



USING JMP FDE TO ANALYZE CURVES AND MAKING ASSESSMENT AVAILABLE FOR LARGE DATASETS

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JMP DACH usergroup meeting
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PRESENTATION OVERVIEW – DACH USERGROUP MEETING USING JMP FUNCTIONAL DATA EXPLORER (FDE) TO ANALYZE CURVES

Siltronic AG – Background of using JMP

- company, sites
- value chain
- processes and data
- high standards for the quality of processes and products

DACH usergroup meeting story

- FDE for analysis of functional data
- using data in tall and wide format
- modeling FDE results for scalable application
- using data table as frontend
- database simulated by query on jmp file

DACH usergroup meeting story details

- using ~100k profiles for assessment
- from real data, anonymized and standardized
- data acquisition and cleaning
- reshaping
- FDE for feature isolation
- modeling isolated feature
- result distribution
- test with new data

SILTRONIC AT A GLANCE

4,300

employees
worldwide

4

world-class
production sites

1.35

billion EUR
sales in 2025

50+

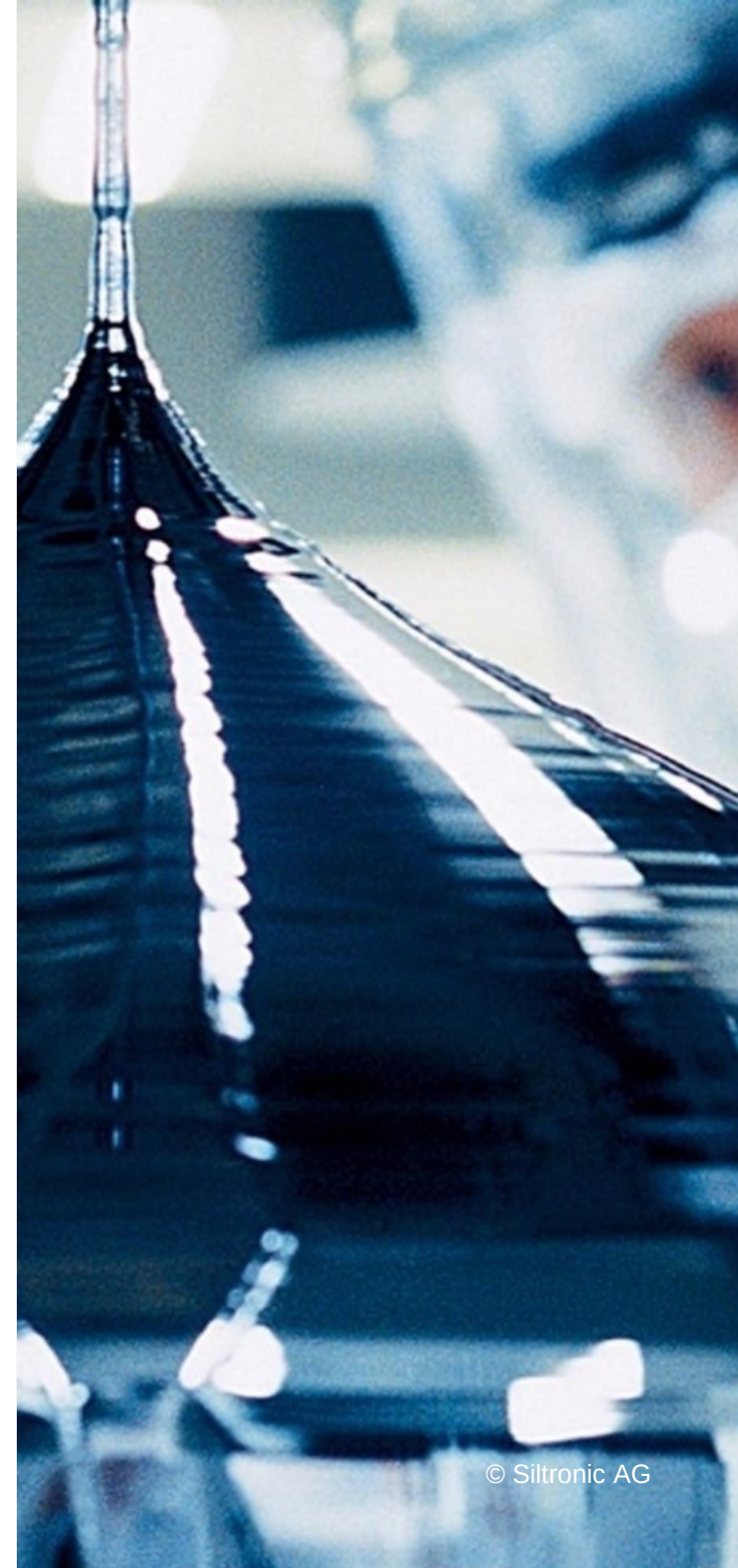
years of history
in silicon technologies

