

# *Phrygian thread factory*

## Case Study 3 Analysis - Calculus support sheet

Gestão de Operações e Logística

Cláudia Guedes      up201505409

Eduarda Cunha      up201506524

Francisca Paupério      up201403785

### ***Content***

Table 1

Table 2

Fred and Robert's proposal

Simple Exponential Method

HoltWinters

HoltWinters vs Fred and Robert

Monthly order for NC in pounds								
	2010	2011	2012	2013	2014	2015	2016	2017
January		1340	3690	4110	4500	2600	5330	5140
February		1600	3620	3870	4290	5830	5290	4900
March		1570	3330	3550	4010	5400	4960	4400
April		1360	3120	3420	3830	4210	4730	4090
May		1350	2880	3250	3570	3900	4370	4600
June		1400	2670	2910	3250	3640	4020	4540
July		1610	2790	3080	3520	4010	4020	4930
August		2280	3540	3890	4280	4830	4830	5920
September		2730	3620	4310	4830	5270	4880	6480
October	260	3210	4310	4680	5310	5960	5540	7170
November	550	3350	4200	4660	5180	5830	5430	7080
December	930	3620	4070	4520	5030	5510	5210	6930

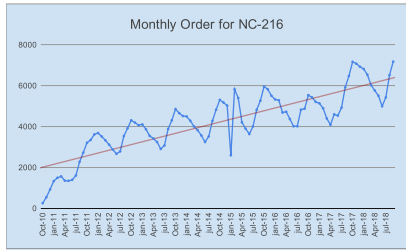
As a matter of policy, no special discounts or sales campaigns have been held for NC-216

Phyrgian dropped NC-336, from their regular product line, retaining it as an option at a price premium

Phyrgian introduced NC-236, identical to NC-216, except with a right hand spin and a left-hand spin

**Notes:**

By going over orders for the last three years, he noticed that each year Non-Specific Motors had placed a larger rush order for NC-216 at about the same time. "Hey, Roy, maybe we could just use last year's figure for a month's demand, plus an inflation factor to get a forecast for the same month this year." "Well, perhaps this forecasting system should have a manual component as well. A place for our intuition to pick up on facts like that."



Auxiliary Table 1	
Date (MM-YY)	Sales amount (£)
Oct-10	260
Nov-10	550
Dec-10	930
Jan-11	1340
Feb-11	1500
Mar-11	1570
Apr-11	1360
May-11	1350
Jun-11	1400
Jul-11	1610
Aug-11	2280
Sep-11	2730
Oct-11	3210
Nov-11	3350
Dec-11	3620
Jan-12	3690
Feb-12	3520
Mar-12	3330
Apr-12	3120
May-12	2880
Jun-12	2670
Jul-12	2790
Aug-12	3540
Sep-12	3920
Oct-12	4310
Nov-12	4200
Dec-12	4070
Jan-13	4110
Feb-13	3870
Mar-13	3550
Apr-13	3420
May-13	3250
Jun-13	2910
Jul-13	3080
Aug-13	3890
Sep-13	4310
Oct-13	4660
Nov-13	4660
Dec-13	4520
Jan-14	4500
Feb-14	4290
Mar-14	4010
Apr-14	3830
May-14	3570
Jun-14	3250
Jul-14	3520
Aug-14	4280
Sep-14	4830
Oct-14	5310
Nov-14	5180
Dec-14	5030
Jan-15	2600
Feb-15	5830
Mar-15	5400
Apr-15	4210
May-15	3900
Jun-15	3640
Jul-15	4010
Aug-15	4830
Sep-15	5270
Oct-15	5960
Nov-15	5830
Dec-15	5510
Jan-16	5330
Feb-16	5290
Mar-16	4690
Apr-16	4730
May-16	4370
Jun-16	4020
Jul-16	4020
Aug-16	4830
Sep-16	4880
Oct-16	5540
Nov-16	5430
Dec-16	5210
Jan-17	5140
Feb-17	4900
Mar-17	4400
Apr-17	4090
May-17	4600
Jun-17	4540
Jul-17	4930
Aug-17	5920
Sep-17	6480
Oct-17	7170
Nov-17	7080
Dec-17	6930
Jan-18	6820
Feb-18	6540
Mar-18	6030
Apr-18	5770
May-18	5510
Jun-18	5200
Jul-18	5430
Aug-18	6520
Sep-18	7180
Oct-18	
Nov-18	
Dec-18	
Jan-19	
Feb-19	
Mar-19	
Apr-19	
May-19	
Jun-19	
Jul-19	
Aug-19	

