The frontier of pSeven's integration, automation and data science use cases in Japan

Section III Products Promotion Dept. Digital Engineering Solutions Div.
Products & Services Business Group. SCSK Corporation

Yuta Yamada
18th October 2023

SCSK-23081760

Index

Corporate Information

Company name:	SCSK Corporation
Established:	October 25, 1969
Capital：	21,200 million yen
Net sales:	445,900 million yen (FY2023 Consolidated)
Employees:	14,938 (2023 Consolidated)
Head Office：	Toyosu Front, 3-2-20, Toyosu, Koto-ku, Tokyo 135-8110 Toyosu Foresia, 3-2-24, Toyosu, Koto-ku, Tokyo 135-8110
Business：	IT Consulting, System Development, IT Infrastructure, IT Management, BPO, Sales of Hardware & Software
Domestic Network:	Tokyo(3 Offices), Osaka (3 Offices), Aichi, Hiroshima, Fukuoka, Okinawa

Solution Map

Applications

*some part of this slide are written in Japanese

SCSK

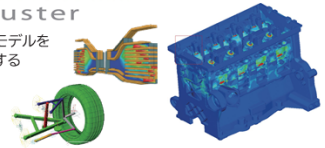
CAE

大規模高速構造解析ソフトウェア

製品名:ADVENTURECluster

ADVENTURE Cluster

大規模な解析モデルを
超高速で計算する
国産構造解析
ソフトウェア

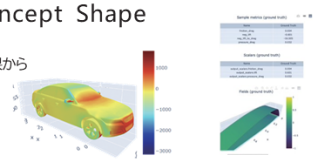


深層学習AIによる解析結果予測ソリューション

製品名:Neural Concept Shape

Neural Concept Shape

3D形状と解析結果から
AIモデルを構築
最短数ミリ秒で
数値解析と
同等の結果を予測



マテリアルズ・インフォマティクスソリューション

製品名:Citrine Platform

THE CITRINE PLATFORM

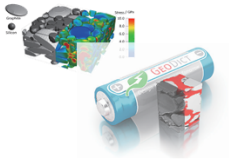
革新的な材料開発の
高速化を実現する
マテリアルズ・
インフォマティクスソリューション

研究開発向け材料開発ソリューション

製品名:GeoDict

GEODICT

電池、多孔質素材料の特性、
機能を最適化する革新的な
ソフトウェア

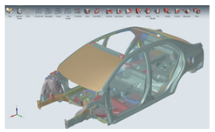


汎用プリポストプロセッサー

製品名:SimLab、HyperWorks(HyperMesh、HyperView)

Altair SimLab™
Altair HyperWorks™

様々な解析ソルバーを
標準サポートした
汎用CAEプリポストツール

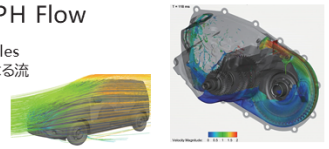


SPH法・流体シミュレーション

製品名:Simcenter SPH Flow

Simcenter SPH Flow

SPH:Smoothed Particles
Hydrodynamics法による流
体シミュレーション



自動車・輸送機器開発向けソリューション

製品名:Realis Simulation

Realis Simulation

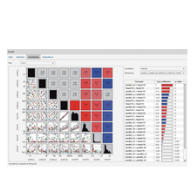
MDB、機械系、流
体系を網羅するパ
ワートレイン
統合開発プラットフォーム

多目的ロバスト設計最適化支援ソリューション

製品名:pSeven

pSeven

実験、解析の既存データ
からサロゲートモデルを生成、
アルゴリズム自動選択で予測モデリング・最
適化を支援する設計空間探索
ソフトウェアプラットフォーム



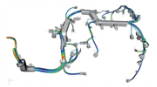
Production Engineering

ケーブルホースシミュレーション

製品名:IPS Cable Simulation

IPS CABLE SIMULATION

ケーブル、ホース類などの
屈曲製品向け経路設計シミュレーション

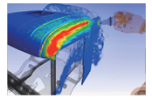


静電塗装シーリングシミュレーション

製品名:IPS Virtual Paint

IPS Virtual Paint - Spray

静電噴霧塗装と
シーリング工程を
高精度で高速にシミュレーション



組立工程シミュレーション

製品名:IPS Path Planner / IMMA

IPS Path Planner

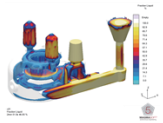
組立時の部品干渉、
設備の稼働領域、
作業者の姿勢をシミュレーション

鋳造プロセスシミュレーション

製品名:MAGMASOFT

MAGMASOFT autonomous engineering

鋳造プロセス全体を
シミュレーション

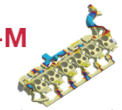


砂中子造型プロセスシミュレーション

製品名:MAGMA C+M

MAGMA C+M

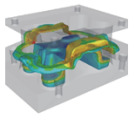
砂中子のブロー造型・
各種硬化プロセスのシミュレーションソフト



鍛造塑性加工シミュレーション

製品名:仏Transvalor社製 鍛造シミュレーション

鍛造工程から熱処理まで
幅広いプロセスを
ワンパッケージでカバー

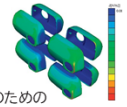


電気めっきシミュレーション

製品名:Elsyca PlatingManager

elsyca Pm

電気めっきの分析、最適化のための
シミュレーション・プラットフォーム

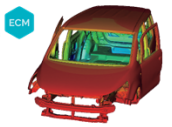


電着塗装シミュレーション

製品名:Elsyca ECoatMaster

elsyca ECM

電着塗装の
性能評価用プロセス
シミュレーション

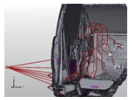


ノイズ経路探索シミュレーション

製品名:Elsyca LeakageMaster

elsyca LM

3Dモデルから雑音経路を
探索するソリューション



抵抗溶接シミュレーション

製品名:SORPAS

sorpas

抵抗溶接、　SPR
機械接合に特化した溶接
シミュレーション

CAE Outsource

ADVENTURE Cluster
大規模・高速・構造解析

GEODICT
研究開発向け
材料開発
ソリューション

Realis Simulation
自動車・輸送機器
開発向け
ソリューション

SCSK

MAGMASOFT
鋳造プロセス
シミュレーション

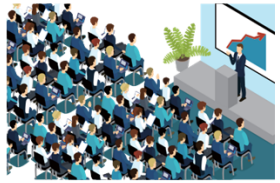
鍛造・塑性加工シ
ミュレーション

Simcenter SPH Flow
SPH法・流体シミュレーション

CAE Training

CAEソフトウェア操作方法(有償)
CAE基礎講座(有償)

