

# Example of Day-to-Day Adoption and Benefits of AI Tools in the Concrete Industry

Giatec

Sarah De Carufel

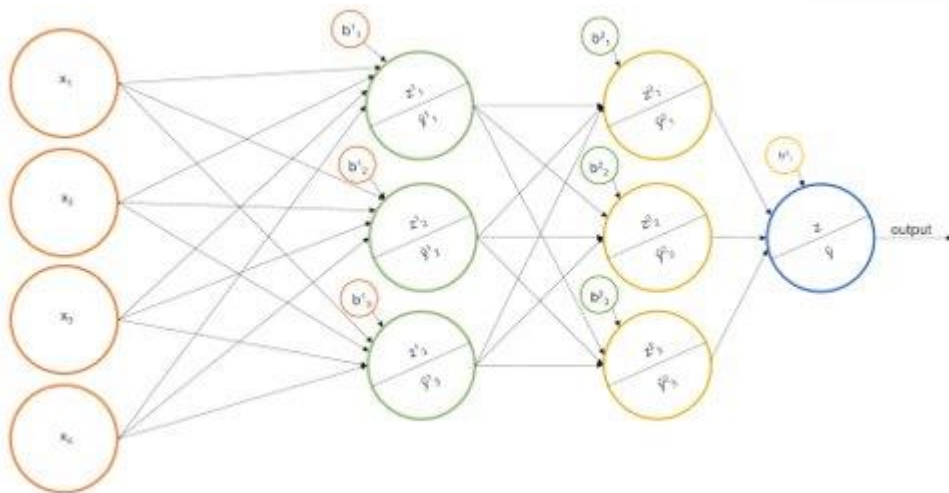
# Agenda

- Introduction
- Examples:
  1. Concrete pouring time detection
  2. Maturity calibration validation and mix performance
  3. Concrete mix optimization
- Conclusion

# Introduction

- Validation
- Alerting
- Suggestion

More tools to  
make decisions !