Supplier

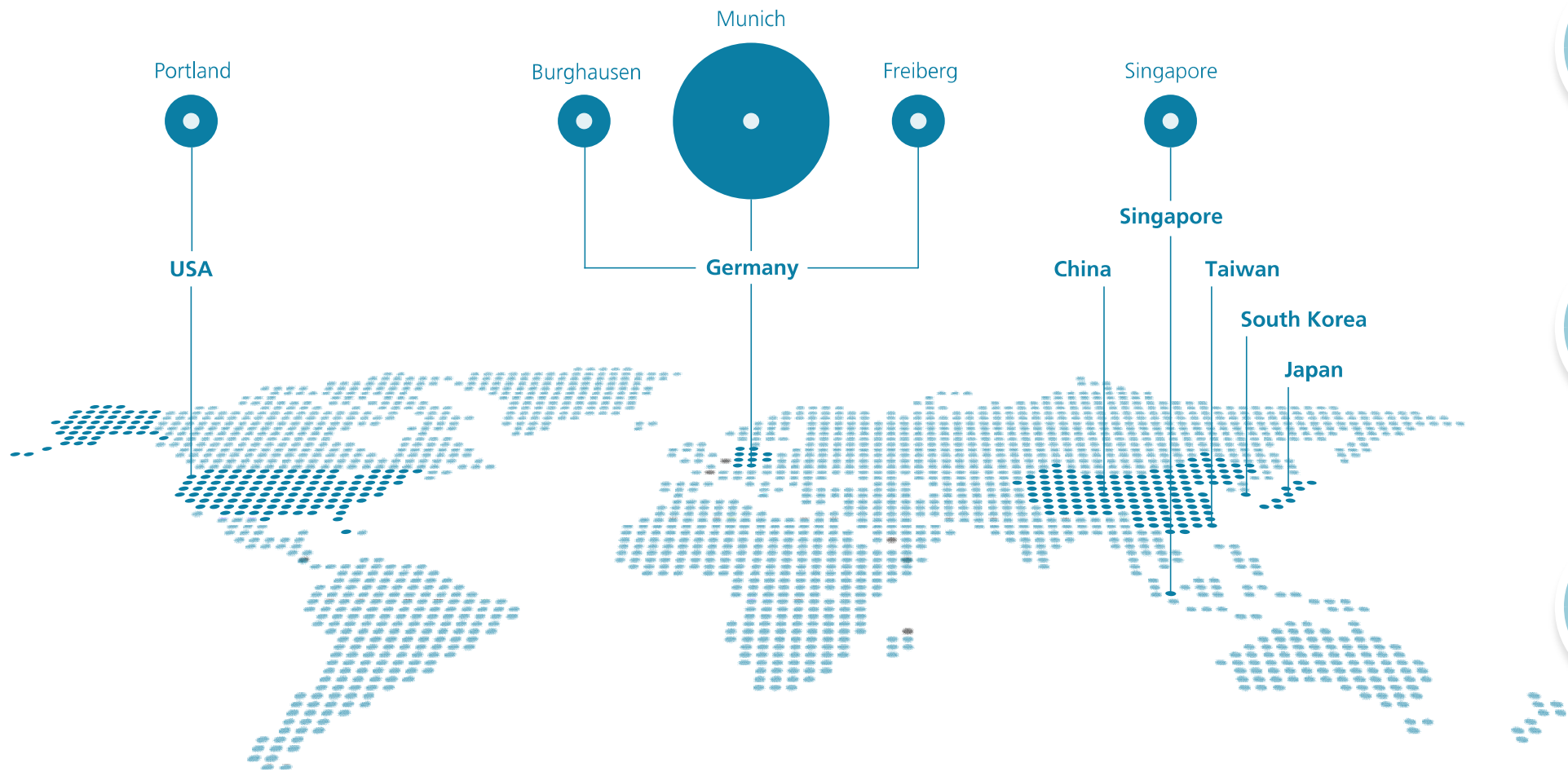
to top
semiconductor producers

23.5

percent
EBITDA margin in 2025



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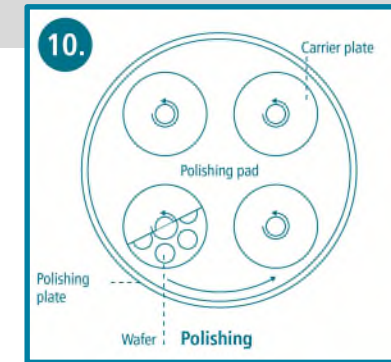
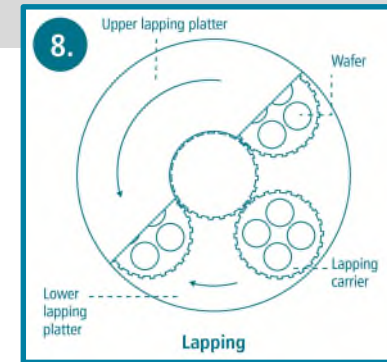
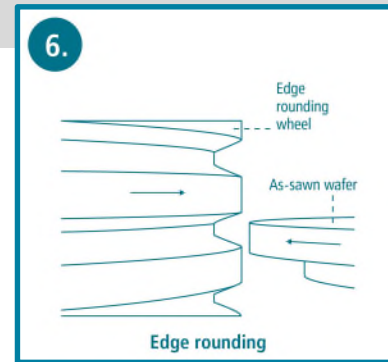
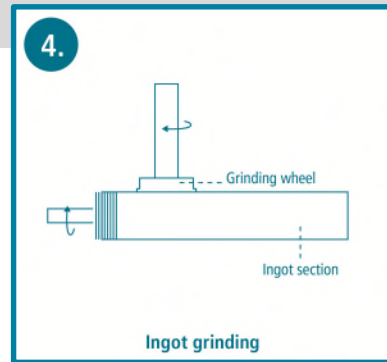
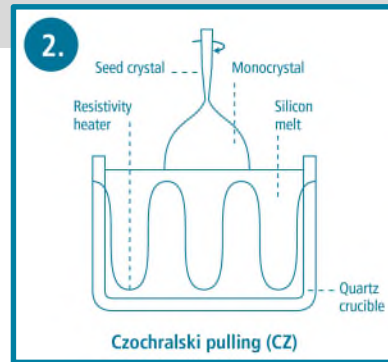
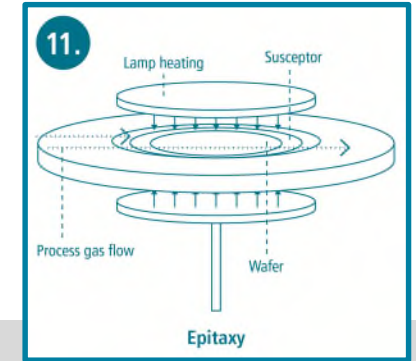
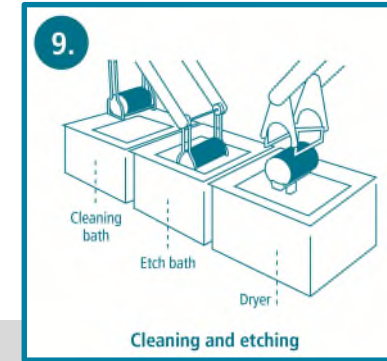
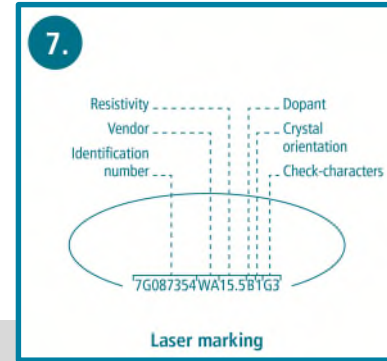
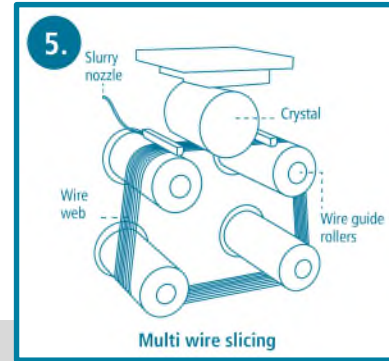
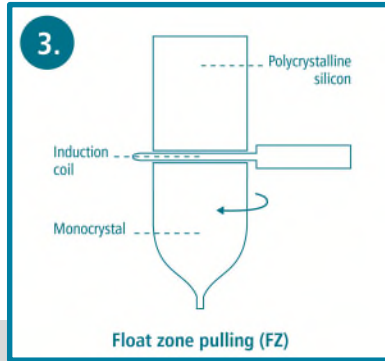
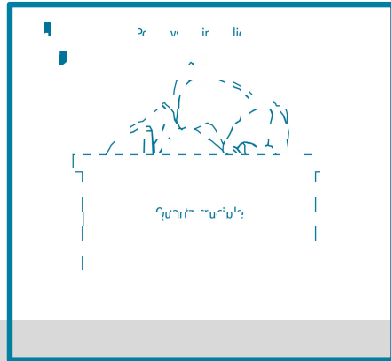