CAE Seminar



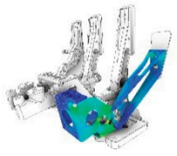
製品紹介／機能紹介／事例紹介／
ユーザー会

Industrial Design

設計／ビジュアライゼーション

製品名:Autodesk VRED Professional／
Alias／AutoCAD／
Product Design & Manufacturing Collection

- AUTODESK Alias AutoStudio
- AUTODESK VRED Professional
- AUTODESK AutoCAD
- AUTODESK Product Design & Manufacturing Collection



PLM

製品データ管理ソフトウェア

製品名:Autodesk Vault Professional

AUTODESK Vault Professional

設計データと工程を
一元管理する設計支援ツール

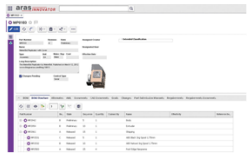
PLM

PLMソリューション

製品名:aras INNOVATOR

aras INNOVATOR

デジタルスレッドで、人・モノ・時間
のあらゆる製造情報を連携／
管理
スモールスタートできるオープ
ンソースPLM

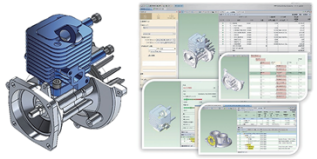


製造コスト&サステナビリティソリューション

製品名:aPriori

aPriori

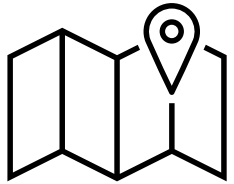
3DCADデータから、製
造コストとカーボンフット
プリントをシミュレーション



Our Customer Desires

Reduce lead time

Reduce workload



Consider multi domain

Want to produce the best product at high speed
while ensuring employee’s work-life balance

SCSK use-case in this session

SCSK solutions

GEODICT

ADVENTURE Cluster

aPriori

IPS

TRANSVALOR

Already shared
in User conference 2021

This session

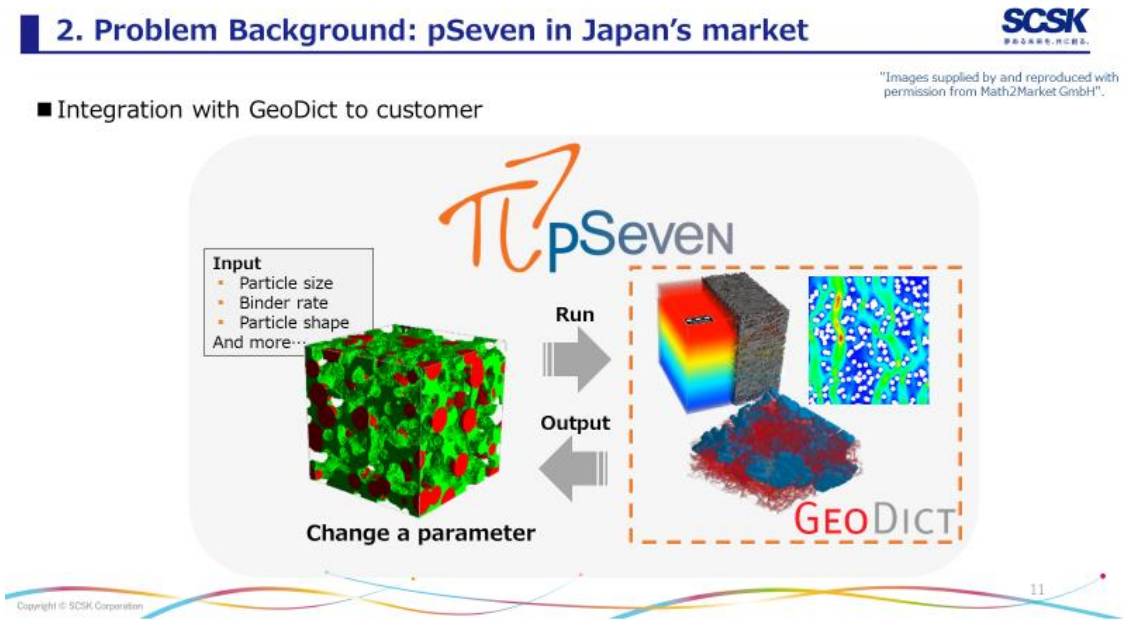
We have various use cases.(Transvalor FORGE, GeoDict …)
We will share two use cases in this session

