



PRODUCT EXAMPLE REVERSE ENGINEER AN ICE CREAM FORMULA



Pam is a product development specialist. Today, she is developing a prototype ice cream formula based on a competitor's existing formula. Before her company started using TechWizard™ it would take several days or longer to reverse engineer a product. Using TechWizard™ she will be able to develop a comparable product in a fraction of the time. Pam would like to do the following:

- Create a comparable ice cream formula based on information from a competitor's nutrition facts panel and ingredient listing.
- Compare the original formula's nutrition facts information to the new formula.
- Make a sample of her new formula and compare it to the original

Enter Information and Create Comparable Formula

Pam starts by entering the nutrition facts information into TechWizard™ for the product she wishes to reverse engineer. The screen below shows where this information is entered in TechWizard™. She enters the serving size (A) and the Calories per serving (B) in the spaces shown below. She continues entering the information from the nutrition facts panel. TechWizard™ estimates the actual composition based on the rounding rules for reporting data in a nutrition facts panel (C).

The screenshot shows the TechWizard software interface. On the left is a 'Nutrition Facts' panel with the following information:

Nutrition Facts	
Serving Size 1/2 cup (71g)	
Servings Per Container 16	
Amount Per Serving	
Calories 160	Calories from Fat 90
Total Fat 10g 15%	
Saturated Fat 7g 35%	
Cholesterol 55mg 18%	
Sodium 40mg 2%	
Total Carbohydrate 15g 5%	
Protein 3g	
Vitamin A 8%	Vitamin C 0%
Calcium 10%	Iron 0%

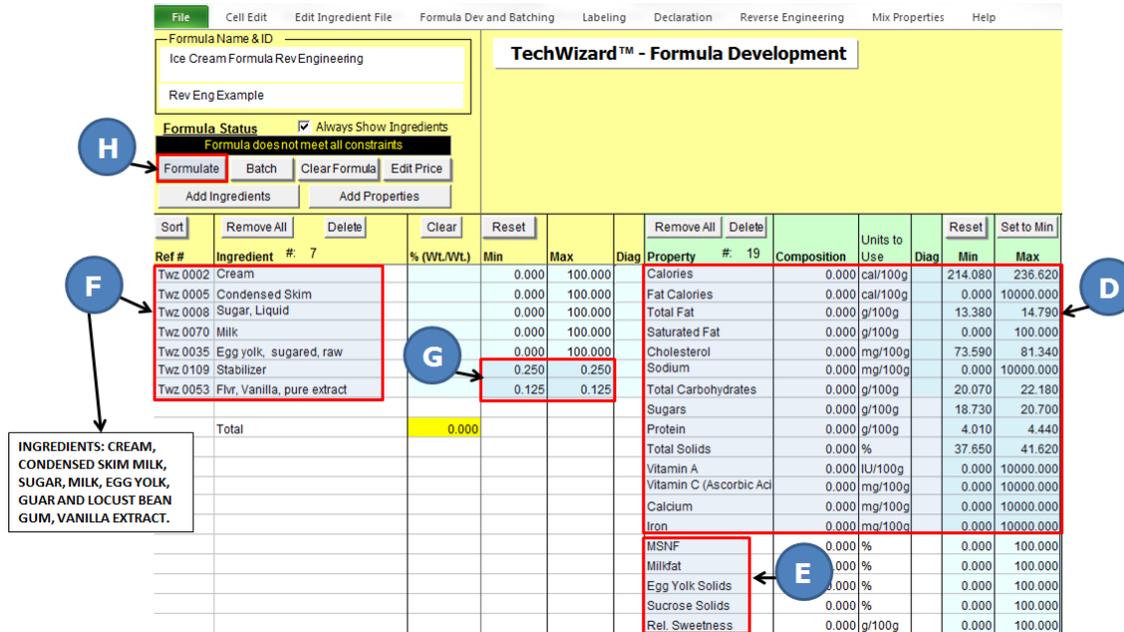
On the right is a data entry table with the following structure:

