



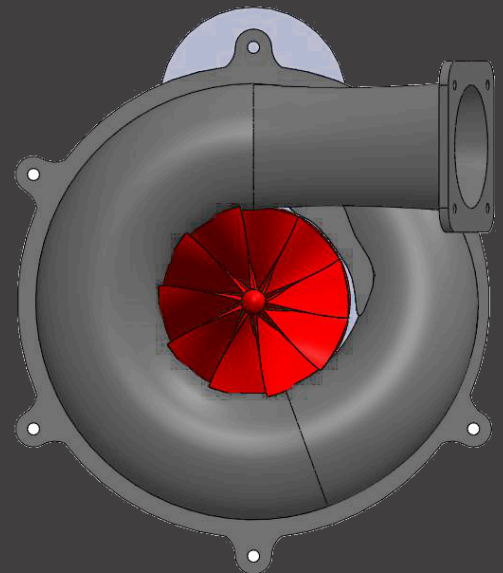
CASE STUDY · TURBOMACHINERY

# Compressor Impeller Design Changes

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PARAMETRIC EDITS  
THROUGH AGENTIC AI  
WITH NEXUS & SOLIDWORKS

**Tools** Nexus · SolidWorks  
**Outcome** Up to 75% time saved



# WHAT'S INSIDE

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An engineer worked with Nexus to edit a centrifugal compressor assembly through natural language — taking an edit pass from ~30–50 minutes of manual work down to ~7–10 minutes. What the agent successfully completed, where it self-corrected, and where the engineer was still needed.

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## Summary

P. 03

Up to 75% time saved; height, count, diameter and bore clearance all reconfigured.

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## Problem

P. 03

Geometry is constraint-driven; the right feature is rarely the first one found.

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## Methodology

P. 04

How Nexus identified driving dimensions and navigated through edits.

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## Results

P. 05

Outcomes across seven edit requests.

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## Time Savings

P. 06

Modeled estimates for the same edit pass — with and without prior knowledge of the model.

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## Try Nexus

P. 07

How to bring the same workflow to your own assemblies.

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## SUMMARY

# The edits that fill an engineer’s day, driven through agentic AI — in a fraction of the time.

Across a full editing pass on a centrifugal compressor, Nexus reconfigured blade height (4 → 7 mm), total height (40 → 43 mm), and blade count (12 → 10) among other geometry modifications.

**65–75%**

TIME SAVED PER EDIT PASS, ENGINEER NEW TO MODEL

**7**

CAD EDITS DRIVEN THROUGH AGENTIC AI

**0**

BROKEN MODELS LEFT BEHIND

## PROBLEM

Editing in-assembly is unforgiving — one dimension hides behind layers of sketches, patterns and derived features.

**01 Constraint-driven, not point-driven**

Moving a sketch endpoint does nothing — fully-defined sketches snap it back on rebuild. The real control is the driving dimension (e.g. D4@Sketch1).

**02 One edit ripples across the assembly**

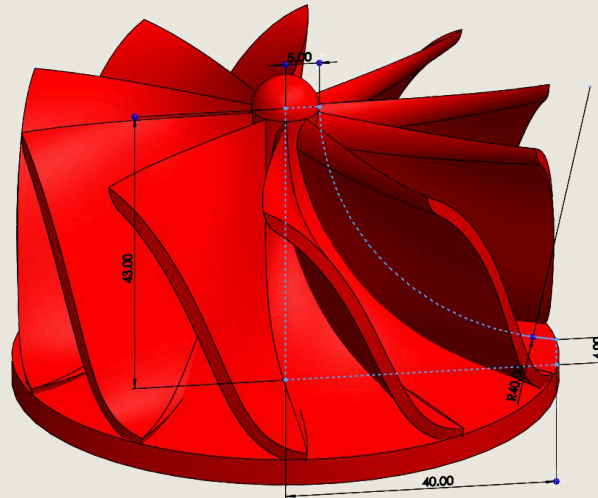
Geometry is coupled — grow the impeller diameter and the housing bore must follow to hold clearance. Knock-on edits have to be tracked across parts.

**+ Benefit to engineer**

For an engineer new to the model, the pass drops from **~30–50 minutes to ~7–10 minutes** — the agent finds the driving dimension and course-corrects on its own.

# METHODOLOGY

For each request, Nexus inspected the relevant sketches, proposed a target feature, applied the edit and checked the rebuild — correcting itself when the result did not hold.



DRIVING DIMENSIONS D2 / D4@SKETCH1

BLADE HEIGHT 4 → 7 MM, AS IT TOOK PLACE

ENGINEER

Open the Blade part from the assembly and make the blade taller — take the height from 4 to 7 mm.

NEXUS

The 4 mm height lives in two sketches — Sketch1 (revolve) and Sketch3 (loft). I'll raise those points by 3 mm.

NEXUS

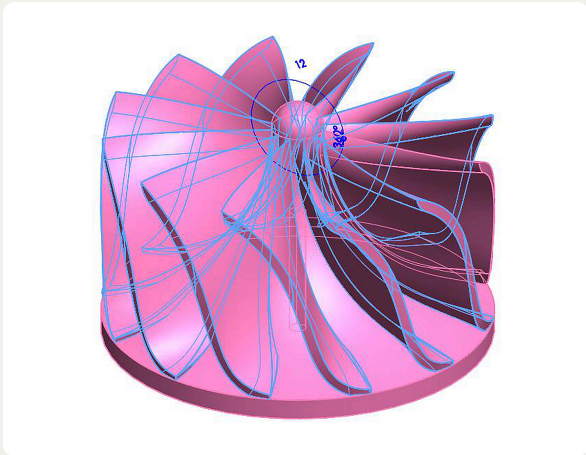
That did not hold — the sketches are fully defined, so the constraints snapped the points back on rebuild. The real control is the driving dimension D4@Sketch1 . Editing that instead.