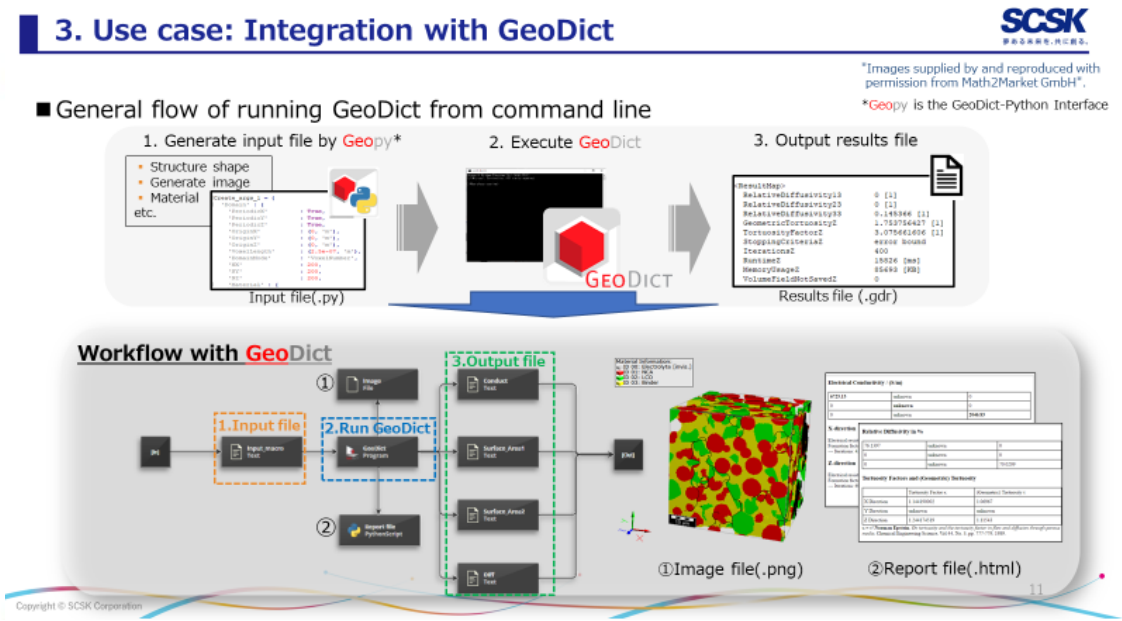
Use case of GeoDict is already uploaded to DA HP

The use case is found on DATADVANCE Website.

"*Optimization of Microstructure Properties for Lithium-Ion Secondary Batteries using GeoDict*" in DATADVANCE User Conference 2021

https://www.pseven.io/blog/events/2021/datadvance-user-conference-2021.html





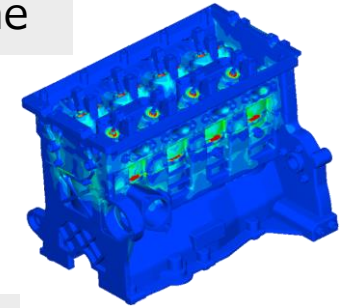
ADVENTURECluster

ADVENTURECluster (ADVC)

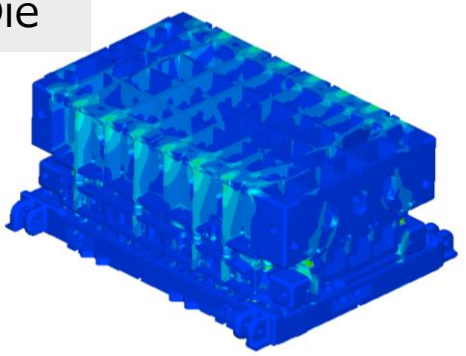
Structural analysis software that solves operational issues such as increased computing time in structural calculations and handling of analysis data that grows larger every year.

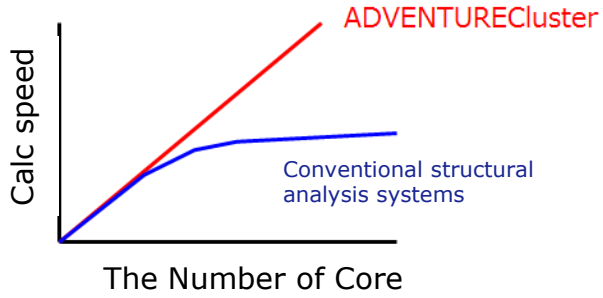
Large Scale	• **Capable of computing large computational models with more than 100 million nodes**
Speed	• **Implicit solver with high parallelization efficiency** • **Unparalleled computation speed**

Engine



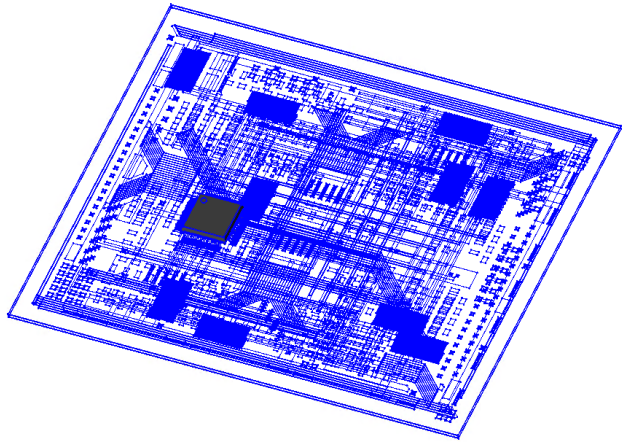
Die





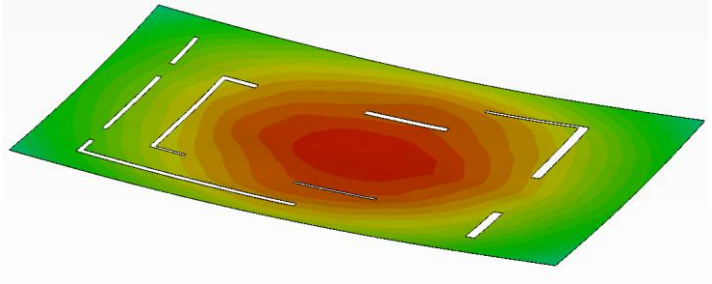
Manufacturing process of multilayer Printed Circuit Boards (PCB)

- Problem: mounting defects of electronic components due to warping of the board caused by heat



- Multilayer Printed Circuit Boards are a collection of thin sheets
- Complex shape with many wires
- =>Huge number of meshes

- Conventional method:
- Simplified model with fewer meshes, etc.