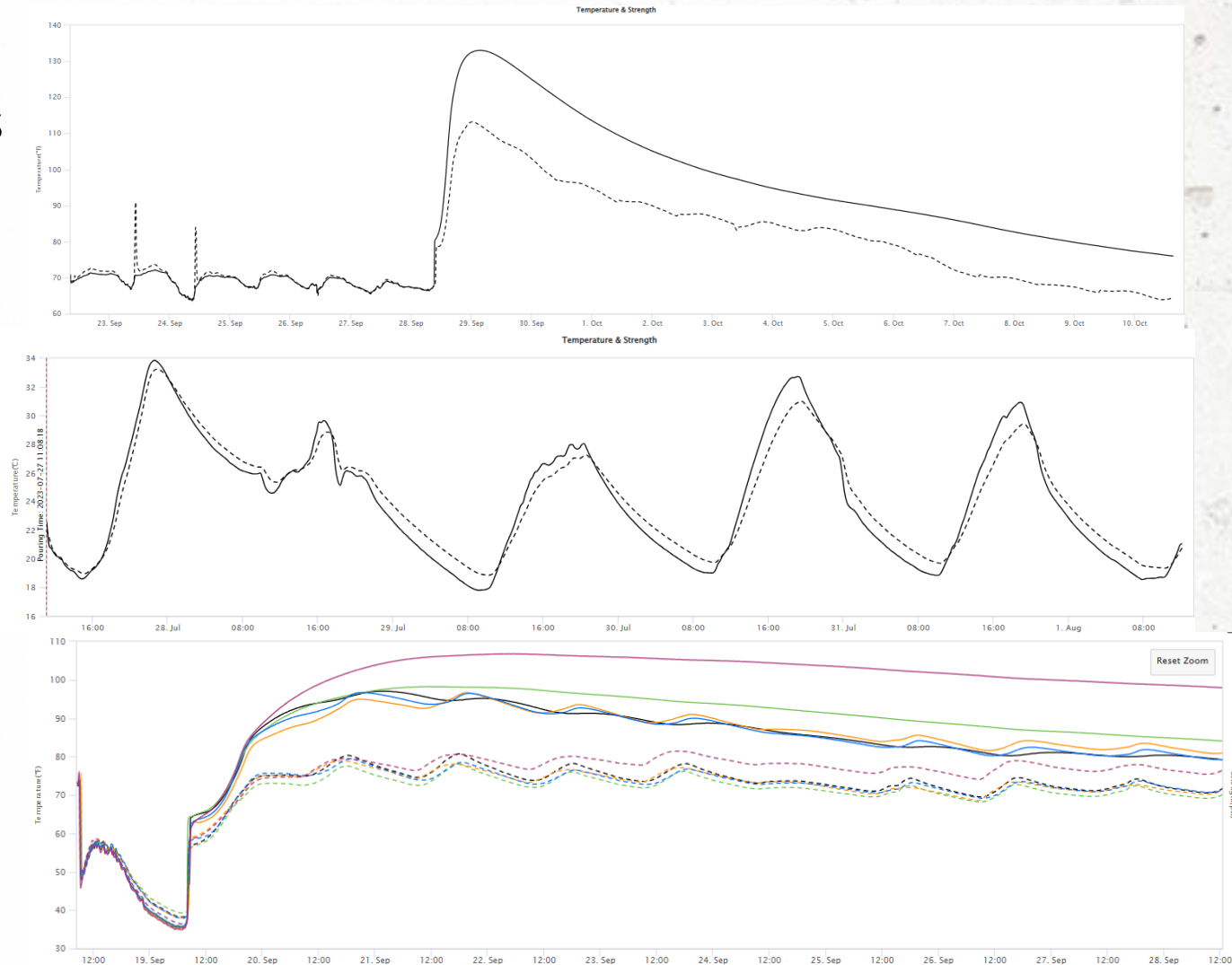
# Concrete pouring time detection

# IOT Sensors & Data Collection

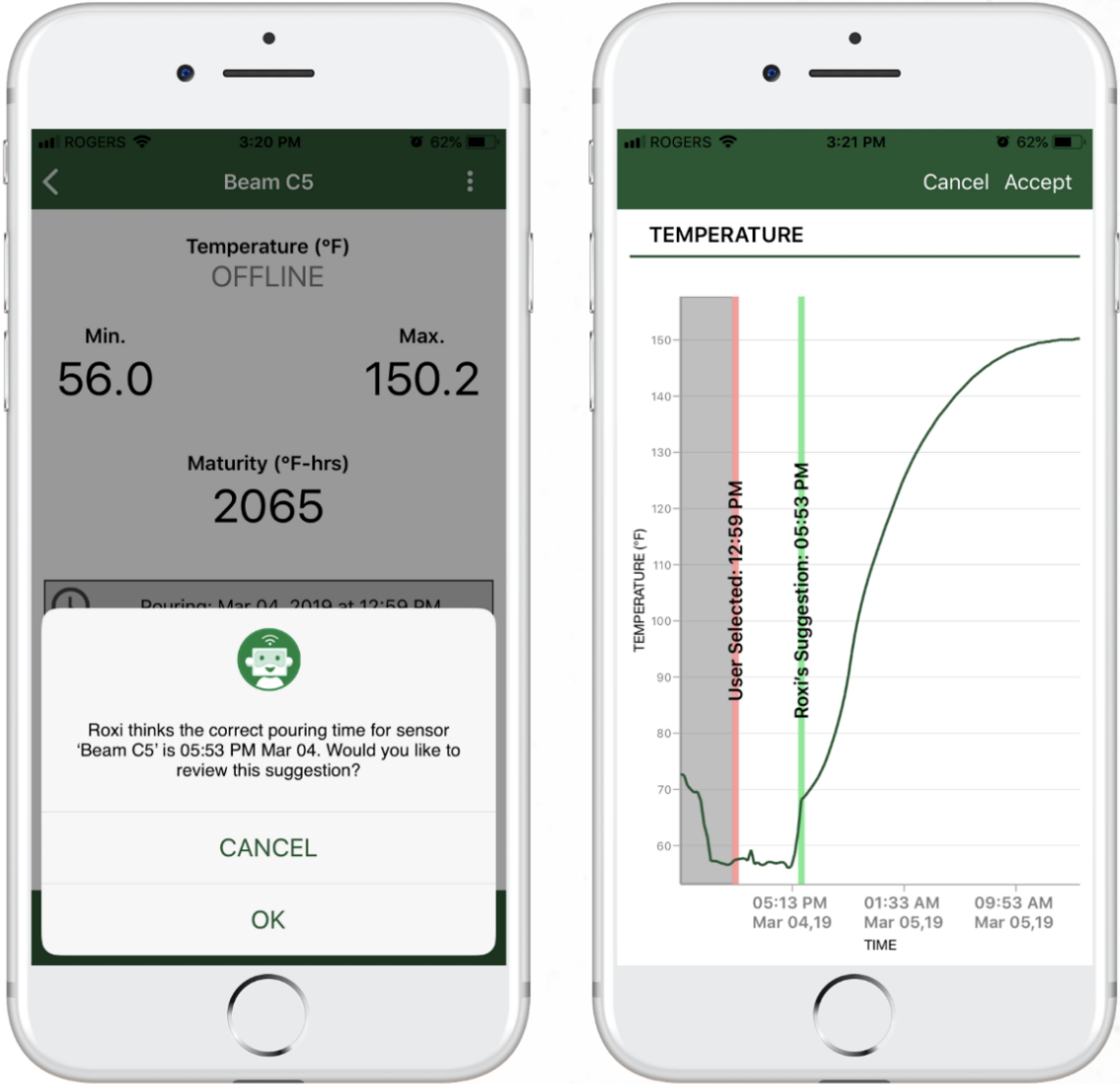
Collection of concrete temperature profiles

**8+ years**

- Different concrete types
- Different weather conditions
- Different type of applications
- Different installation depths
- Worldwide locations (85+ countries)