NEXUS

D4@Sketch1 set to 7 mm and the model rebuilt cleanly — blade height is now 7 mm.

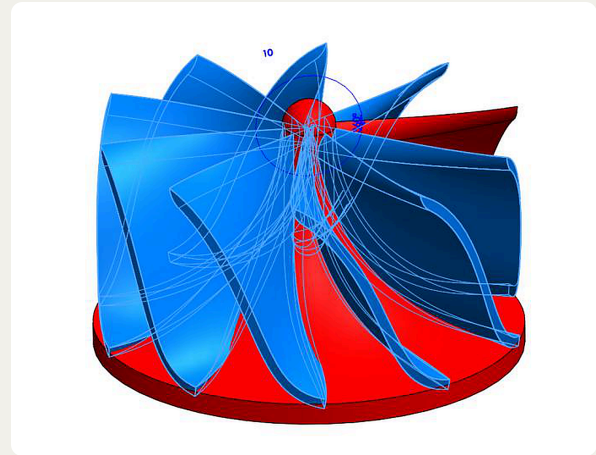
# RESULTS

Every figure below was produced in SolidWorks during the session as Nexus walked the feature tree and applied edits — reporting back to the engineer conversationally at each step.



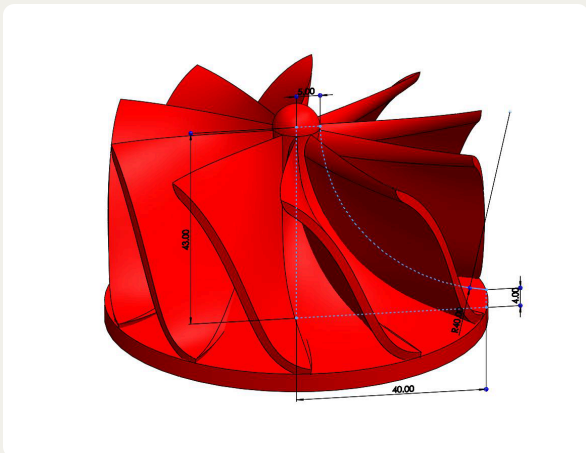
### Feature-tree inspection

Nexus traced the controlling sketches before touching any geometry.



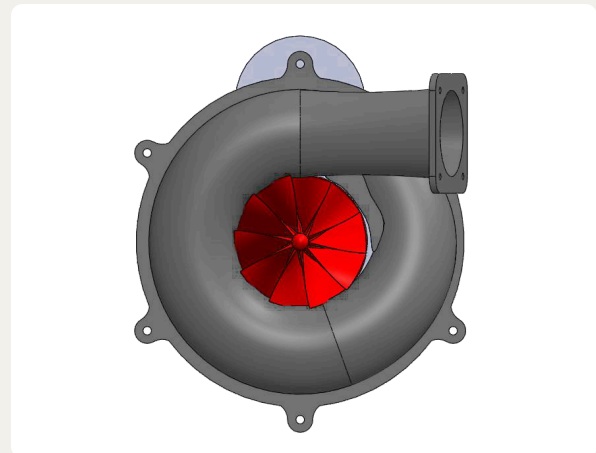
### Blade count 12 → 10

Total instances on CirPattern2 edited; model rebuilt cleanly.



### Blade height, dimension-driven

Height changed via D4@Sketch1 after the direct point-move was restored on rebuild.



### Impeller in volute housing

The assembly under edit — bore resized to 81 mm to clear the 80 mm impeller.

# TIME SAVINGS

Modeled engineering estimates for the same edit pass — not stopwatch data. The manual baseline assumes realistic feature-tree hunting overhead, not just the final click.

TASK	METHOD	MANUAL	NEXUS	SAVINGS*
Inspect feature tree, find driving dims	Feature-tree analysis	5–10 min	~instant	<b>~7 min</b>
Blade height 4 → 7 mm	D4@Sketch1	3–6 min	~1 min	<b>~3 min</b>
Total height 40 → 43 mm	D2@Sketch1	2–4 min	~1 min	<b>~2 min</b>
Blade count 12 → 10	Circular pattern	1–2 min	~1 min	<b>~1 min</b>
Part variants (10- & 12-blade)	Save As	1–2 min	~1 min	<b>~1 min</b>
Blade diameter 75 → 80 mm	D1@Sketch1	2–3 min	~1 min	<b>~1.5 min</b>
Housing bore 76 → 81 mm (cross-part)	Boss-Extrude10 / Sketch26	5–10 min	~2 min	<b>~6 min</b>
Surface bump (Indent workflow)	API automation	10–15 min	–	–
<b>Total</b>		<b>~30–50 min</b>	<b>~7–10 min</b>	<b>~22–40 min</b>

\* vs. the engineer new to the model.

**New to the model: the hunt disappears**

The big wins are where unfamiliarity is highest — Nexus avoided the fully-defined-sketch snap-back trap, easily 10+ minutes of debugging.

**Original author: shift to hands-free work**

The value shifts to hands-free parallel work, batch intent and the conversation doubling as the changelog.

**Bottom line**

Approximately **65–75% time saved** on CAD edits. Instead of clicking through the feature tree and hunting for dimensions, the engineer was able to make changes through agentic AI and natural language.



# Think through > click through. Let **Nexus** handle the rest.

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YOUR AI AGENT FOR ENGINEERING WORKFLOWS

Want to try Nexus on your assembly workflow?  
Visit [www.cosmon.com](http://www.cosmon.com) or email [info@cosmon.com](mailto:info@cosmon.com) to start a trial.