4
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production sites

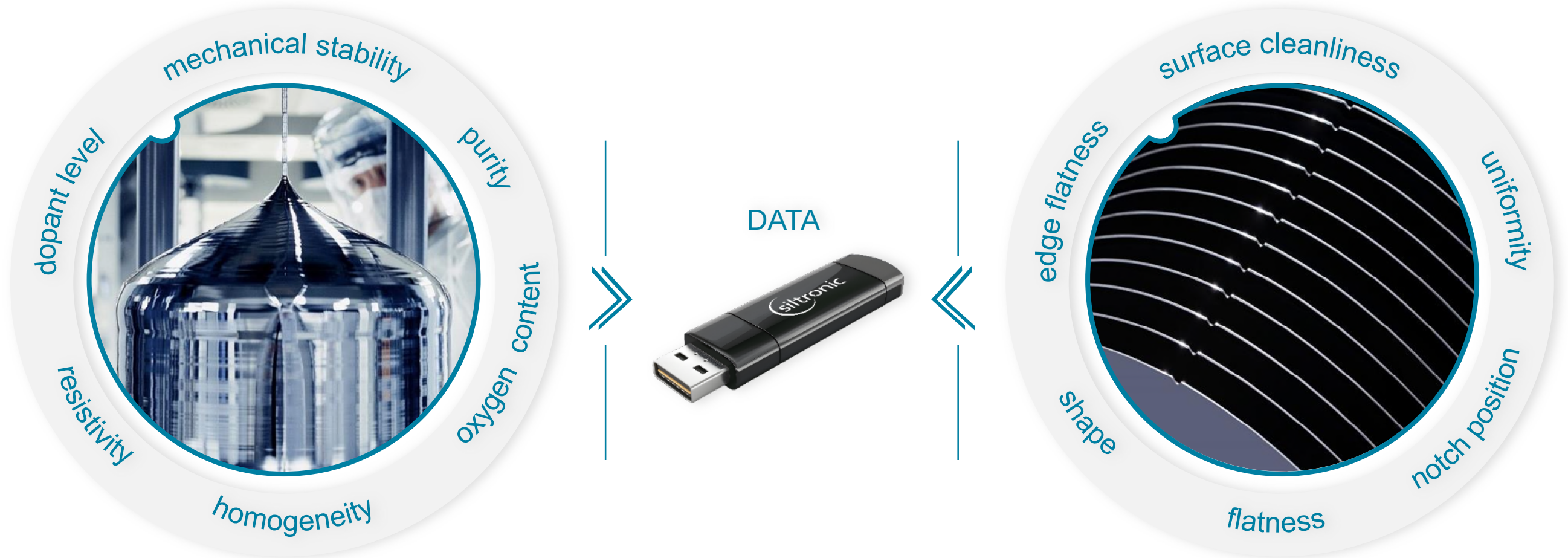


50+
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WAFER PRODUCTION PROCESS



A NUMBER OF KEY INGOT AND WAFER PROPERTIES DEFINE THE WAFER SPECIFICATION AND ITS FURTHER USE BY THE CUSTOMER



WAFER PURITY AND FLATNESS REQUIREMENTS ARE EXTREMELY HIGH, AS SHOWN BY MACRO-WORLD SCALING EXAMPLES

Particles

The particle size is specified in the nanometer range. The requirements correspond to a maximum of 10 grains of sand distributed throughout the city of Munich.



nm = nanometer

Flatness

20 nm on a wafer is equivalent to the height of a leaf on the surface of Lake Chiemsee – or a single bacterium on a tennis court.