- ADVC's Advantage:
- Solid shell elements allow detailed model analysis

ADVENTURECluster : Create data for surrogate model
pSeven : automation and build surrogate model with the data

Quickly estimate substrate material properties using pSeven

Situation

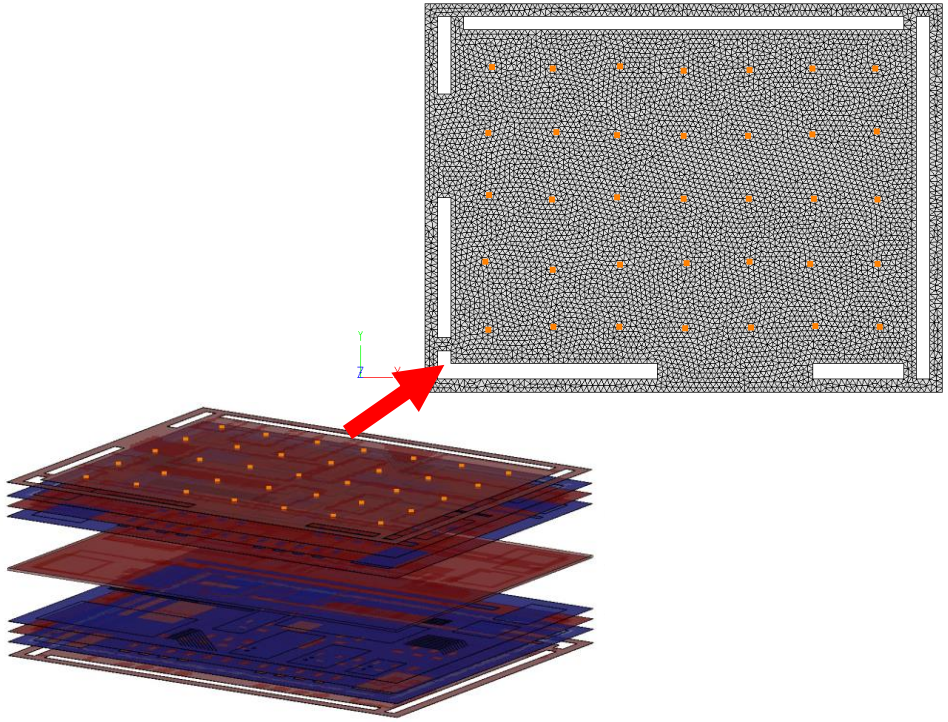
Premise:

The warpage (Z displacement) that occurs when the temperature of a multi-layered electronic substrate is increased from an initial temperature of 25°C to 75°C is obtained at 35 points on the surface of the top layer substrate.

Objective:

Estimate the three physical properties (orthogonal anisotropic linear expansion coefficient: L, T, Z) of the substrate's insulator material (pp) with pSeven.

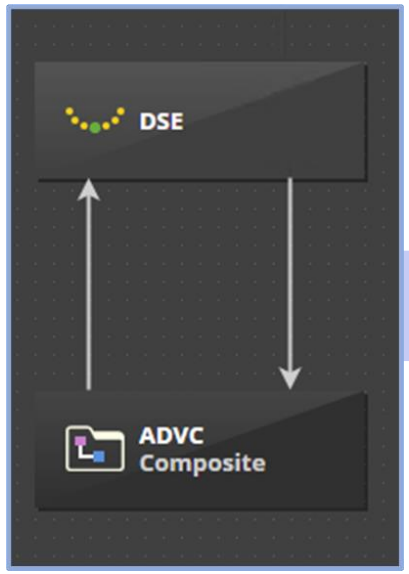
We already had ideal value set(L=5.3,T=8.7、Z=13.2)

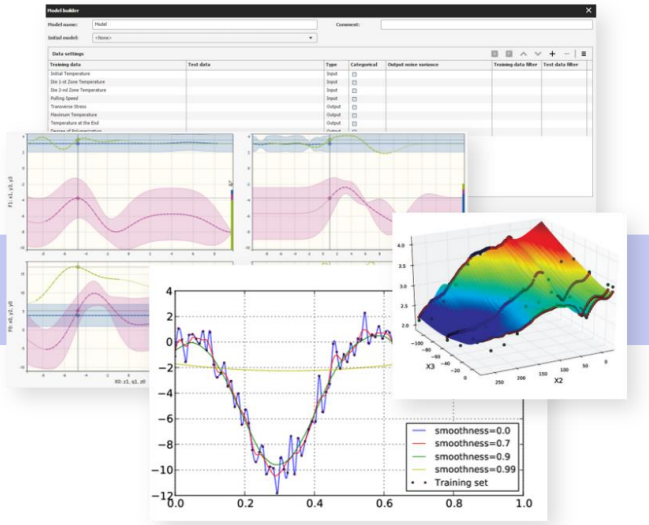


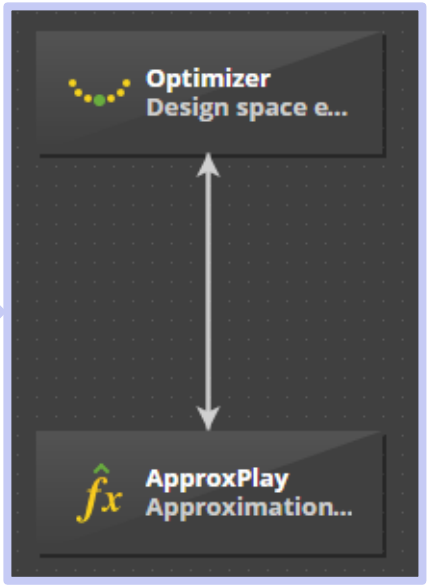
A set of (L,T,Z) was used to perform analytical calculations in ADVC to collect warpage (Z displacement) at 35 points on the top layer substrate surface.

A set of supervised data consisted of 38 (=3 physical properties+35 points) variables, and 27 (=3x3x3) sets of supervised data were prepared (i.e., 27 analytical calculations were performed in ADVC).