# Prediction of pouring time, when did the concrete get in contact with the sensor?



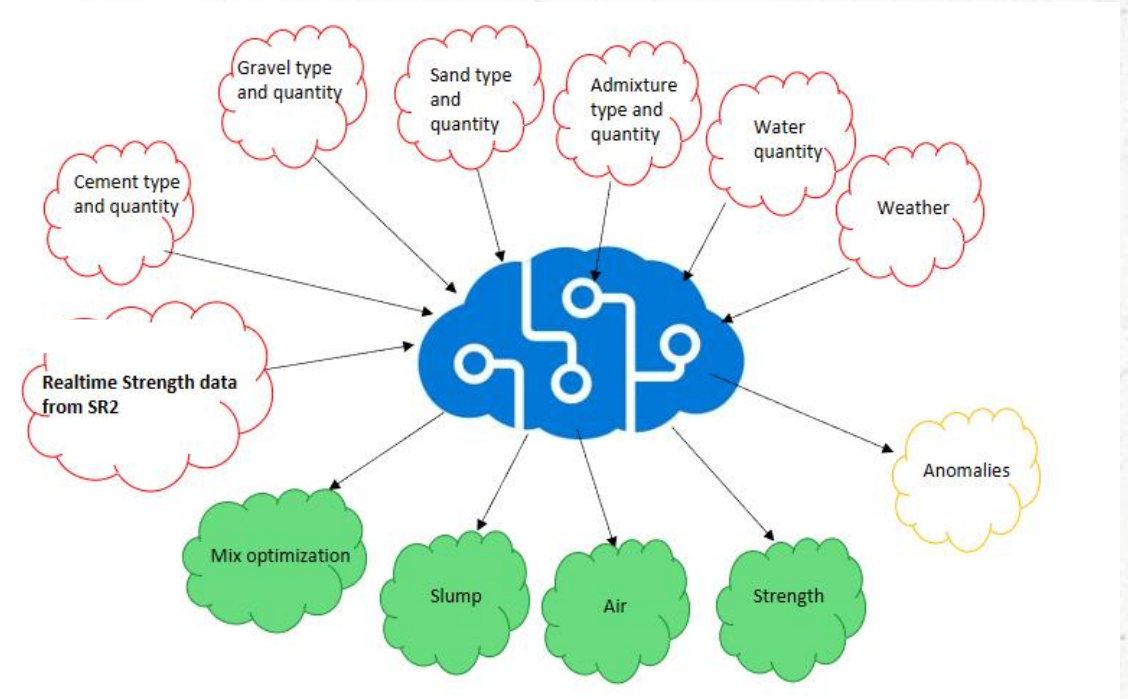
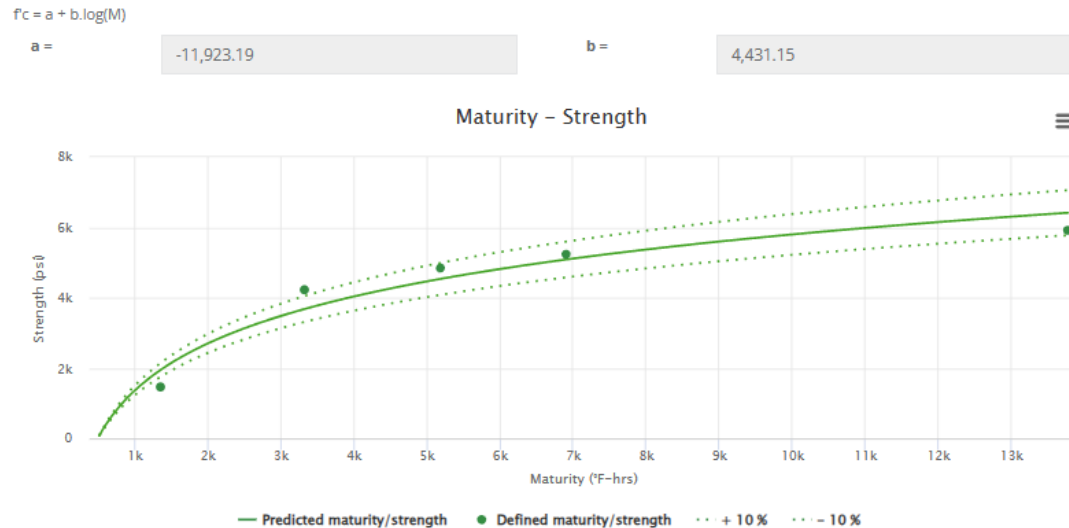
Available for > 4 years