NC-216 Intro

Strike

NC-336 drop from the regular product line

NC-236 Intro

Fred's forecasts for October 2017 through September 2019			
	2017	2018	2019
January		5983	6796*
February		6767	7481
March		6355	6910
April		6380	6305
May		5326	6116
June		4960	5698
July		5565	6105
August		6646	7350
September	7018	7980	
October	7353	8006	
November	7009	7736	
December	6795	7578	

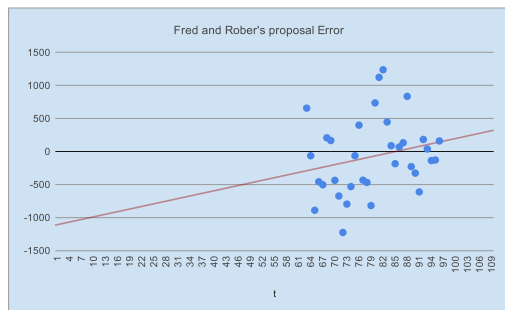
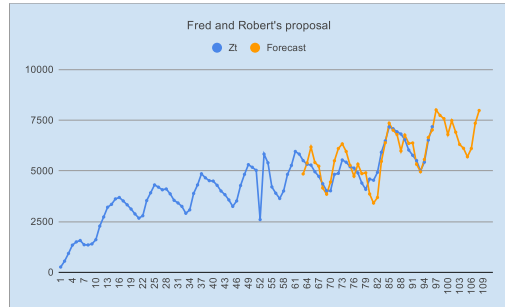
**Notes:**

We need the forecast about three months in advance; that means the first week of October, 2018. Suppose we take the average January demand for the five years preceding and inflate it by a certain percentage. Since we will know October 2018's real demand by then, we will let the inflation percentage be the percentage difference between October 2018's real demand and the five preceding year's average of October demands. Following that procedure, we should be able to develop forecasts for even the next twelve months."

year	t	Zt	Inflation	Forecast	Et (ERROR)	APEt
2010	1	260				
	2	550				
	3	930				
2011	4	1340				
	5	1500				
	6	1570				
	7	1360				
	8	1350				
	9	1400				
	10	1610				
	11	2280				
	12	2730				
	13	3210				
	14	3350				
	15	3620				
2012	16	3690				
	17	3520				
	18	3330				
	19	3120				
	20	2880				
	21	2670				
	22	2790				
	23	3540				
	24	3920				
	25	4310				
	26	4200				
	27	4070				
2013	28	4110				
	29	3870				
	30	3550				
	31	3420				
	32	3250				
	33	2910				
	34	3080				
	35	3890				
	36	4310				
	37	4860				
	38	4660				
	39	4520				
2014	40	4500				
	41	4290				
	42	4010				
	43	3830				
	44	3570				
	45	3250				
	46	3520				
	47	4280				
	48	4830				
	49	5310				
	50	5180				
	51	5030				
2015	52	2600				
	53	5830				
	54	5400				
	55	4210				
	56	3900				
	57	3640				
	58	4010				
	59	4830				
	60	5270				
	61	5960				
	62	5830				
	63	5510	33,50%	4851	659	11,95%
2016	64	5330	66,02%	5392	-62	1,17%
	65	5290	62,49%	6178	-888	16,78%
	66	4960	51,62%	5416	-456	9,19%
	67	4730	64,10%	5232	-502	10,60%
	68	4370	39,14%	4160	210	4,80%
	69	4020	38,86%	3852	168	4,18%
	70	4020	48,37%	4454	-434	10,80%
	71	4830	46,15%	5501	-671	13,90%
	72	4880	44,92%	6104	-1224	25,08%
	73	5540	33,91%	6334	-794	14,33%
	74	5430	28,32%	5959	-529	9,75%
	75	5210	15,86%	5272	-62	1,18%
2017	76	5140	17,12%	4739	401	7,80%
	77	4900	16,93%	5332	-432	8,81%
	78	4400	14,51%	4866	-466	10,60%
	79	4090	27,04%	4906	-816	19,96%
	80	4600	7,46%	3862	738	16,04%
	81	4540	3,53%	3414	1126	24,79%
	82	4930	5,90%	3690	1240	25,16%
	83	5920	27,99%	5470	450	7,60%
	84	6480	37,66%	6390	90	1,39%
	85	7170	41,50%	7353	-183	2,55%
	86	7080	38,51%	7009	71	1,01%
	87	6930	39,60%	6795	135	1,94%
2018	88	6820	37,99%	5983	837	12,27%
	89	6540	39,92%	6767	-227	3,46%
	90	6030	42,36%	6355	-325	5,39%
	91	5770	57,29%	6380	-610	10,56%
	92	5510	35,24%	5326	184	3,35%
	93	5000	35,08%	4960	40	0,80%
	94	5430	42,26%	5565	-135	2,49%
	95	6520	39,92%	6646	-126	1,93%
	96	7180	36,17%	7018	162	2,26%
	97		38,80%	8006		
	98		37,26%	7736		
	99		39,31%	7578		
2019	100		39,31%	6796		
	101		39,31%	7481		
	102		39,31%	6910		
	103		39,31%	6305		
	104		39,31%	6116		
	105		39,31%	5698		
	106		39,31%	6105		
	107		39,31%	7350		
	108		39,31%	7980		
	109					
	110					
	111					