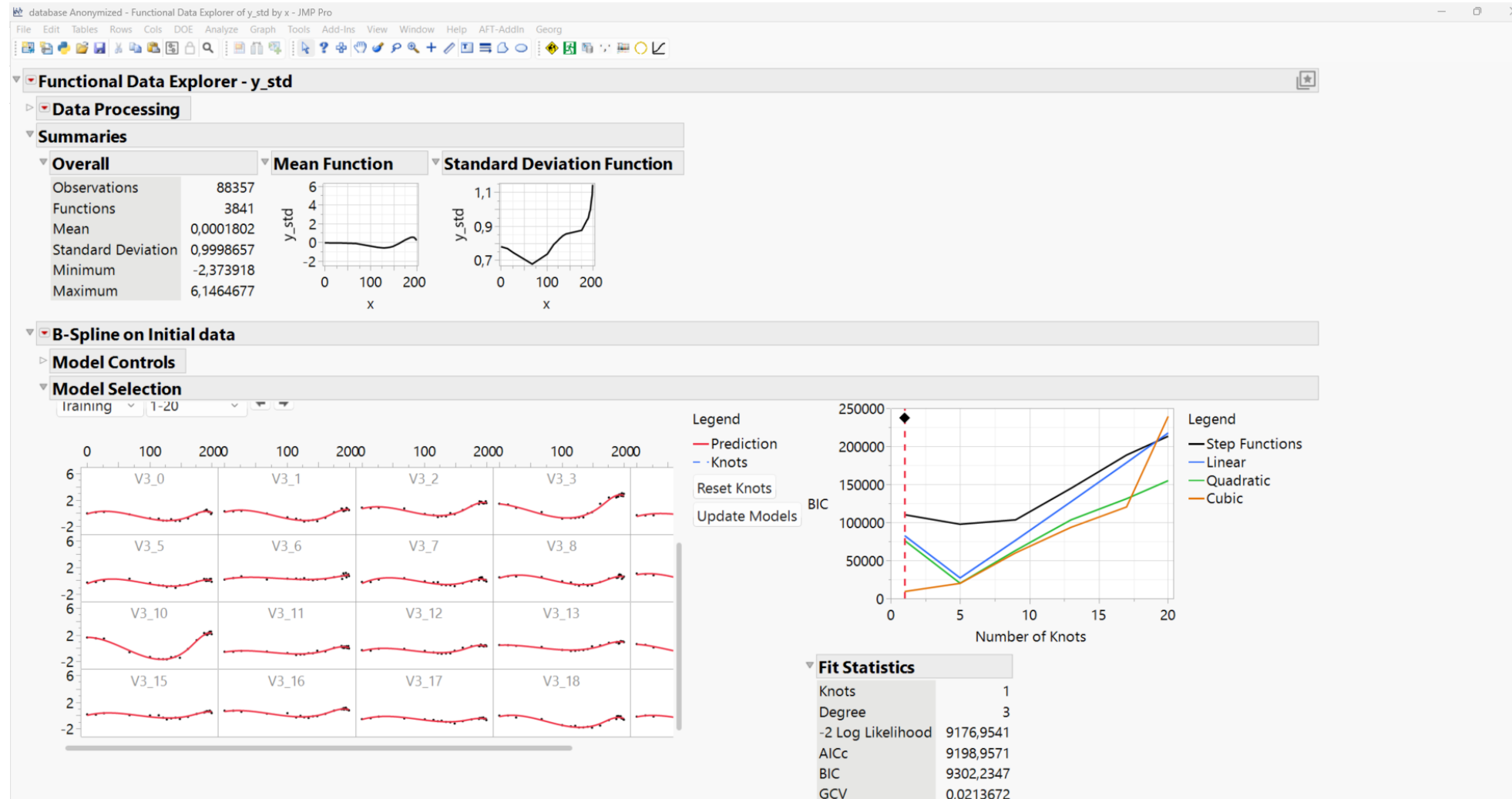
DATASET FOR CURVE ANALYSIS

A JMP Table is used to simulate database access

- Same way in comparison to real database query
- `new sql query()` is used
- 88.357 rows total
- 23 rows for each batch id, 3841 curves
- anonymized id's
- standardized data ranges
- x is an arbitrary batch maturity parameter
- data contains a few double values (2 curves with 31 values instead of 23)
 - applied methods are robust

	date	machine	id	x	y_std	missing
	21.06.2026	V2_19	V3_2668	200	6,15	
		V2_15	V3_2670			
		V2_6	V3_0			
		V2_3	V3_1			
		V2_24	V3_2			
	03.10.2025	33 others	3.836 others	0	-2,37	0
1	21.06.2026 ...	V2_0	V3_0	0	-0,000563005	0
2	21.06.2026 ...	V2_0	V3_0	14	0,1603588156	0
3	21.06.2026 ...	V2_0	V3_0	27	0,2129661792	0
4	21.06.2026 ...	V2_0	V3_0	68	-0,156343616	0
5	21.06.2026 ...	V2_0	V3_0	101	-0,732813798	0