# **Maturity calibration validation and mix performance**


# Performance prediction

- **1000+** Maturity calibrations
- **12+** producer partners



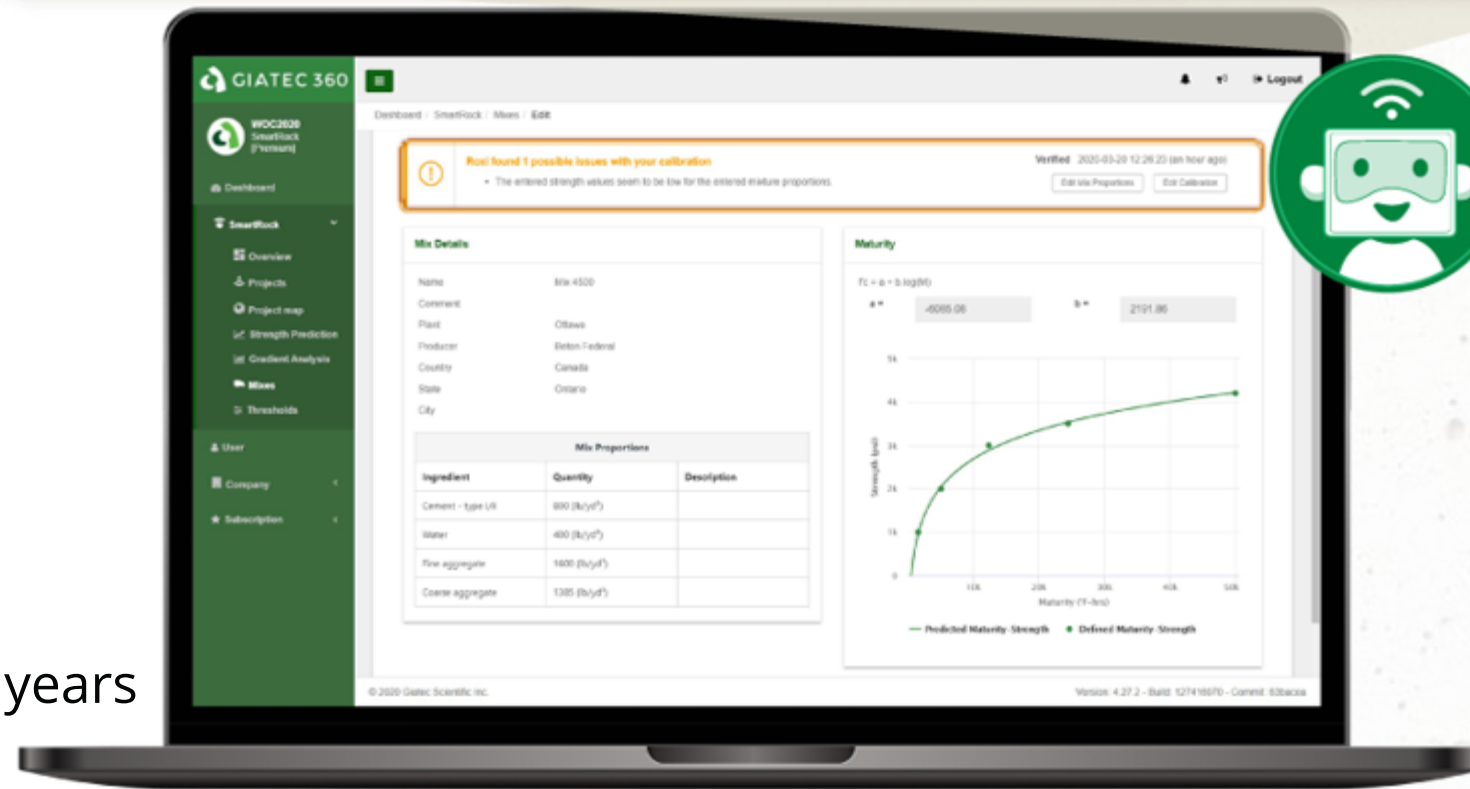


# Is the maturity calibration provided within acceptable range?

 **Roxi found 1 possible issues with your calibration** Verified 2020-03-20 12:26:23 (an hour ago)

- The entered strength values seem to be low for the entered mixture proportions.

[Edit Mix Proportions](#) [Edit Calibration](#)



**Roxi™**

Available for > 3 years

# Suggestion on cement reduction

GIATEC 360

groupowner  
Giatec  
[Premium]

Dashboard / SmartRock / Mixes / Edit

Water lb/yd<sup>3</sup>

Fine aggregate lb/yd<sup>3</sup>

Coarse aggregate lb/yd<sup>3</sup>


**Specified Performance**  
The calculated target strength will be used to optimize your mix proportions

Age	Strength	Safety Margin	Calculated Target Strength
Day(s)	psi	10 %	Enter Safety Margin

