iterative process based on series of designs validated by the Computer Aided Engineering (CAE) approach.

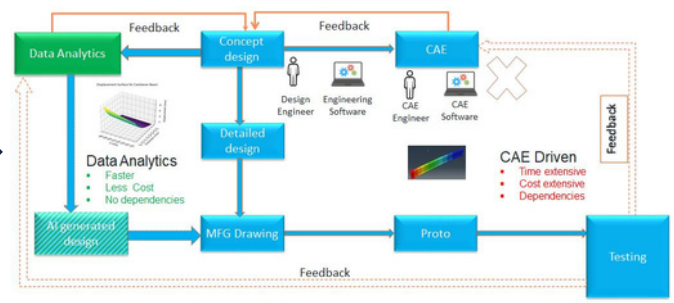
Proposed Process

In the initial design phase, replacing CAE validation with a Data analytics approach involves deploying Data analytics through advanced methodologies and streamlined workflows.

Current Process (CAE Driven, Person Dependent)



Developed Method (Data analytics Driven)



Response 1

```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D

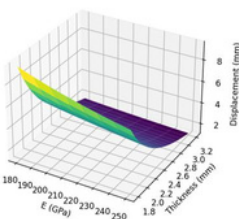
# Create grid
thickness_range = np.arange(1.8, 3.3, 0.1)
E_range = np.arange(180, 250)

# Displacement data
displacement_data = np.zeros((len(thickness_range), len(E_range)))

# ... (omitted data) ...

# Create grid for the plotting
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
ax.plot_surface(E, thickness, displacement_data, cmap=viridis)
ax.set_xlabel('E (GPa)')
ax.set_ylabel('Thickness (mm)')
ax.set_zlabel('Displacement (mm)')
plt.show()
plt.close()
```

Displacement Surface for Cantilever Beam



Response 2

```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d import Axes3D

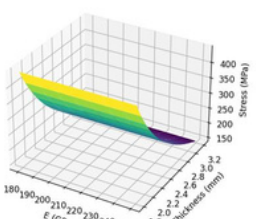
# Create grid
thickness_range = np.arange(1.8, 3.3, 0.1)
E_range = np.arange(180, 250)

# Stress data
stress_data = np.zeros((len(thickness_range), len(E_range)))

# ... (omitted data) ...

# Create grid for the plotting
fig = plt.figure()
ax = fig.add_subplot(111, projection='3d')
ax.plot_surface(E, thickness, stress_data, cmap=viridis)
ax.set_xlabel('E (GPa)')
ax.set_ylabel('Thickness (mm)')
ax.set_zlabel('Stress (MPa)')
plt.show()
plt.close()
```

Stress Surface for Cantilever Beam



Technologies



Wissen Baum created a Data analytics solution using Python, MySQL, HTML, and Matplotlib.

Principal Advantages

- To empower designer by reducing dependency on CAE using Data analytics approach.
- Reduce product develop cost by partially eliminating CAE infrastructure requirements.
- Reduce product development time.