6	21.06.2026 ...	V2_0	V3_0	115	-0,787676306	0
7	21.06.2026 ...	V2_0	V3_0	122	-1,076300807	0
8	21.06.2026 ...	V2_0	V3_0	128	-1,076300807	0
9	21.06.2026 ...	V2_0	V3_0	135	-0,878318711	0
10	21.06.2026 ...	V2_0	V3_0	142	-1,11446603	0
11	21.06.2026 ...	V2_0	V3_0	149	-1,129234456	0
12	21.06.2026 ...	V2_0	V3_0	162	-0,754281736	0
13	21.06.2026 ...	V2_0	V3_0	176	-0,157950123	0
14	21.06.2026 ...	V2_0	V3_0	188	0,314344515	0
15	21.06.2026 ...	V2_0	V3_0	189	0,3310418001	0
16	21.06.2026 ...	V2_0	V3_0	191	0,4781816228	0
17	21.06.2026 ...	V2_0	V3_0	192	0,5433358545	0
18	21.06.2026 ...	V2_0	V3_0	193	0,3377438655	0
19	21.06.2026 ...	V2_0	V3_0	195	0,2260874362	0
20	21.06.2026 ...	V2_0	V3_0	196	0,2466449691	0

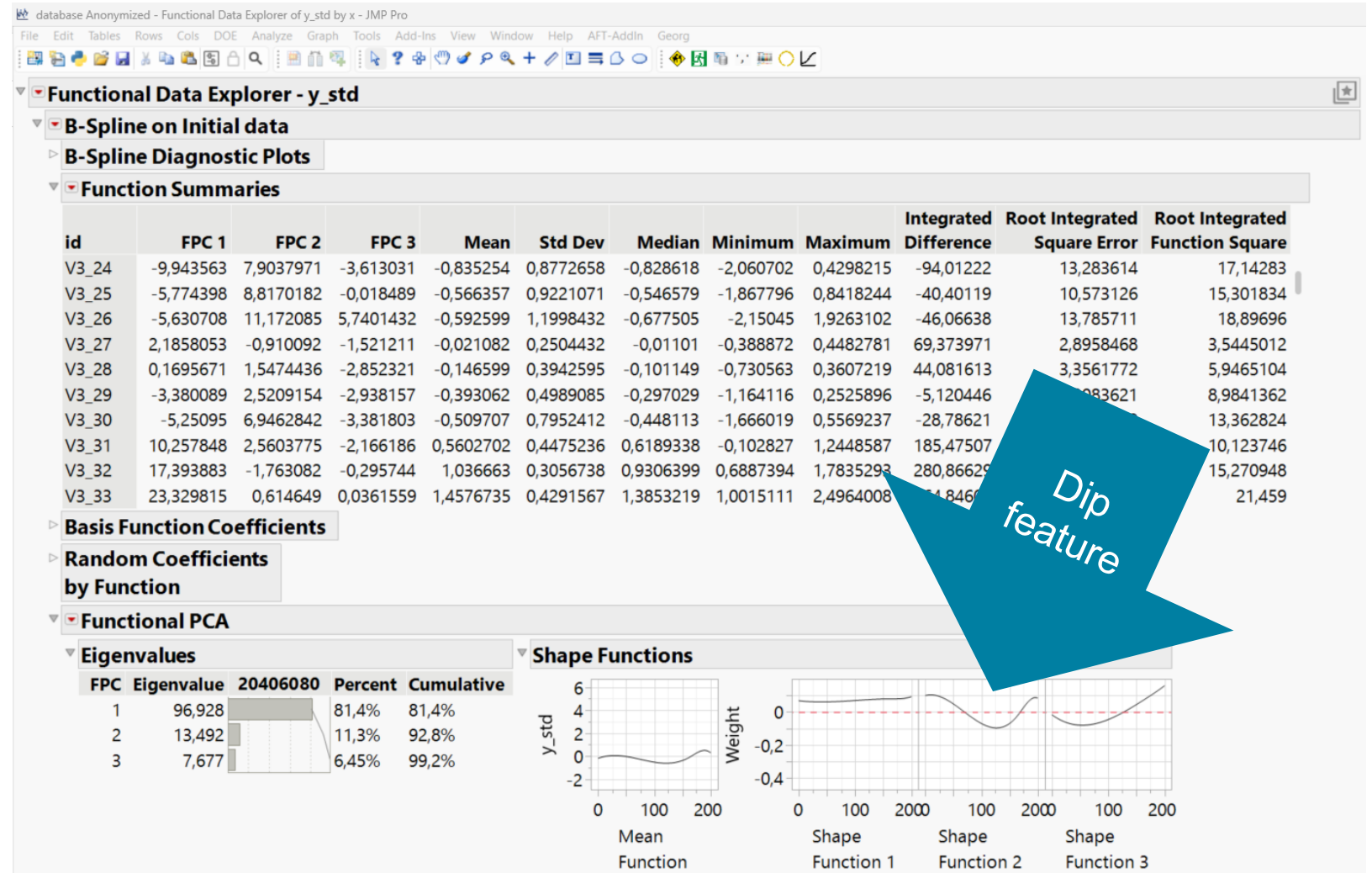
CURVE ASSESSMENT IN FUNCTIONAL DATA EXPLORER (FDE) TALL DATATABLE, FUNCTIONS IN ROW