Slump in

Air Content %

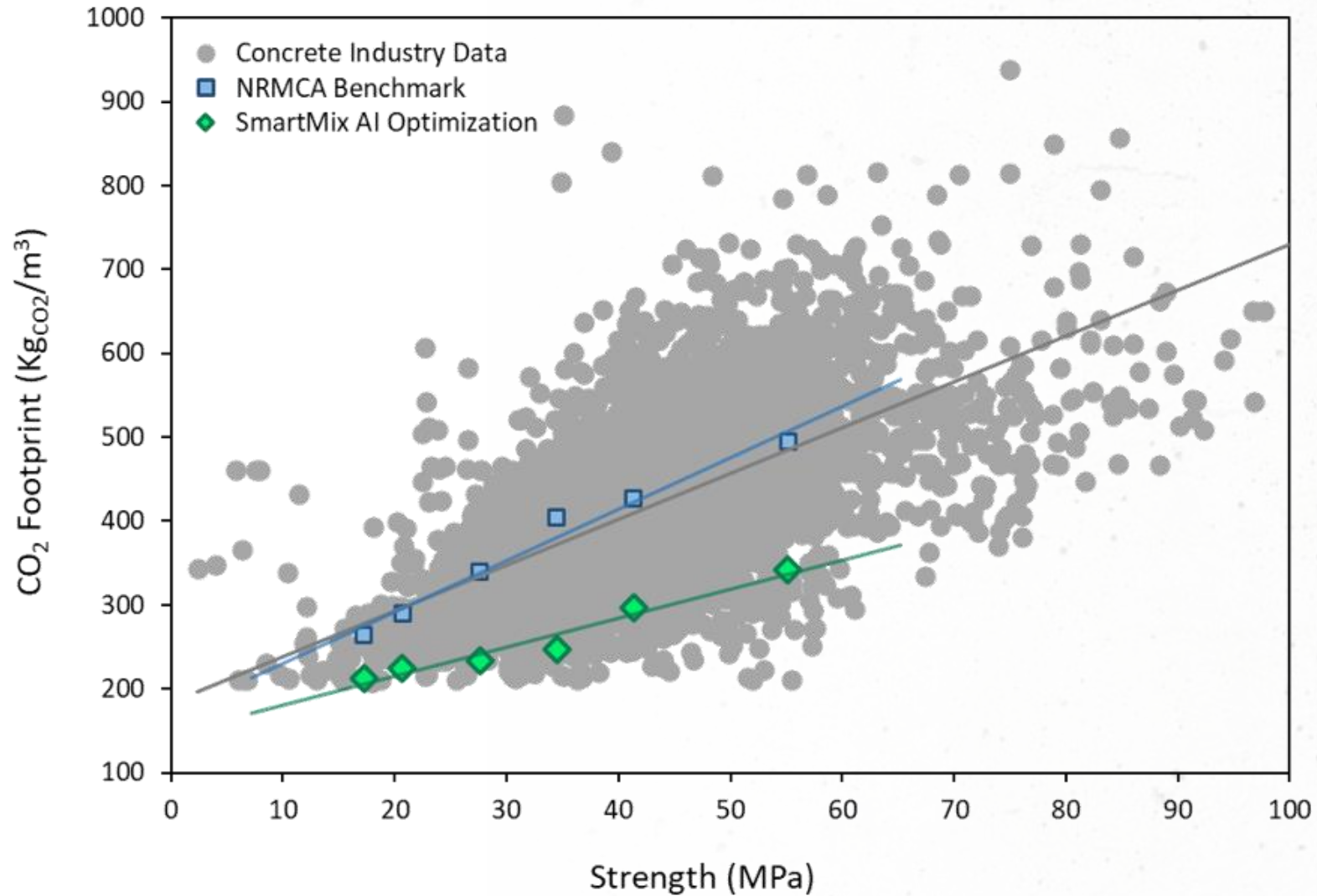
Cancel Back Skip Save

 Your mix calibration looks good.  
Roxi however detected that you can reduce your total cement content by:

- 9% if W/CM is maintained, or
- 3% if water content is maintained

# Concrete mix optimization

# Reducing cement content and Concrete CO2 footprint





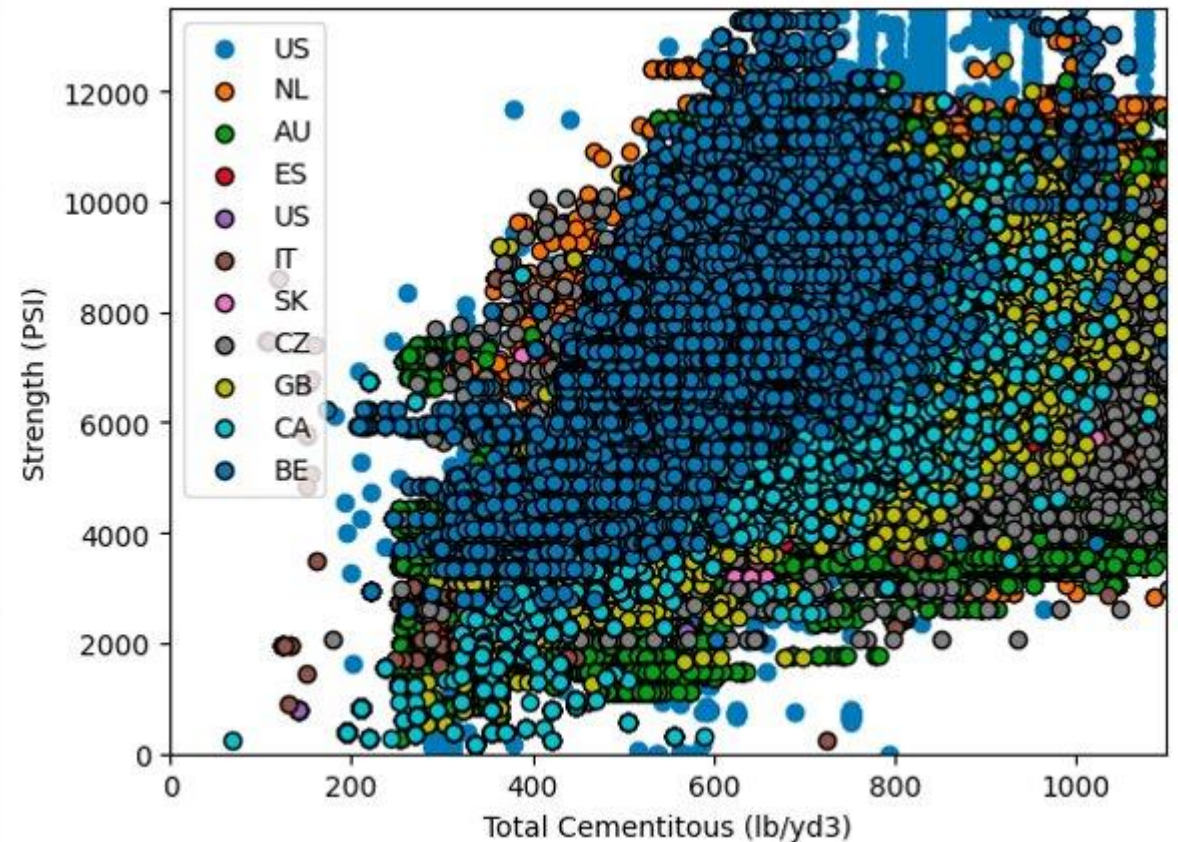
# We came a long way

Algorithms powered by the largest database of concrete performance encompassing:

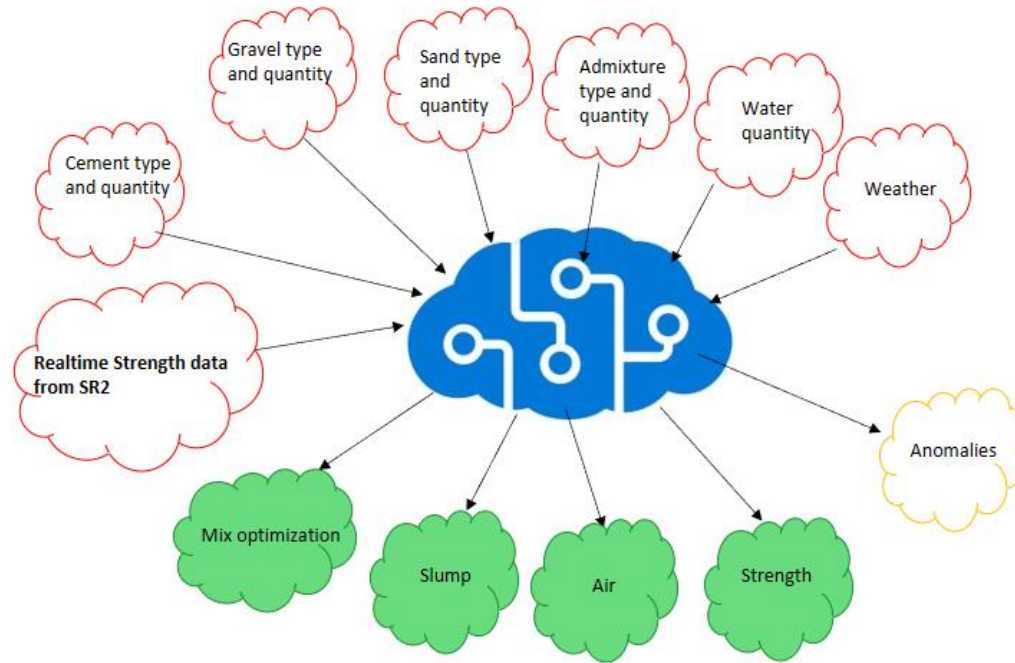
- **200,000+** concrete mixes (**1500+** plants)
- **50M+** concrete deliveries
- **10,000** raw materials
- **20** countries



A very big thank you to all our partners !



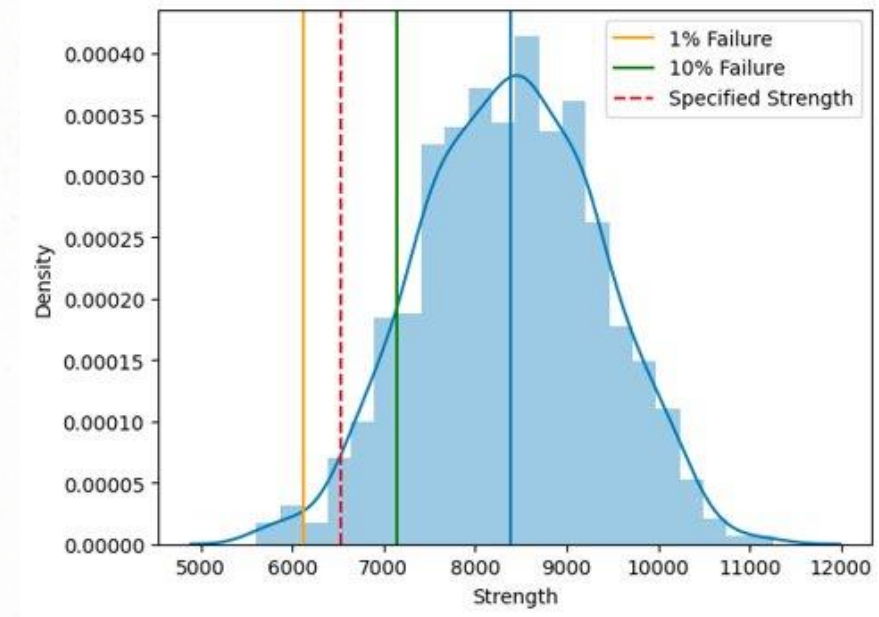




Let's do the reverse !