Use case







DoE+ADVC

Create Data

pSeven modeling

Build surrogate model

Surrogate + Optimizer

Find best values

Use case

Create Data and build model
Input :
- L
- T
- Z

Output:
- Z displacement (35 areas)

Adaptive DoE
Design :
- L
- T
- Z

Constraints:
- Z displacement (35 areas)

DoE+ADVC

Create Data

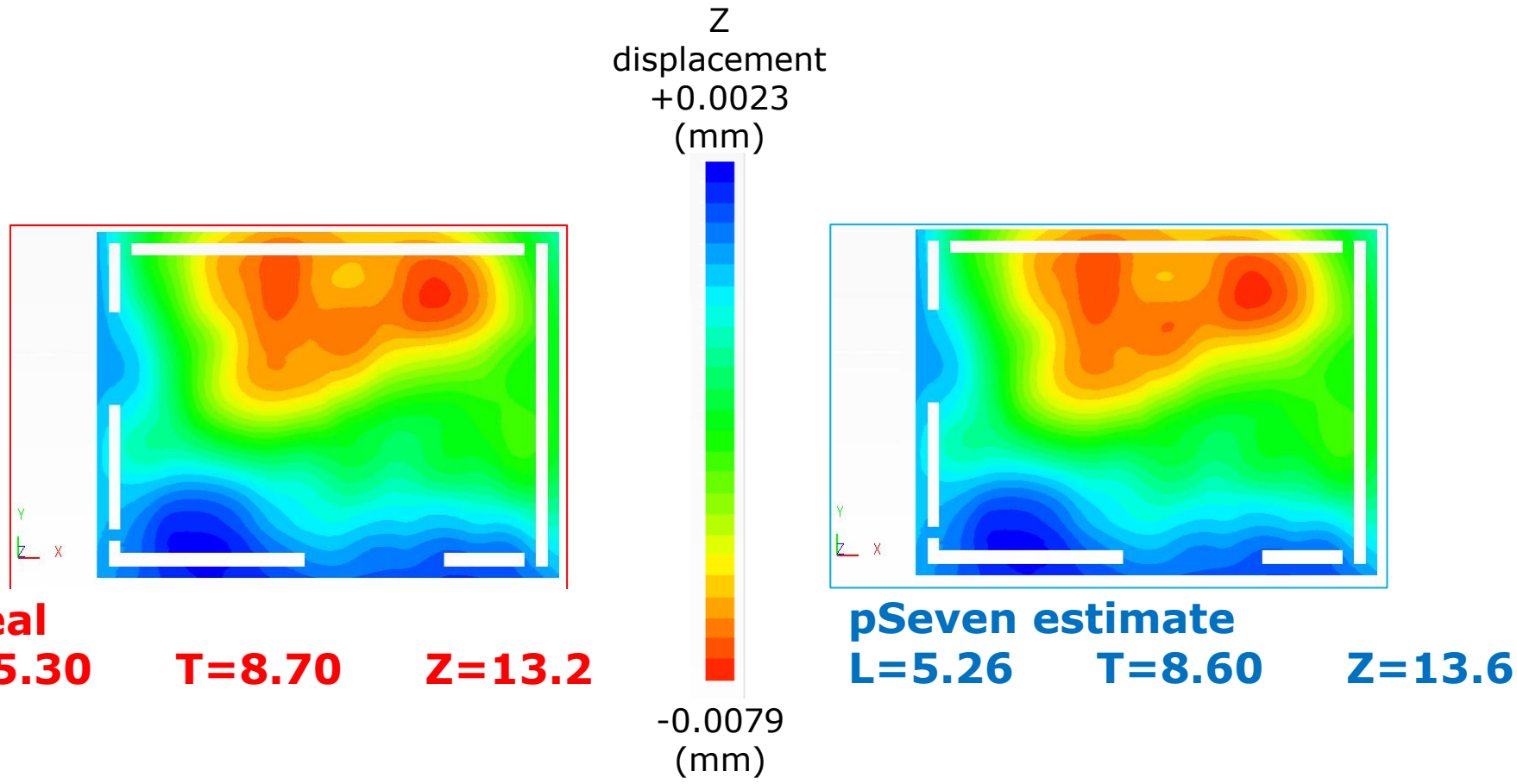
pSeven modeling

Build surrogate model

Surrogate + Optimizer

Find best values

Use case



pSeven could estimate the ideal values
Contour plots based on estimated values were in close agreement with the ideal contour plots