Amount per Serving		Amount per 100 g	Lower Estimate	Upper Estimate	Units
Calories per serving	160.0	225.35	202.82	247.89	cal/100g
Calories from Fat	90.0	126.76	120.42	133.10	cal/100g
Total Fat (g)	10.0	14.08	13.38	14.79	g/100g
Saturated Fat (g)	7.0	9.86	9.37	10.35	g/100g
Polysaturated Fat (g)		0.00	0.00	0.00	g/100g
Monounsaturated Fat (g)		0.00	0.00	0.00	g/100g
Cholesterol (mg)	55.0	77.46	73.59	81.34	mg/100g
Sodium (mg)	40.0	56.34	53.52	59.15	mg/100g
Potassium (mg)		0.00	0.00	0.00	mg/100g
Total Carbohydrate (g)	15.0	21.13	20.07	22.18	g/100g
Dietary Fiber (g)	0.0	0.00	0.00	0.00	g/100g
Soluble Fiber (g)		0.00	0.00	0.00	g/100g
Insoluble Fiber (g)		0.00	0.00	0.00	g/100g
Sugars (g)	14.0	19.72	18.73	20.70	g/100g
Sugar Alcohol (g)		0.00	0.00	0.00	g/100g
Other Carbohydrate (g)		0.00	0.00	0.00	g/100g
Protein (g)	3.0	4.23	4.01	4.44	g/100g
Estimated Total Solids:		39.6	37.65	41.62	g/100g

Red boxes and letters A, B, and C highlight the following fields:

- A**: Serving Size (71g) in the Nutrition Facts panel and the 'Enter Amount' field for 'Enter Serving Size' in the software.
- B**: Calories (160) in the Nutrition Facts panel and the 'Enter Amount' field for 'Calories per serving' in the software.
- C**: The 'Estimated Total Solids' row in the software table.

TechWizard™ transfers the estimated composition obtained from the nutrition facts panel to the Formula Development section (D). Pam has added a few other properties she would like to follow (E). Pam adds ingredients to the formula based on the ice cream ingredient listing (F). She sets limits on two ingredients that are used in very small amounts (G) and presses the **Formulate** button (H). This instructs TechWizard™ to find the best combination of ingredients to meet all of Pam's compositional requirements.



Formula Name & ID
Ice Cream Formula RevEngineering

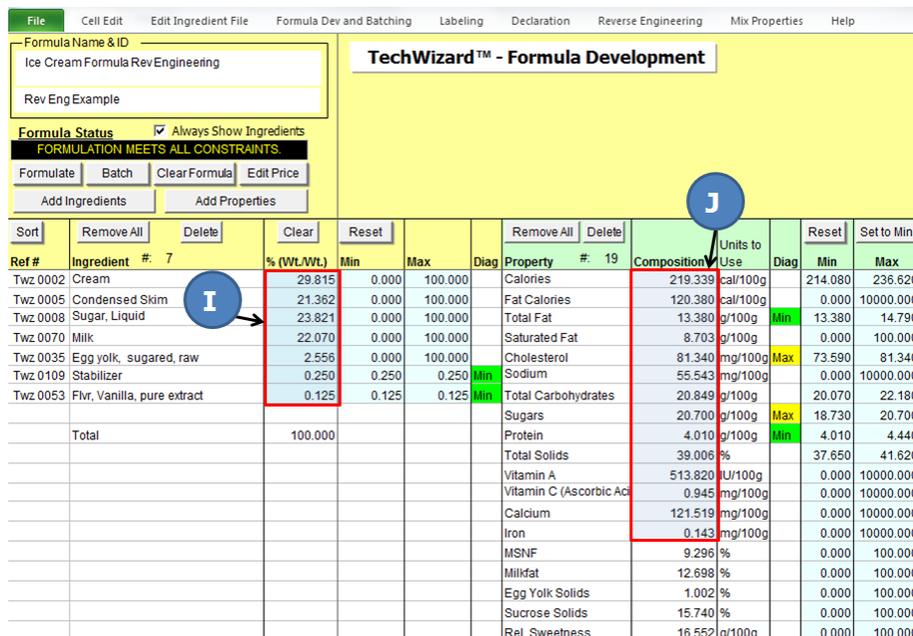
Formula Status Always Show Ingredients
Formula does not meet all constraints