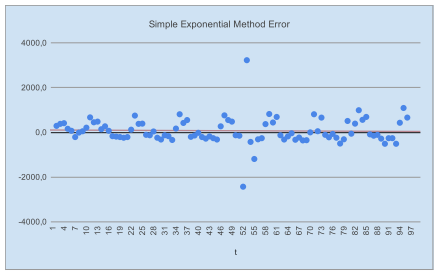
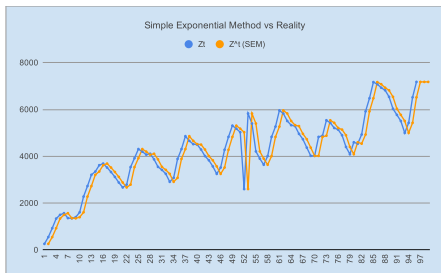
MAPE 4,00%

Fred's forecasts for October 2017 through September 2019			
	2017	2018	2019
January		5983	6796
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October	7353	8006	
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December	6795	7578	



MAPE for $85 \leq t \leq 96$	6,73%
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STDEV											580.6
Moving Average (MA) N=5						Simple Exponential Method (SEM)					
year	t	Zt	n*t	Z*(n)	n*t	Z*(SEM)	Et (ERROR)	ERROR^2	AP/Et	LowerLimit	UpperLimit
2010	1	260			260.0						
	2	550			549.7	260.0	290.0	84100.0	52.7%	-877.9	1397.9
	3	930			929.6	549.7	380.3	144620.5	40.9%	-588.2	549.7
2011	4	1340			1339.6	929.6	410.4	168412.0	30.6%	-208.3	929.6
	5	1500	916.0		1499.8	1339.6	160.4	25731.5	10.7%	-201.7	1339.6
	6	1570	1178.0	916.0	1569.2	1499.8	70.2	4929.25	4.5%	-261.9	1499.8
	7	1360	1340.0	1178.0	1360.2	1569.9	-208.9	44070.5	15.4%	432.0	1569.9
	8	1350	1424.0	1340.0	1350.0	1360.2	-10.2	104.2	0.8%	222.3	1360.2
	9	1400	1436.0	1424.0	1400.0	1350.0	50.0	2499.0	3.6%	212.1	1350.0
	10	1610	1458.0	1436.0	1609.8	1400.0	210.0	44121.0	13.0%	262.1	1400.0
	11	2280	1600.0	1458.0	2279.3	1609.8	670.2	449181.5	29.4%	471.9	1609.8
	12	2730	1874.0	1600.0	2729.5	2279.3	450.7	203103.8	16.5%	1141.2	2279.3
	13	3210	2246.0	1874.0	3209.5	2729.5	480.5	230832.8	15.0%	1591.7	2729.5
	14	3350	2636.0	2246.0	3349.9	3209.5	140.5	19748.4	4.2%	2071.6	3209.5
	15	3620	3038.0	2636.0	3619.7	3349.9	270.1	72975.9	7.5%	2212.0	3349.9
	16	3490	3320.0	3038.0	3489.7	3619.7	70.3	4937.8	1.9%	2481.8	3619.7
	17	3520	3470.0	3320.0	3520.2	3689.9	-168.9	28861.4	4.8%	2552.0	3689.9
	2012	18	3330	3502.0	3478.0	3330.2	3520.2	-190.2	36164.6	5.7%	2382.3
19		3320	3560.0	3502.0	3120.2	3330.2	240.2	44179.9	6.7%	2192.3	3330.2
20		2880	3308.0	3560.0	2880.2	3120.2	-240.2	57700.9	8.3%	1982.3	3120.2
21		2670	3104.0	3308.0	2670.2	2880.2	-210.2	44200.9	7.9%	1742.8	2880.2
22		2790	2958.0	3104.0	2789.9	2670.2	119.8	14349.6	4.3%	1532.3	2670.2
23		3540	3000.0	2958.0	3539.2	2789.9	750.1	562679.7	21.2%	2789.9	2789.9
24		3920	3160.0	3000.0	3919.6	3539.2	380.8	144907.7	9.1%	2401.4	3539.2
25		4310	3440.0	3160.0	4309.6	3919.6	390.4	152391.7	9.1%	2781.7	3919.6
26		4200	3752.0	3440.0	4200.1	4309.6	-109.6	12014.3	3.7%	2917.0	4309.6
27		4070	4008.0	3752.0	4070.1	4200.1	-130.1	16928.5	3.2%	3062.2	4200.1
28		4110	4122.0	4008.0	4110.0	4070.1	39.9	1589.6	1.0%	2932.2	4070.1