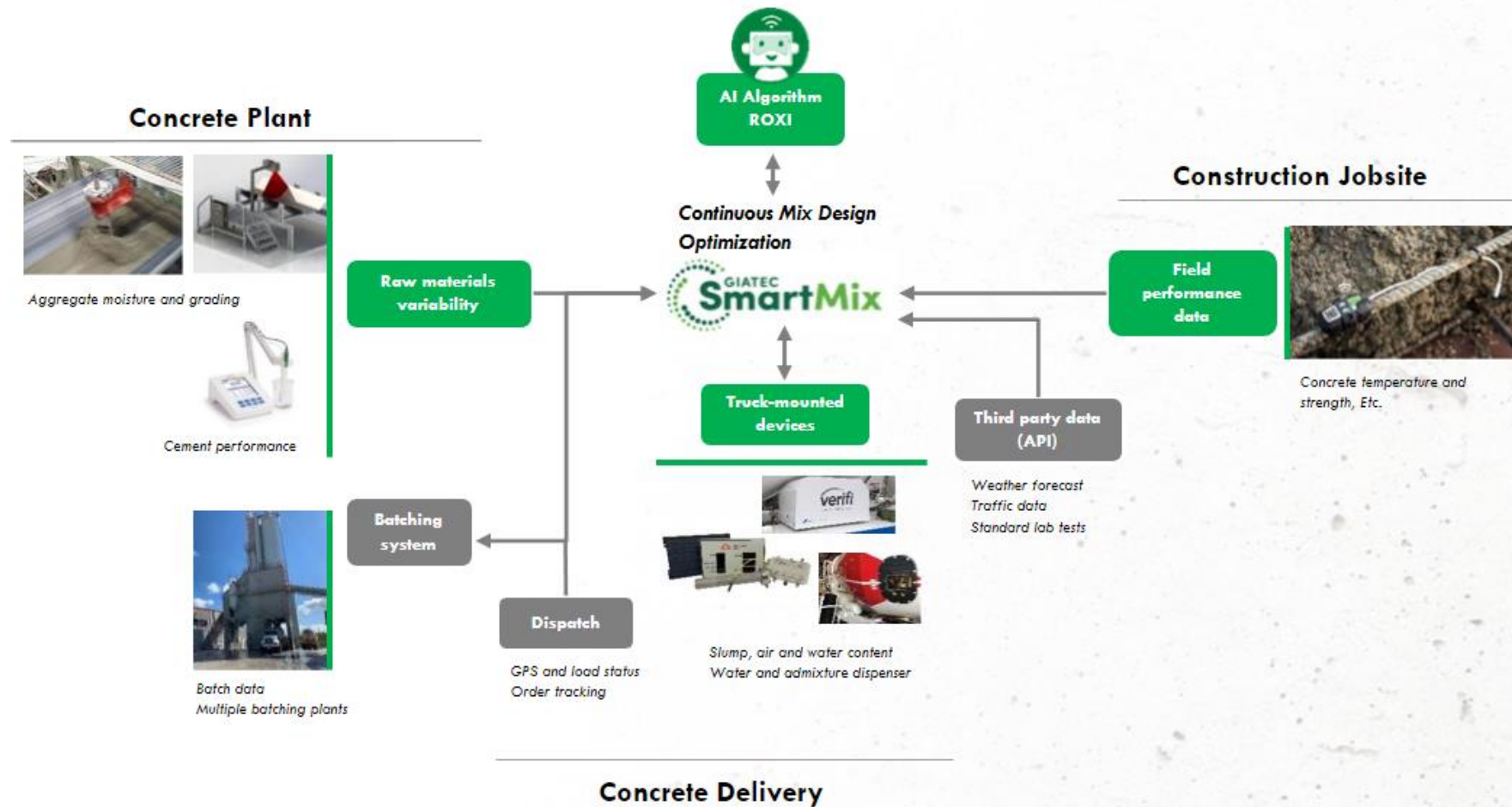
# Concrete Mix Optimization

- Concrete is ordered to meet specific performance criteria
- Concrete mix optimization is very challenging as



- Concrete producers overdose cement by up to **20%** to mitigate the risk

# Real time data collection and mix optimization



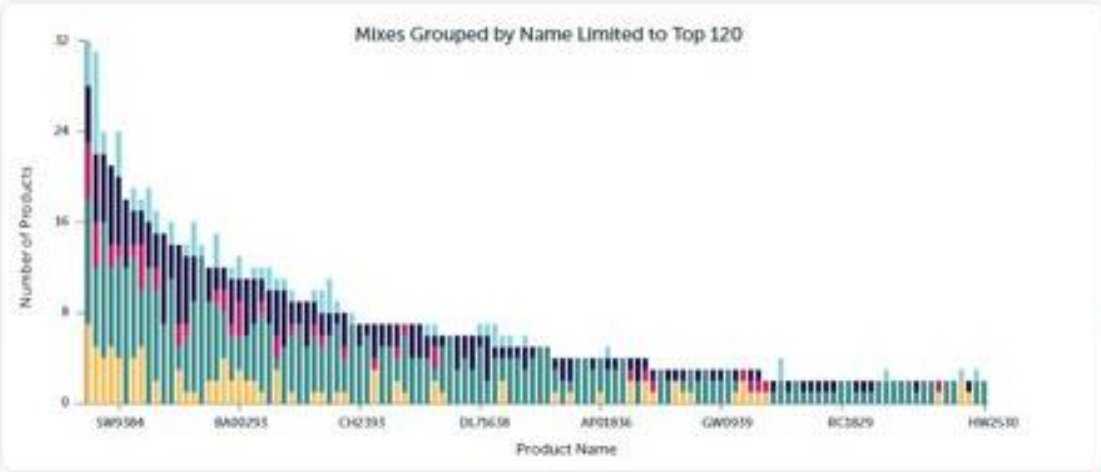


# Opportunity identification and recommendation

## Products

Generate Submittal + Add Product

Search Samples  Batched Last 30 Days   Group By: Product Name



Total Batched <b>2,890</b>	Normal <b>81</b>
Over-Performing <b>557</b>	Under-Performing <b>114</b>
At Risk <b>51</b>	Over-Yielding <b>235</b>