aPriori

aPriori

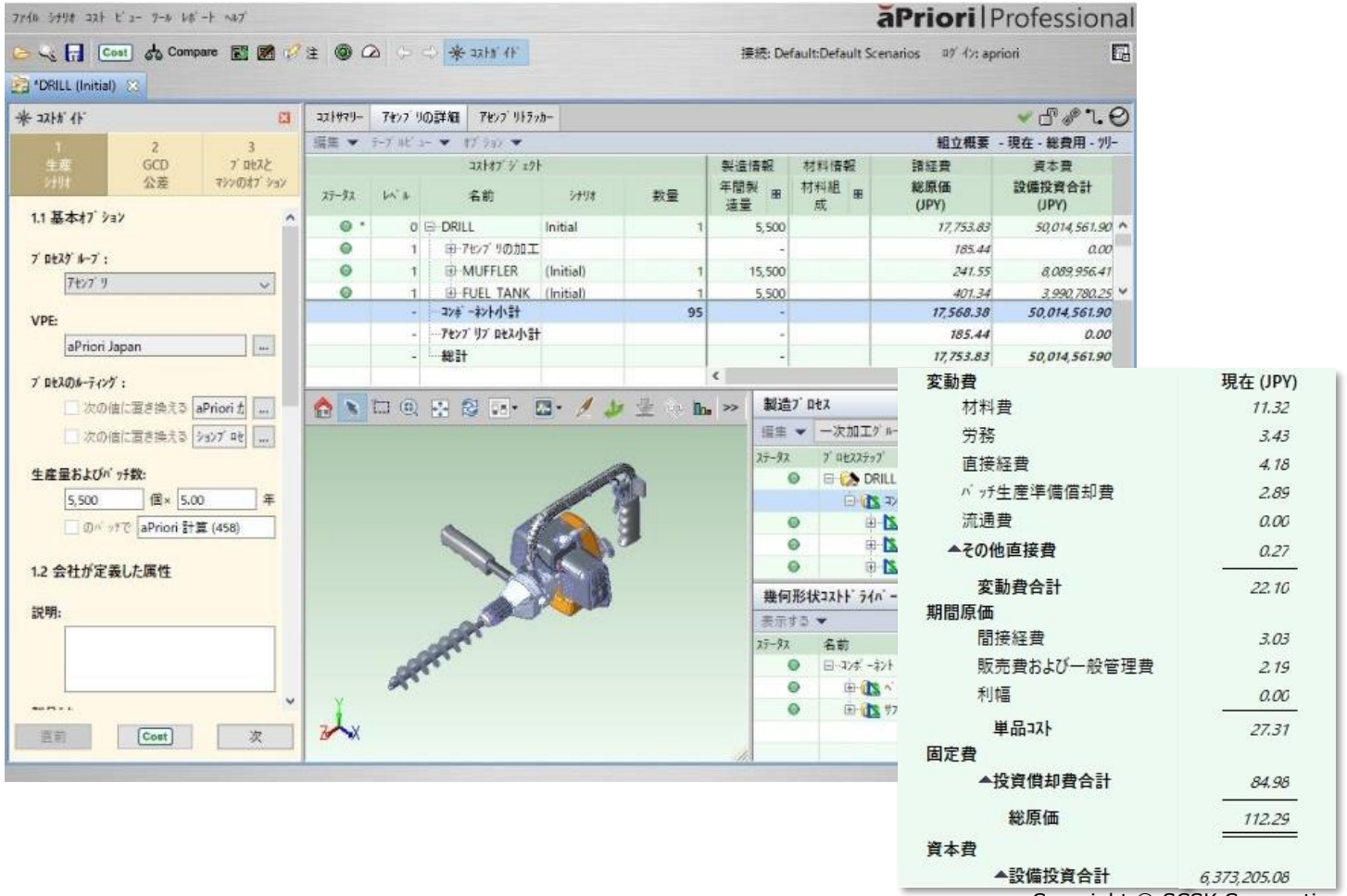
Simulation of manufacturing costs can be performed by simply entering "**3DCAD**" and "**calculation conditions**" as input information.

Input

3DCAD

Calc Conditions

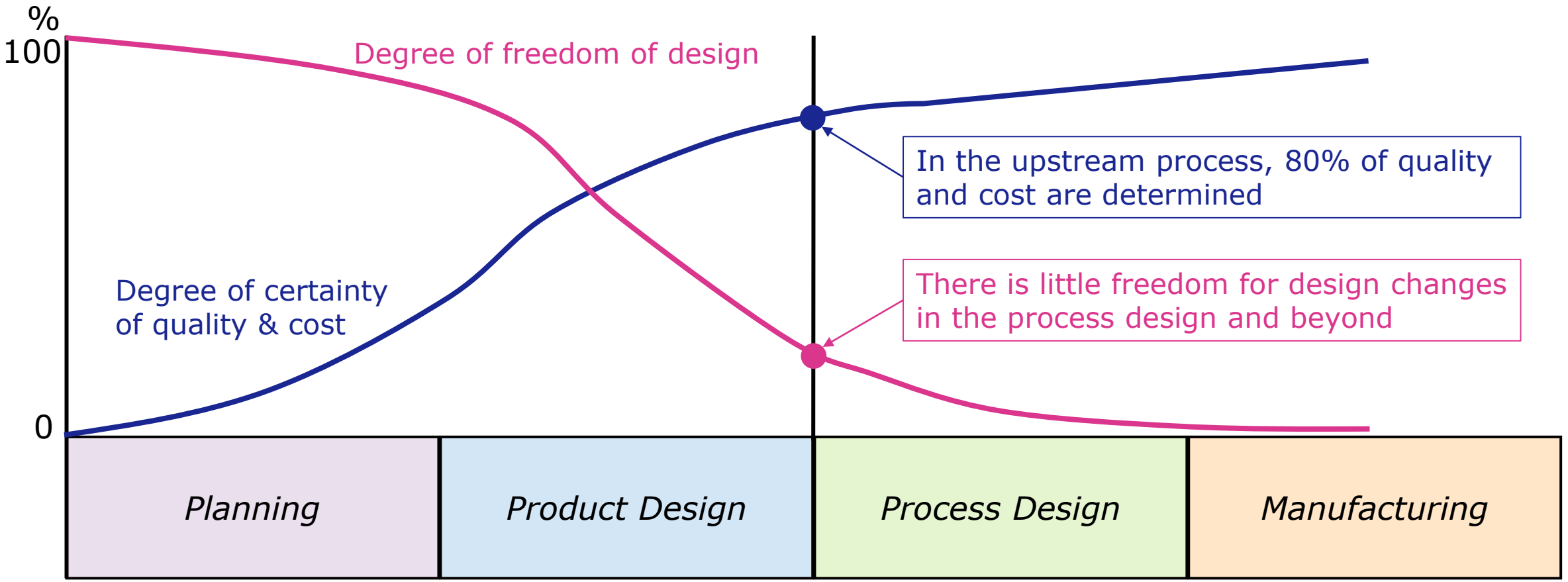
- Production method(※)
- Region
- Material
- Production volume



(※)

Sheetmetal press Casting Forging Machining Plastic molding

Want to consider various factors in the upstream process



Quote:METI

Early consideration and visualization of manufacturing feasibility, cost, CO2, and product performance to enable front-loading

pSeven + aPriori + CAD/CAE

Optimal product design can be considered from various aspects such as manufacturability, manufacturing cost, CO_2 emissions, and strength.