29		3870	4112.0	4122.0	3870.2	4110.0	-240.0	57580.9	6.2%	2921.1	4110.0
30		3550	3960.0	4112.0	3550.3	3870.2	-320.2	102553.6	8.0%	2732.4	3870.2
31		3420	3804.0	3960.0	3420.1	3550.3	-130.3	16963.4	3.8%	2412.4	3550.3
32		3250	3640.0	3804.0	3250.2	3420.1	-170.1	28944.3	5.2%	2282.2	3420.1
33	2910	3400.0	3640.0	2910.3	3250.2	-340.2	115715.7	11.7%	2112.3	3250.2	
34	3080	3242.0	3400.0	3079.8	2910.3	169.7	28784.5	5.5%	1772.5	2910.3	
35	3690	3310.0	3242.0	3689.2	3079.8	810.2	656374.9	20.8%	1941.9	3079.8	
36	4510	3488.0	3310.0	4508.2	3689.2	428.8	177081.2	12.6%	2701.3	3689.2	
37	4860	3810.0	3488.0	4859.4	4508.2	550.4	302693.1	11.3%	3171.7	4508.2	
38	4660	4160.0	3810.0	4660.2	4859.4	-199.4	39780.1	4.3%	3721.6	4859.4	
39	4520	4448.0	4160.0	4520.1	4660.2	-140.2	19655.9	3.1%	3522.3	4660.2	
2013	40	4500	4570.0	4448.0	4500.0	4520.1	-20.1	405.6	0.4%	3382.3	4520.1
	41	4290	4566.0	4570.0	4290.2	4500.0	-210.0	44108.5	4.9%	3362.1	4500.0
	42	4010	4396.0	4566.0	4010.3	4290.2	-280.2	78517.7	7.0%	3152.3	4290.2
	43	3830	4330.0	4396.0	3830.2	4010.3	-180.3	32501.0	4.7%	2872.4	4010.3
	44	3590	4040.0	4330.0	3570.3	3830.2	-260.2	67998.8	7.3%	2692.3	3830.2
	45	3250	3740.0	4040.0	3250.3	3570.3	-320.3	102666.6	9.9%	2432.4	3570.3
	46	3570	3636.0	3740.0	3570.7	3250.3	386.7	149477.7	12.3%	3250.3	3250.3
	47	4280	3690.0	3636.0	4279.2	3519.7	760.3	578700.0	17.8%	2381.8	3519.7
	48	4630	3890.0	3690.0	4629.4	4279.2	550.8	303336.9	11.4%	3141.4	4279.2
	49	5310	4238.0	3890.0	5309.5	4629.4	480.6	230929.9	9.0%	3691.6	4629.4
	50	5180	4624.0	4238.0	5180.1	5309.5	-129.5	16775.3	2.5%	4171.6	5309.5
	51	6030	4926.0	4624.0	6030.2	5180.1	-150.1	22538.9	3.0%	4042.2	5180.1
	52	2600	4590.0	4926.0	2602.4	5030.2	-2430.2	5905629.7	93.5%	3892.3	5030.2
	53	5830	4790.0	4590.0	5828.8	2602.4	3227.6	10417207.1	55.4%	1464.5	2602.4
	54	5400	4808.0	4790.0	5400.4	5828.8	-426.8	182134.7	7.9%	4689.9	5828.8
55	4210	4614.0	4808.0	4211.2	5400.4	-1190.4	1417115.9	28.3%	4262.5	5400.4	
56	3900	4388.0	4614.0	3903.3	4211.2	-311.2	96835.5	6.9%	3773.3	4211.2	
57	3640	4596.0	4388.0	3640.3	3903.3	-260.3	67761.9	7.2%	2762.9	3903.3	
2015	58	4010	4232.0	4596.0	4009.6	3640.3	369.7	136707.4	9.2%	2502.4	3640.3
	59	4830	4118.0	4232.0	4829.2	4009.6	820.4	673006.5	17.0%	2871.7	4009.6
	60	5270	4330.0	4118.0	5269.6	4829.2	440.8	194322.6	8.4%	3691.3	4829.2
	61	5960	4742.0	4330.0	5959.3	5269.6	690.4	476708.6	11.6%	4131.7	5269.6
	62	5830	5180.0	4742.0	5830.1	5959.3	-129.3	16721.0	2.2%	4821.4	5959.3