PRODUCT NAME	PLANT NAME	COST(\$/Y <sup>3</sup> )	CO <sub>2</sub> (LBS/Y <sup>3</sup> )	PRODUCTION VOLUME (Y <sup>3</sup> )	OPTIMIZATION	COV	AVG. ACTUAL STRENGTH	# OF TEST SAMPLES	STANDAR
<input type="checkbox"/> Product Name: GW7283 (6)		85.64	553.0	1285.60					
<input type="checkbox"/> 160		84.37	574.10	725.18	-1.5% \$ -5.1% CO <sub>2</sub>	0.12	4154 psi @ 28 Days	11	699
<input type="checkbox"/> 260		91.33	582.12	6554.53	-3.5% \$ -1.1% CO <sub>2</sub>	0.07	4764 psi @ 28 Days	6	450
<input type="checkbox"/> 220		81.86	514.13	22.17	Excluded from optimization	0.01	4450 psi @ 28 Days	12	541
<input type="checkbox"/> 900		92.18	514.13	162.09	-2.3% \$ -1.0% CO <sub>2</sub>	0.03	4346 psi @ 28 Days	12	623
<input type="checkbox"/> 120		82.22	561.15	22746	-3.1% \$ -10.8% CO <sub>2</sub>	0.01	4553 psi @ 28 Days	14	504
<input type="checkbox"/> 140		81.86	513.12	22.17	Excluded from optimization	0.01	4219 psi @ 28 Days	10	614

# Opportunity identification and recommendations

Products / GW7283 / Variant Details

160

🗑️
📄
Push
Save

Revision: Sep 18, 2023 03:30 PM ▾

DETAILS TEST SAMPLES

Plant  
160 ▾

Created: Jun 28, 2023 03:12 PM  
 Created by: Martha Cohen  
 Modified: Sep 18, 2023 03:30 PM  
 Modified by: Martha Cohen  
 Synced: -  
 Synced by: -

### Mix Summary

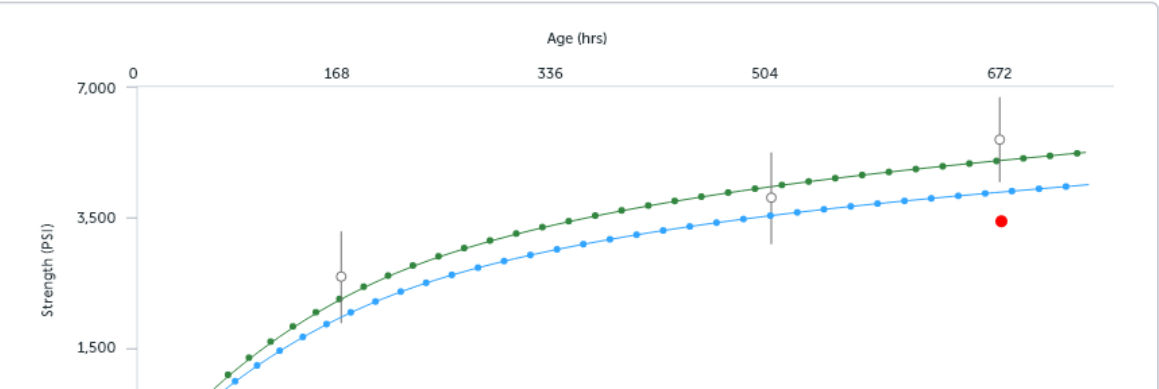
<b>Yield</b> 1.00 m <sup>3</sup>	<b>Volume</b> 0.94 yd <sup>3</sup>	<b>Cost</b> 81.79 yd <sup>3</sup> ↓ - \$2.58 /yd <sup>3</sup>	<b>CO<sub>2</sub></b> 512.0 lbs/yd <sup>3</sup> ↓ - 62.10 lbs /yd <sup>3</sup>
<b>Total Cementitious</b> 564 lbs/yd <sup>3</sup> ↓ - 29.00 lbs/yd <sup>3</sup>	<b>Water/Cementitious</b> 0.45	<b>Fine / Total Aggregate</b> 46.00% ↑ + 1.5 %	<b>SCM / Cementitious</b> 10.00 %

### Optimizations

- Scenario # 1**
🗑️ 🔖  
 -\$1.5% -5% CO<sub>2</sub> ✓  
 Optimize cementitious content while keeping water content the same.
- Scenario # 2**
🗑️ 🔖  
 -\$2.3% -7.7% CO<sub>2</sub> ✓  
 Optimize cementitious content and water content to maintain w/c ratio
- Scenario # 3**
🗑️ 🔖  
 -\$3.1% -10.8% CO<sub>2</sub>  
 Optimize all materials to meet selected criteria

Generate New Scenarios

### Strength





**Thank you!**

**Questions?**