H Formulate **F** Add Ingredients **G** Add Properties

Ref #	Ingredient #	% (WL/WL)	Min	Max	Diag	Property #	Composition	Units to Use	Diag	Min	Max
Twz 0002	Cream		0.000	100.000		Calories	0.000	cal/100g		214.080	236.620
Twz 0005	Condensed Skim		0.000	100.000		Fat Calories	0.000	cal/100g		0.000	10000.000
Twz 0008	Sugar, Liquid		0.000	100.000		Total Fat	0.000	g/100g		13.380	14.790
Twz 0070	Milk		0.000	100.000		Saturated Fat	0.000	g/100g		0.000	100.000
Twz 0035	Egg yolk, sugared, raw		0.000	100.000		Cholesterol	0.000	mg/100g		73.590	81.340
Twz 0109	Stabilizer		0.250	0.250		Sodium	0.000	mg/100g		0.000	10000.000
Twz 0053	Flvr, Vanilla, pure extract		0.125	0.125		Total Carbohydrates	0.000	g/100g		20.070	22.180
Total		0.000				Sugars	0.000	g/100g		18.730	20.700
						Protein	0.000	g/100g		4.010	4.440
						Total Solids	0.000	%		37.650	41.620
						Vitamin A	0.000	IU/100g		0.000	10000.000
						Vitamin C (Ascorbic Acid)	0.000	mg/100g		0.000	10000.000
						Calcium	0.000	mg/100g		0.000	10000.000
						Iron	0.000	mg/100g		0.000	10000.000
						MSNF	0.000	%		0.000	100.000
						Milkfat	0.000	%		0.000	100.000
						Egg Yolk Solids	0.000	%		0.000	100.000
						Sucrose Solids	0.000	%		0.000	100.000
						Rel. Sweetness	0.000	g/100g		0.000	100.000

INGREDIENTS: CREAM, CONDENSED SKIM MILK, SUGAR, MILK, EGG YOLK, GUAR AND LOCUST BEAN GUM, VANILLA EXTRACT.

Below we see the recipe that TechWizard™ came up with (I) and the composition of the formula (J). Pam can now compare the composition of her new formula with that of her original.



Formula Name & ID
Ice Cream Formula RevEngineering

Formula Status Always Show Ingredients
FORMULATION MEETS ALL CONSTRAINTS

I Formulate **J** Add Properties

Ref #	Ingredient #	% (WL/WL)	Min	Max	Diag	Property #	Composition	Units to Use	Diag	Min	Max
Twz 0002	Cream	29.815	0.000	100.000		Calories	219.339	cal/100g		214.080	236.620
Twz 0005	Condensed Skim	21.362	0.000	100.000		Fat Calories	120.380	cal/100g		0.000	10000.000
Twz 0008	Sugar, Liquid	23.821	0.000	100.000		Total Fat	13.380	g/100g	Min	13.380	14.790
Twz 0070	Milk	22.070	0.000	100.000		Saturated Fat	8.703	g/100g		0.000	100.000
Twz 0035	Egg yolk, sugared, raw	2.556	0.000	100.000		Cholesterol	81.340	mg/100g	Max	73.590	81.340
Twz 0109	Stabilizer	0.250	0.250	0.250	Min	Sodium	55.543	mg/100g		0.000	10000.000
Twz 0053	Flvr, Vanilla, pure extract	0.125	0.125	0.125	Min	Total Carbohydrates	20.849	g/100g		20.070	22.180
Total		100.000				Sugars	20.700	g/100g	Max	18.730	20.700
						Protein	4.010	g/100g	Min	4.010	4.440
						Total Solids	39.006	%		37.650	41.620
						Vitamin A	513.820	IU/100g		0.000	10000.000
						Vitamin C (Ascorbic Acid)	0.945	mg/100g		0.000	10000.000
						Calcium	121.519	mg/100g		0.000	10000.000
						Iron	0.143	mg/100g		0.000	10000.000
						MSNF	9.296	%		0.000	100.000
						Milkfat	12.698	%		0.000	100.000
						Egg Yolk Solids	1.002	%		0.000	100.000
						Sucrose Solids	15.740	%		0.000	100.000
						Rel. Sweetness	16.552	g/100g		0.000	100.000