	63	5510	5480.0	5180.0	5510.3	5830.1	-320.1	102482.8	5.8%	4692.2	5830.1
	64	5330	5580.0	5480.0	5330.2	5510.3	-180.3	32515.3	3.4%	4372.4	5510.3
	65	5290	5584.0	5580.0	5290.0	5330.2	-40.2	1614.5	0.8%	4192.3	5330.2
	66	5300	5584.0	5584.0	5300.0	5290.0	-330.0	108900.5	12.9%	4152.2	5290.0
	67	4730	5164.0	5384.0	4730.2	4960.3	-230.3	53051.9	4.9%	3822.4	4960.3
	68	4370	4936.0	5164.0	4370.4	4730.2	-360.2	129766.9	8.2%	3592.3	4730.2
	69	4020	4674.0	4936.0	4020.4	4370.4	-350.4	122752.3	8.7%	3325.5	4370.4
	70	4020	4420.0	4674.0	4020.0	4020.4	-0.4	0.1	0.0%	2882.5	4020.4
	71	4830	4394.0	4420.0	4829.2	4020.0	810.0	660609.4	16.8%	2882.1	4020.0
	72	4880	4424.0	4394.0	4879.9	4829.2	50.8	2581.7	1.0%	3691.3	4829.2
73	5540	4658.0	4424.0	5539.3	4879.9	660.1	435667.1	11.9%	3742.1	4879.9	
74	5430	4940.0	4658.0	5430.1	5539.3	-109.3	11965.2	2.0%	4041.5	5539.3	
2016	75	5210	5178.0	4940.0	5210.2	5430.1	-220.1	48448.1	4.2%	4292.2	5430.1
	76	5140	5240.0	5178.0	5140.1	5210.2	-70.2	4938.9	1.4%	4073.3	5210.2
	77	4920	5244.0	5240.0	4920.2	5140.1	-240.1	57633.7	4.9%	4002.2	5140.1
	78	4400	5016.0	5244.0	4400.5	4900.2	-500.2	250240.1	11.4%	3762.4	4900.2
	79	4090	4748.0	5016.0	4090.3	4400.5	-310.5	96410.4	7.6%	3262.6	4400.5
	80	4600	4626.0	4748.0	4599.5	4090.3	509.7	259783.4	11.1%	2952.4	4090.3
	81	4540	4506.0	4626.0	4540.1	4599.5	-59.5	3539.1	1.3%	3461.6	4599.5
	82	4930	4512.0	4506.0	4929.6	4540.1	389.9	152053.6	7.9%	3402.2	4540.1
	83	5920	4512.0	4512.0	5919.0	4929.6	990.4	980872.2	16.7%	3791.7	4929.6
	84	5480	5294.0	4816.0	5479.4	5919.0	561.0	314710.2	8.7%	4781.1	5919.0
	85	7170	5080.0	5294.0	7169.3	5479.4	690.6	478974.5	9.6%	5341.6	5479.4
	86	6316	5680.0	5080.0	6315.7	7169.3	-85.3	7297.2	0.8%	6031.4	7169.3
	87	6930	5716.0	5616.0	6930.2	7080.1	-150.1	22538.9	2.2%	5942.2	7080.1
	88	6820	5896.0	5716.0	6820.1	6930.2	-110.2	12133.0	1.6%	5792.3	6930.2
	2018	89	6540	5908.0	5896.0	6540.3	6820.1	-280.1	78461.7	4.3%	5682.2
90		6300	6680.0	6908.0	6300.5	6540.3	-510.3	260385.8	8.5%	5024.4	6540.3
91		5770	6148.0	6680.0	5770.3	6030.5	-260.5	67865.6	4.5%	4892.6	6030.5
92		5510	6410.0	6148.0	5510.3	5770.3	-260.3	67735.5	4.7%	4632.4	5770.3
93		5000	5770.0	6134.0	5000.5	5510.3	-510.3	260365.5	10.2%	4372.4	5510.3
94		5430	5548.0	5770.0	5429.6	5000.5	429.5	184461.4	7.9%	3826.6	5000.5
95		6520	5646.0	5548.0	6518.9	5429.6	1090.4	1189036.5	16.7%	4291.7	5429.6
96		7180	5928.0	5646.0	7179.3	6518.9	661.1	437040.6	9.2%	5381.0	6518.9
97											
98											
99											
100											