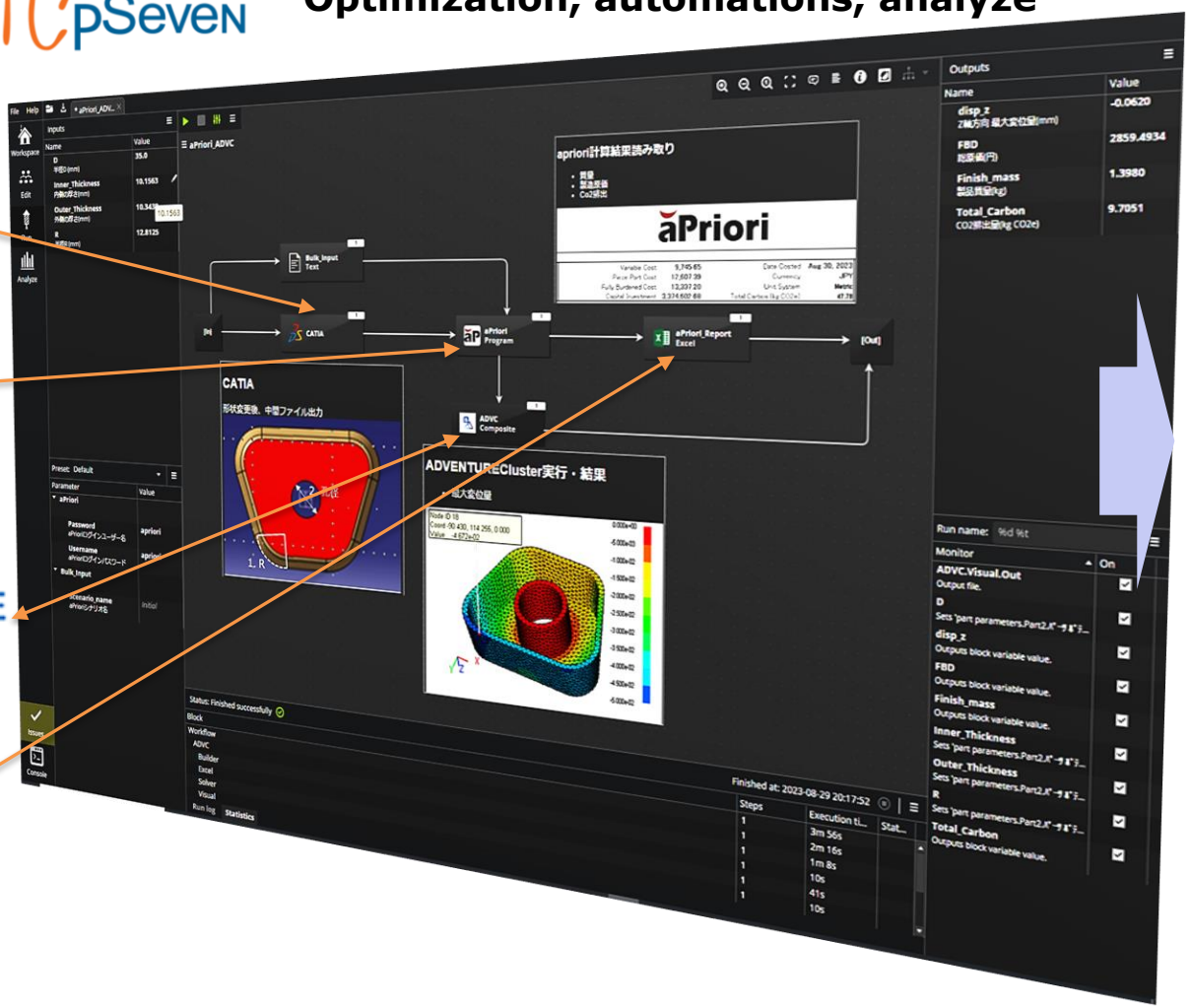
Optimization, automations, analyze

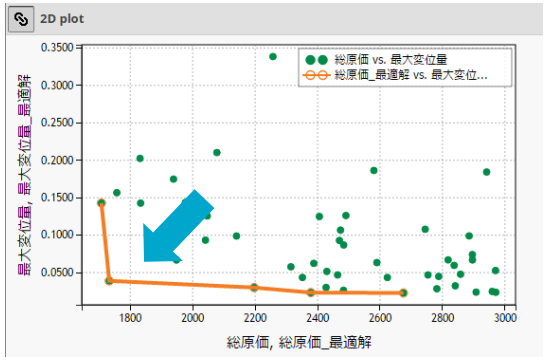
Model modify

Cost
manufacturability
CO2 emissions

Max displacement

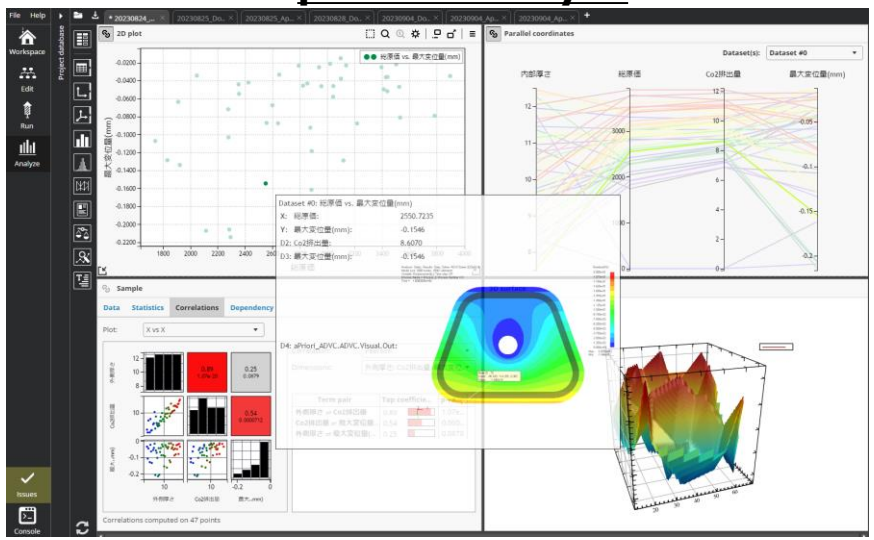
Objective values are obtained from aPriori reports