Compare Original Nutrition Information with New Formula

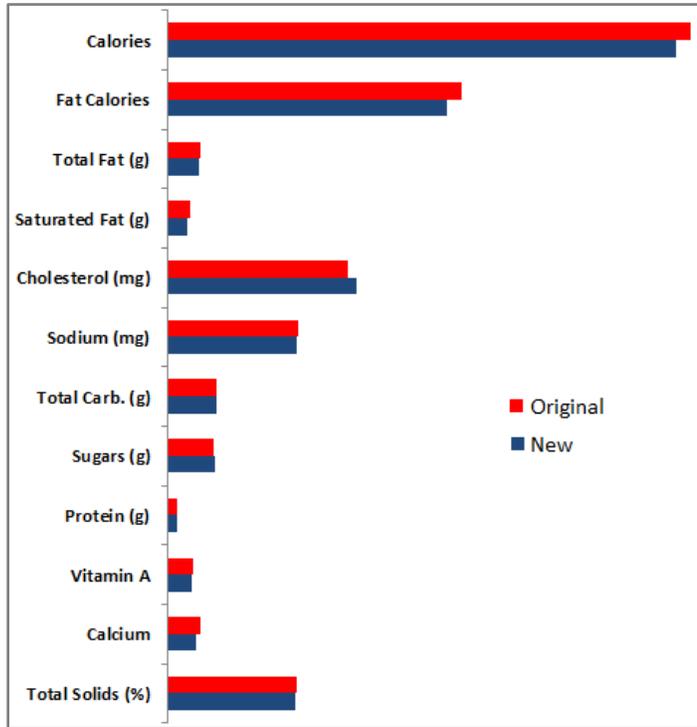
Amount per Serving	Enter Amount	Amount per Serving
Calories per serving	160.0	155.731
Calories from Fat	90.0	85.470
Total Fat (g)	10.0	9.500
Saturated Fat (g)	7.0	6.179
Polyunsaturated Fat (g)		
Monounsaturated Fat (g)		
Cholesterol (mg)	55.0	57.751
Sodium (mg)	40.0	39.435
Potassium (mg)		
Total Carbohydrate (g)	15.0	14.803
Dietary Fiber (g)	0.0	
Soluble Fiber (g)		
Insoluble Fiber (g)		
Sugars (g)	14.0	14.697
Sugar Alcohol (g)		
Other Carbohydrate (g)		
Protein (g)	3.0	2.847
% Daily Value		
Vitamin A	8	7.296
Vitamin C	0	1.119
Calcium	10	8.628
Iron	0	0.566

Pam goes back to the screen where she entered the nutrition facts panel data for the ice cream she is reverse engineering. She did this so she can compare the original information with the data from her new formula. The information for her new formula is displayed on right portion of the screen (K) the original data on the left (J).

Pam finds that all the numbers compare well with each other.

She has decided to export her information to an Excel bar chart to make the comparison easier (shown on right). There are slight differences in calories and some of the others properties which could easily be accounted for by the rounding that occurs when creating a nutrition facts panel or variation in composition data for the ingredients.

At this point Pam feels confident that TechWizard™ has succeeded in providing a prototype formula that closely matches the original ice cream. She saves all her work so she can access it later.





Prepare Batch Sheet

TechWizard™ data show that this formula is slightly sweeter than a typical ice cream although the freezing properties appear to be acceptable. At this point, Pam would like to make a sample of this ice cream and compare it to the original formula. Pam uses the report features in TechWizard™ to create a 1 Liter batch (shown below). TechWizard™ calculated that the overrun of the original formula was 81%. Pam will make sure her finished ice cream sample has the same overrun.

Recipe Formulation			01-Jul-2011 14:41		
Formula For:		Ice Cream Formula Rev Engineering Version 1			
Quantity:		1.086 Kg 1.000 L		Formula ID #: Rev Eng Example	
Ref. #	Ingredient	% Weight	Amount		Amount
Twz 0002	Cream	29.815	323.795 g		0.332 L
Twz 0005	Condensed Skim	21.362	231.997 g		0.209 L
Twz 0008	Sugar, Liquid	23.821	258.704 g		0.197 L
Twz 0070	Milk	22.070	239.684 g		0.232 L
Twz 0035	Egg yolk, sugared, raw	2.556	27.761 g		0.027 L
Twz 0109	Stabilizer	0.250	2.715 g		
Twz 0053	Flvr, Vanilla, pure extract	0.125	1.358 g		0.002 L
TOTAL				1086.014	

Density	1.08601 Kg/L				
Calories	219.339 cal/100g	Cholesterol	81.340 mg/100g	Protein	4.010 g/100g
Fat Calories	120.380 cal/100g	Sodium	55.543 mg/100g	Total Solids	39.006 %
Total Fat	13.380 g/100g	Total Carbohydrates	20.849 g/100g	Vitamin A	513.820 IU/100g
Saturated Fat	8.703 g/100g	Sugars	20.700 g/100g	Vitamin C (Ascorbic Acid)	0.945 mg/100g

Notes: This is the first formula prototype is based on the nutrition facts panel and the ingredient listing.

Versatility

TechWizard™ is a very versatile tool. If she wants, Pam can have chemical analyses done on the ice cream and add that information to TechWizard™ to improve her formula. She can determine raw ingredient costs for a production run. She can create a nutrition facts panel and ingredient listing for her new formula and compare it with information from the original product. She can determine the freezing properties of the new ice cream and estimate how well it will stand up to temperature changes that occur during shipping and handling. Contact us today to find out what TechWizard™ can do for you.