**Solver Parameters**

Set Objective:

To: ☐ Max ☒ Min ☐ Value Of:

By Changing Variable Cells:

Subject to the Constraints:

- 
- 

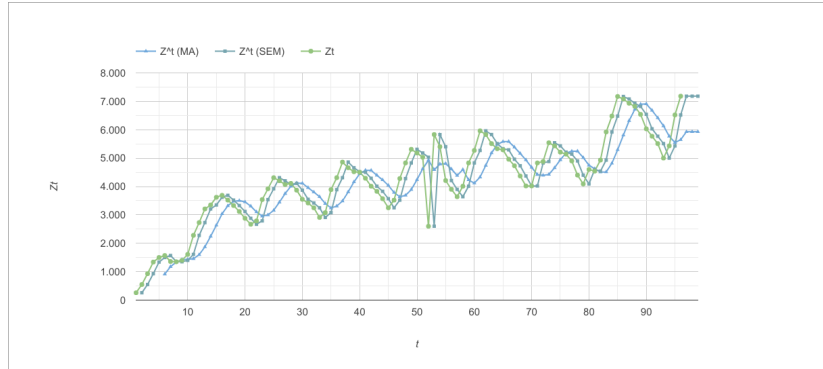
☐ Make Unconstrained Variables Non-Negative

Select a Solving Method:

**Solving Method**

Select the GRG Nonlinear engine for Solver Problems that are smooth nonlinear. Select the LP Simplex engine for linear Solver Problems, and select the Evolutionary engine for Solver problems that are non-smooth.

**Options**



## Exponential Smoothing Holt-Winters - additive model (Seasonality N = 12)

Accuracy			
Standard Statistical Measures			
Mean Error		110.2	MPE -0.30%
Mean Absolute Error		459.1	MAPE 8.48%
Sum of Squared Errors		22360826.2	MAPE for 85<=n<=96 6.10%
Mean Squared Error		310567.0	
Standard Deviation of Errors		691.9	
Standard Deviation of Mean of Errors		75.5	