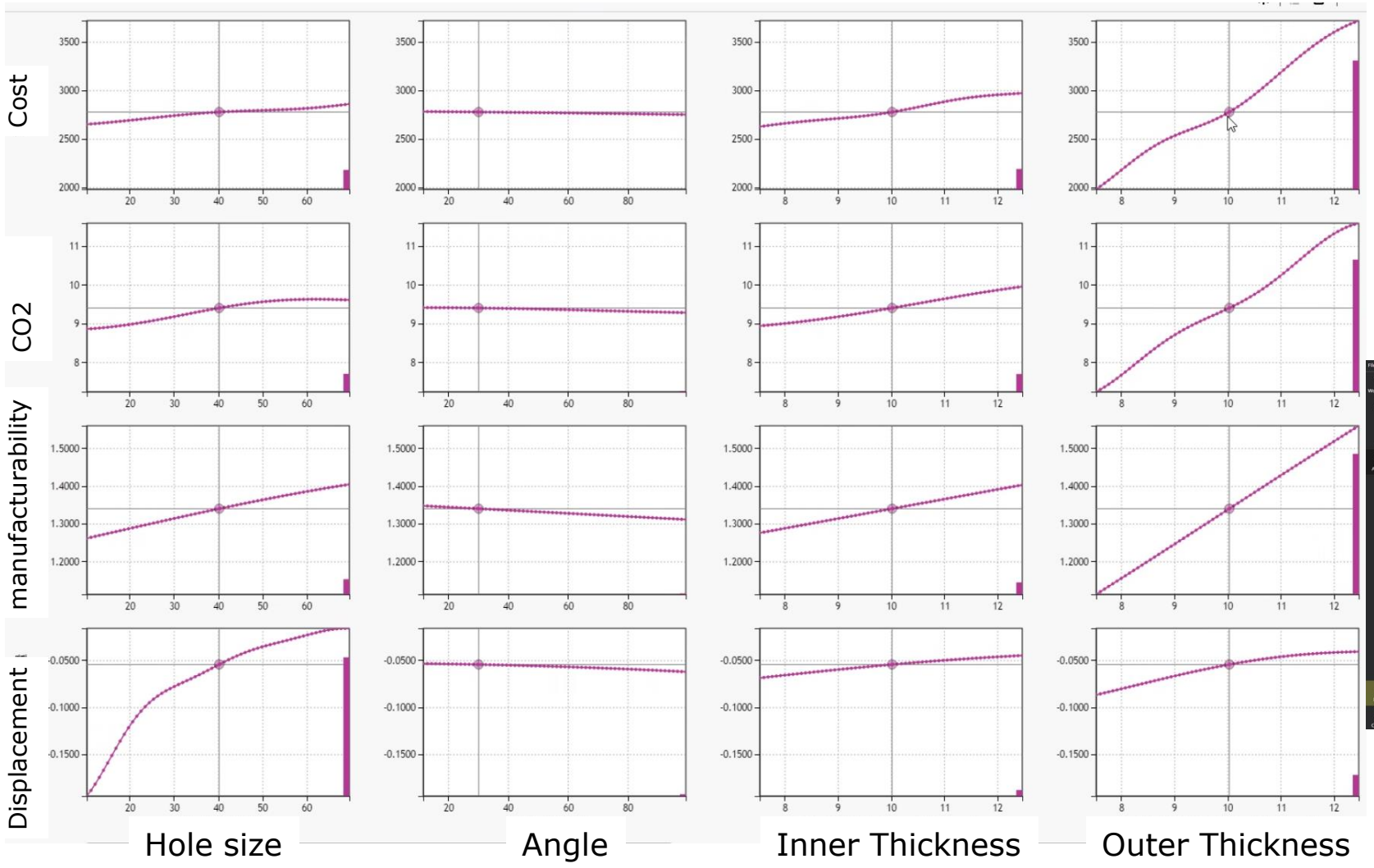


Trade-off analysis, such as cost vs. strength, is possible.

pSeven Analyze

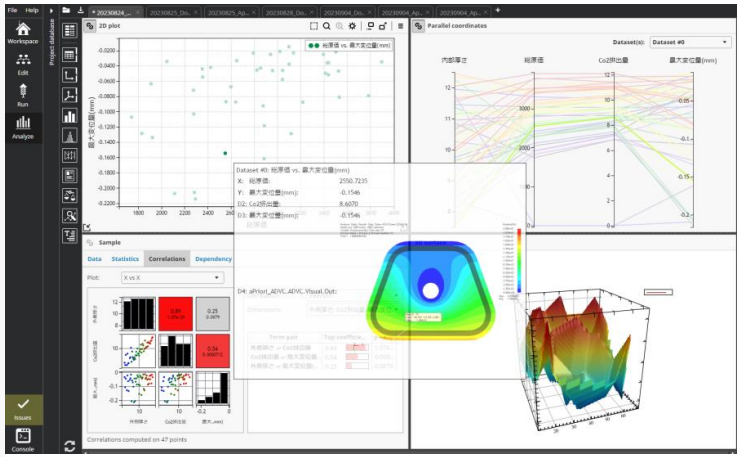


Discussion is possible based on quantified results!



In this case, I can't reduce the cost by changing the shape.

We need to verify if we can get by with production technology.



Here's a shape that could reduce CO2 emissions!

Conclusion

- We shared two use-cases about SCSK solutions.
  - We have a lot of Software for manufacturing industry

- Integration with ADVENTURECluster
  - By utilizing ADVC, even thin geometries can be analyzed quickly and accurately with sufficient mesh
  - High-speed calculations streamline data collection
  - Efficient collection, modeling, and optimization by utilizing pSeven

- Integration with aPriori and CAD/CAE
  - Upstream process allows multifaceted analysis of various factors
  - Enables solid discussions based on quantitative information

SCSK

Create Our Future of Dreams