IDENTIFY FPC 2 FROM FDE AS ASSESSMENT

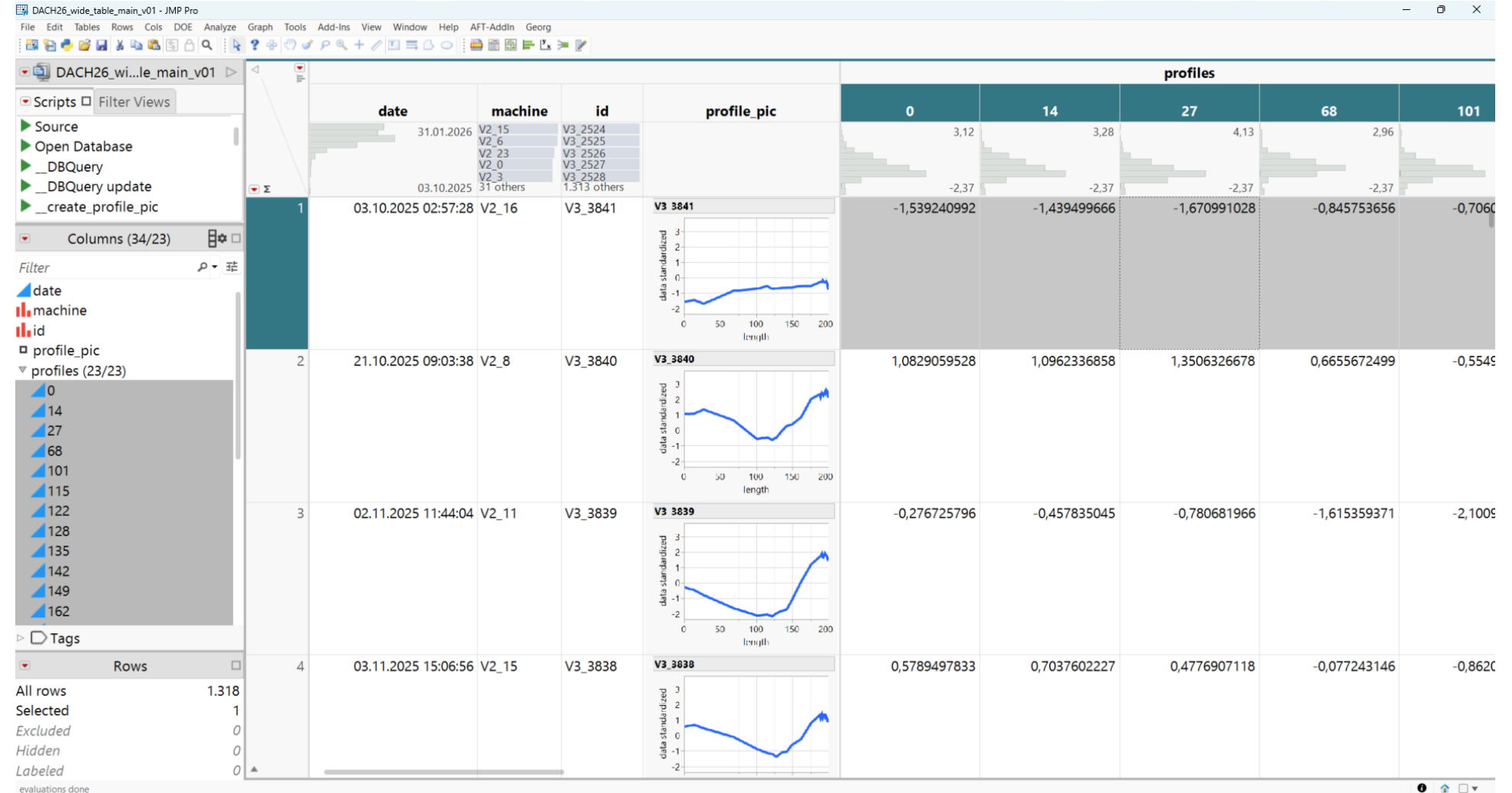
Application of FDE

- all curves can be described with 3 features, FPC1 – 3, covering 99.2 % variations
- Each FPC comprises different variations, depending on how FDE is used (e.g. modeling b-splines, p-splines ...)
- we are lucky that the feature “dip” we are looking for, is covered in FPC 2
- a simple formula
 - $FPC\ 2 < 0$
- gives us the answer, whether we have a dip or not