a	b	g	bs
0.194	0.023	0.699	0.0

		t	Zt	nt	bt	ft	Forecast	Er=Zt-Z*ft	IEr	MeanEr	MeanIEr	Er^2	PE	APE
2010	out	1	1	260			-1146.7							
	nov	2	2	550			-856.7							
	dez	3	3	930			-476.7			DevP Er	SSE			
	jan	4	4	1340			-66.7			691.9	22360826.2			
	fev	5	5	1500			93.3				MSE			
	mar	6	6	1570			163.3				310567.0			
	abr	7	7	1360			-46.7							
	mai	8	8	1350			-56.7							
	jun	9	9	1400			-6.7							
	jul	10	10	1610			203.3							
2011	ago	11	11	2280			873.3							
	set	12	12	2730	1406.7	0.0	1323.3							
	out	1	13	3210	1977.6	13.2	516.8	260.0	2950.0	2950.0		8702500.0	91.9%	91.9%
	nov	2	14	3350	2419.7	23.1	392.9	1134.1	2215.9	2215.9		4909998.2	66.1%	66.1%
	dez	3	15	3620	2762.9	30.5	456.0	1966.1	1653.9	1653.9		2735310.0	45.7%	45.7%
	jan	4	16	3690	2979.8	34.8	475.7	2726.7	963.3	963.3		927886.4	26.1%	26.1%
	fev	5	17	3520	3094.4	36.7	325.7	3108.0	412.0	412.0		169753.7	11.7%	11.7%
	mar	6	18	3330	3138.0	36.8	183.4	3294.4	35.8	35.8		1267.6	0.1%	0.1%
	abr	7	19	3120	3173.2	36.8	-51.2	3128.1	-8.1	8.1		65.8	-0.3%	0.3%
	mai	8	20	2880	3157.1	35.6	-210.8	3153.3	-273.3	273.3		74711.7	-9.5%	9.5%
2012	jun	9	21	2670	3092.8	33.3	-297.6	3186.0	-516.0	516.0		266256.0	-19.3%	19.3%
	jul	10	22	2790	3021.7	30.8	-100.8	3329.4	-539.4	539.4		290942.6	-19.3%	19.3%
	ago	11	23	3540	2977.8	29.1	655.8	3925.8	-385.8	385.8		148873.5	-10.9%	10.9%
	set	12	24	3920	2927.5	27.3	1092.0	4330.3	-410.3	410.3		168332.6	-10.5%	10.5%
	out	1	25	4310	3117.1	31.0	989.6	3471.7	838.3	838.3		702789.1	19.5%	19.5%
	nov	2	26	4200	3275.7	34.0	764.5	3541.0	659.0	659.0		434319.1	15.7%	15.7%
	dez	3	27	4070	3368.6	35.3	627.6	3765.6	304.4	304.4		92656.7	7.5%	7.5%
	jan	4	28	4110	3448.3	36.4	606.0	3880.4	229.6	229.6		52704.4	5.6%	5.6%
	fev	5	29	3870	3496.2	36.6	359.3	3810.4	59.6	59.6		3552.4	1.5%	1.5%
	mar	6	30	3550	3500.7	35.9	89.6	3716.3	-166.3	166.3		27653.9	-4.7%	4.7%
2013	abr	7	31	3420	3523.9	35.6	-88.1	3485.4	-65.4	65.4		4270.9	-1.9%	1.9%
	mai	8	32	3250	3540.4	35.2	-266.5	3348.7	-98.7	98.7		9751.0	-3.0%	3.0%
	jun	9	33	2910	3504.4	33.5	-505.1	3278.0	-368.0	368.0		135391.6	-12.6%	12.6%
	jul	10	34	3080	3468.8	31.9	-302.2	3437.1	-357.1	357.1		127495.3	-11.6%	11.6%
	ago	11	35	3890	3449.1	30.7	505.5	4156.5	-266.5	266.5		71001.6	-6.8%	6.8%
	set	12	36	4310	3429.2	29.6	944.3	4571.8	-261.8	261.8		68555.4	-6.1%	6.1%
	out	1	37	4890	3538.4	31.4	1221.7	4448.3	411.7	411.7		169491.7	8.5%	8.5%
	nov	2	38	4660	3633.8	32.9	948.2	4334.3	325.7	325.7		106083.1	7.0%	7.0%
	dez	3	39	4520	3709.6	33.9	755.4	4293.3	226.7	226.7		51389.6	5.0%	5.0%
	jan	4	40	4500	3772.6	34.5	690.9	4349.4	150.6	150.6		22674.5	3.3%	3.3%
2014	fev	5	41	4290	3831.0	35.1	429.0	4166.4	123.6	123.6		15273.8	2.9%	2.9%
	mar	6	42	4010	3876.6	35.3	120.2	3955.8	54.2	54.2		2941.0	1.4%	1.4%
	abr	7	43	3630	3913.2	35.4	-48.6	3823.9	6.1	6.1		37.6	0.2%	0.2%
	mai	8	44	3570	3926.8	34.9	-329.7	3662.0	-112.0	112.0		12550.6	-3.1%	3.1%
	jun	9	45	3250	3921.7	33.9	-621.6	3456.6	-206.6	206.6		42667.6	-6.4%	6.4%
	jul	10	46	3520	3929.8	33.3	-377.4	3653.5	-133.5	133.5		17814.7	-3.8%	3.8%
	ago	11	47	4280	3926.6	32.5	399.1	4468.7	-188.7	188.7		35592.1	-4.4%	4.4%
	set	12	48	4830	3944.9	32.2	902.9	4903.5	-73.5	73.5		5397.8	-1.5%	1.5%
	out	1	49	5310	3998.6	32.7	1284.4	5198.8	111.2	111.2		12360.1	2.1%	2.1%
	nov	2	50	5180	4070.1	33.6	1061.3	4979.4	200.6	200.6		40226.0	3.9%	3.9%
2015	dez	3	51	5030	4136.7	34.3	851.8	4859.1	170.9	170.9		29207.2	3.4%	3.4%
	jan	4	52	2600	3733.3	24.2	-584.6	4862.0	-2262.0	2262.0		5116434.7	-87.0%	87.0%
	fev	5	53	5830	4075.6	31.6	1355.8	4186.5	1643.5	1643.5		2701207.7	28.2%	28.2%