RESHAPING DATA TO WIDE USING SUBSET MAPPING CURVES INTO 23 COLUMNS „PROFILES“

- 1318 curves
- each with 23 values in columns grouped with column group name “profiles (23/23)”
- for transparency and reality check a profile image is saved



USING FDE WITH WIDE DATATABLE ADDING „Y FPC2“ AS CURVE ASSESSMENT

Modeling on Y FPC 2

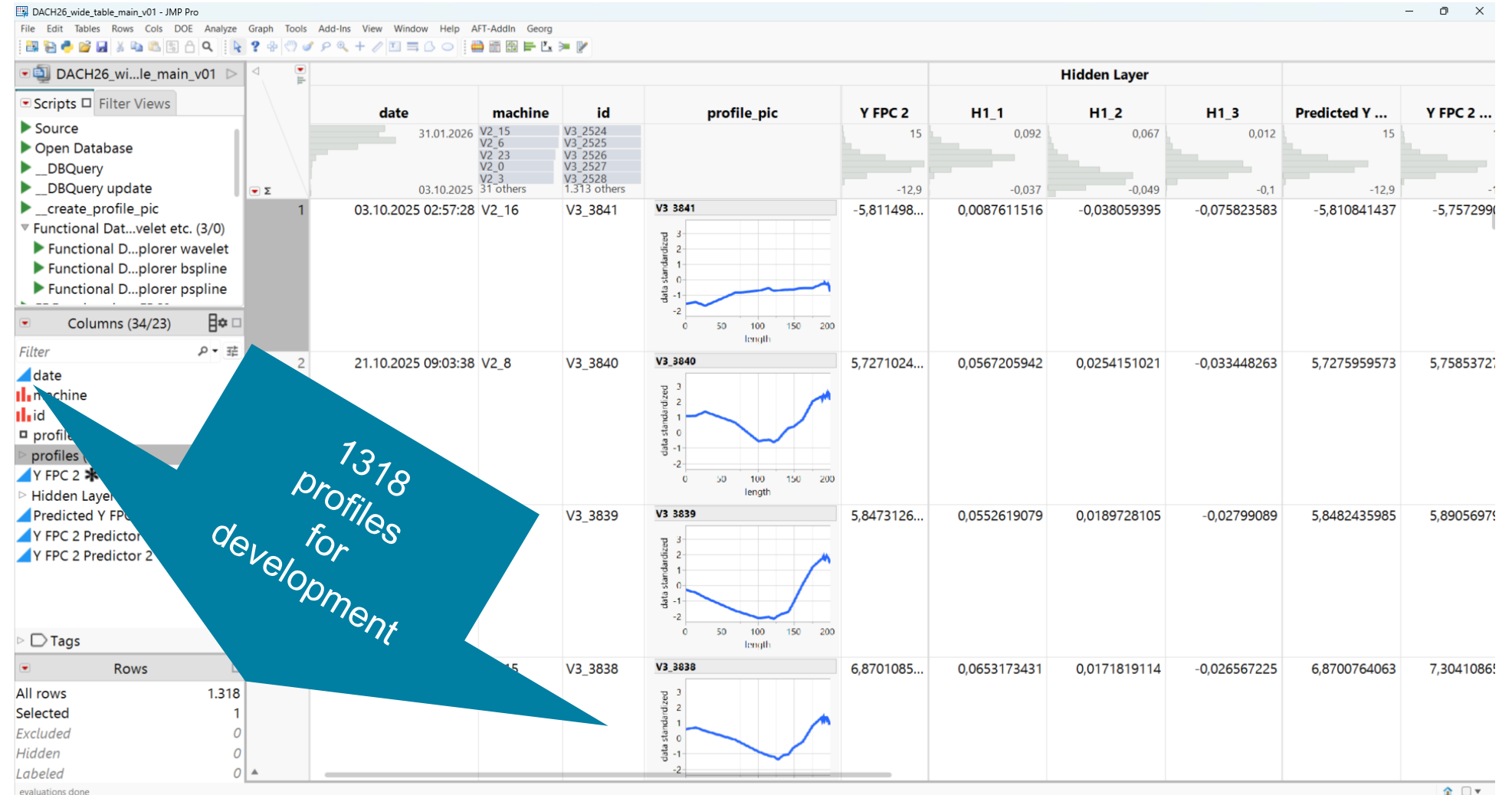
Test of

- Neural
- Boosted Tree
- Bootstrap Forest
- Compare Models

Result

- all models perform well enough
- choosing simplest formula

Saving model formula for curve assessment (w/o) FDE



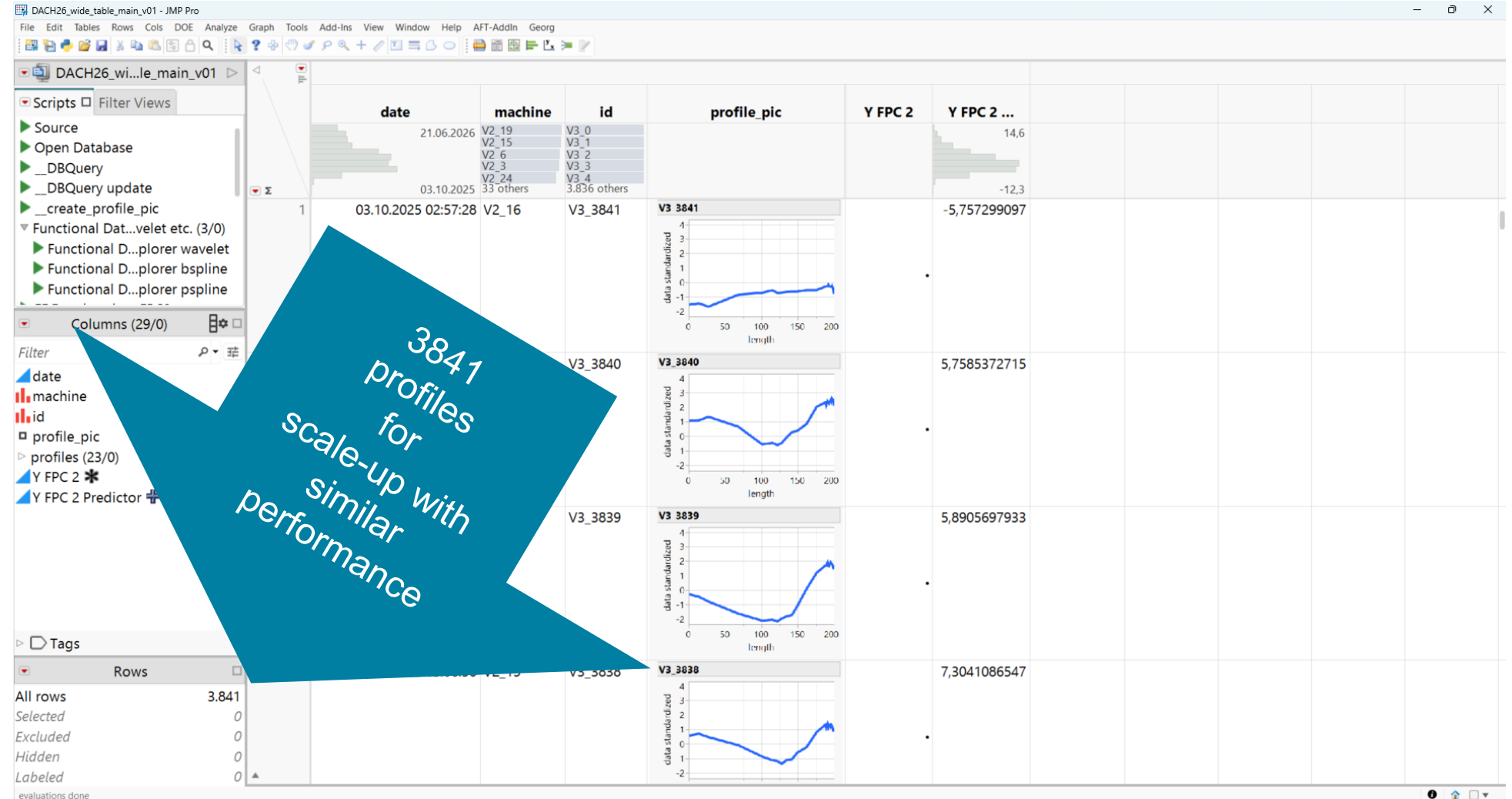
USING FDE WITH WIDE DATATABLE ADDING „Y FPC2“ AS CURVE ASSESSMENT

Request new data from database

- simulation with JMP table instead of database

Using model formula for curve assessment (w/o) FDE

- just application of saved formula in current table on old data and new data
- comparison of formula assessment with png graph to make gross reality check



SUMMARY

Showcase with functional (curve) data

- query from „database“
- dense presentation in wide data table
- with png graph for assessment
- using functional data explorer for curve assessment

Modeling functional data explorer (FDE) result

- testing different types
- comparing
- implementing into wide data table
- for comprehensive use

ACKNOWLEDGEMENT AND REFERENCE

**Thanks
for your
attention!**

Any remarks and questions welcome

References

- [Data Cockpit: Ways to Enrich a Master Table with Additional Data \(2024-EU-30MP-1... - User Community](#)
- [Strategies and Examples for Data Acquisition From Distributed and Complex Source... - JMP User Community](#)
- [How to Enhance Data Analytics Skills by Encouraging JMP in a Company \(2022-EU-30... - JMP User Community](#)
- [Preparing Batch Process Data for Modeling With JMP Pro and Gain Insights Using a... - JMP User Community](#)
- [Scripters Club Recording: Is your SPC Doing Well? - JMP User Community](#)



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