	mar	6	54	5400	4334.1	36.8	781.5	4227.4	1172.6	1172.6		1375103.5	21.7%	21.7%
	abr	7	55	4210	4356.1	36.5	-127.6	4286.3	-76.3	76.3		5815.7	-1.8%	1.8%
	mai	8	56	3900	4361.1	35.7	-421.5	4062.9	-162.9	162.9		26551.4	-4.2%	4.2%
	jun	9	57	3640	4370.6	35.1	-697.6	3775.2	-135.2	135.2		18276.7	-3.7%	3.7%
	jul	10	58	4010	4402.2	35.0	-387.8	4028.3	-18.3	18.3		335.8	-0.5%	0.5%
	ago	11	59	4830	4436.0	35.0	395.5	4836.4	-6.4	6.4		40.8	-0.1%	0.1%
	set	12	60	5270	4450.9	34.6	844.3	5374.0	-104.0	104.0		10806.7	-2.0%	2.0%
2016	out	1	61	5960	4522.3	35.4	1391.6	5769.9	190.1	190.1		36130.4	3.2%	3.2%
	nov	2	62	5830	4598.5	36.4	1180.3	5618.9	211.1	211.1		44543.1	3.6%	3.6%
	dez	3	63	5510	4639.4	36.5	865.0	5486.7	23.3	23.3		542.7	0.4%	0.4%
	jan	4	64	5330	4915.6	42.0	113.9	4091.2	1238.8	1238.8		1534567.5	23.2%	23.2%
	fev	5	65	5290	4759.5	37.4	778.7	6313.4	-1023.4	1023.4		1047313.7	-19.3%	19.3%
	mar	6	66	4960	4677.3	34.7	432.7	5578.4	-618.4	618.4		382460.0	-12.5%	12.5%
	abr	7	67	4730	4740.1	35.3	-45.5	4584.3	145.7	145.7		21236.2	3.1%	3.1%
	mai	8	68	4370	4778.5	35.4	-412.5	4353.9	16.1	16.1		259.9	0.4%	0.4%
	jun	9	69	4020	4795.3	34.9	-752.0	4116.1	-96.1	96.1		9229.7	-2.4%	2.4%
	jul	10	70	4020	4748.5	33.1	-626.0	4442.5	-422.5	422.5		179499.2	-10.5%	10.5%
2017	ago	11	71	4830	4714.4	31.5	199.8	5177.1	-347.1	347.1		120456.3	-7.2%	7.2%
	set	12	72	4880	4608.4	28.3	443.8	5590.2	-710.2	710.2		504331.2	-14.6%	14.6%
	out	1	73	5540	4542.2	26.1	1116.2	6028.4	-488.4	488.4		238512.7	-8.8%	8.8%
	nov	2	74	5430	4506.7	24.7	1000.6	5748.7	-318.7	318.7		101541.1	-5.9%	5.9%
	dez	3	75	5210	4495.4	23.9	759.9	5396.4	-186.4	186.4		34736.6	-3.6%	3.6%
	jan	4	76	5140	4617.3	26.1	399.7	4633.2	506.8	506.8		256891.3	9.9%	9.9%
	fev	5	77	4960	4542.4	23.8	454.2	5422.2	522.2	522.2		272657.7	-10.7%	10.7%
	mar	6	78	4400	4450.3	21.1	95.0	4969.0	-599.0	599.0		358763.4	-13.6%	13.6%
	abr	7	79	4090	4406.4	19.6	-234.9	4426.0	-336.0	336.0		112874.8	-8.2%	8.2%
	mai	8	80	4600	4539.5	22.3	-81.8	4013.6	586.4	586.4		343882.1	12.7%	12.7%
2018	jun	9	81	4540	4703.1	25.5	-340.2	3809.8	730.2	730.2		533244.0	16.1%	16.1%
	jul	10	82	4930	4888.8	29.2	-159.5	4102.6	827.4	827.4		684567.5	16.8%	16.8%
	ago	11	83	5920	5073.3	32.8	652.2	5117.8	802.2	802.2		643537.6	13.6%	13.6%
	set	12	84	6480	5286.1	37.0	968.3	5549.8	930.1	930.1		865126.9	14.4%	14.4%
	out	1	85	7170	5464.5	40.2	1528.3	6439.3	730.7	730.7		533966.4	10.2%	10.2%
	nov	2	86	7080	5616.0	42.8	1324.7	6505.3	574.7	574.7		330273.8	8.1%	8.1%
	dez	3	87	6930	5757.7	45.1	1048.2	6418.6	511.4	511.4		261509.6	7.4%	7.4%
	jan	4	88	6820	5922.3	47.9	747.9	6202.6	617.4	617.4		381213.5	9.1%	9.1%
	fev	5	89	6540	5986.8	48.2	532.5	6454.4	85.6	85.6		7320.3	1.3%	1.3%
	mar	6	90	6030	6015.7	47.8	36.6	6130.0	-100.0	100.0		999.1	-1.7%	1.7%
2019	abr	7	91	5770	6052.1	47.5	-267.9	5828.5	-58.5	58.5		3426.7	-1.0%	1.0%
	mai	8	92	5510	6001.4	45.3	-368.2	6017.9	-507.9	507.9		257956.2	-9.2%	9.2%
	jun	9	93	5000	5909.9	42.1	-738.6	5706.4	-706.4	706.4		498990.2	-14.1%	14.1%
	jul	10	94	5430	5881.8	40.5	-363.9	5796.2	-362.6	362.6		131416.8	-4.2%	4.2%
	ago	11	95	6520	5911.9	40.2	674.5	6514.5	54.5	54.5		2970.1	0.8%	0.8%
	set	12	96	7180	6002.3	41.4	1114.7	6920.3	299.7	299.7		67426.3	3.6%	3.6%
	out	1	97					7572.0						
	nov	2	98					7409.7						
	dez													

t	Fred's Forecast	HoltWinters
1	7353	6439
2	7009	6505
3	6795	6419
4	5983	6203
5	6767	6454
6	6355	6130
7	6380	5829
8	5326	6018
9	4960	5706
10	5565	5793
11	6646	6574
12	7018	6920
13	8006	7572
14	7736	7410
15	7578	7175
16	6796	6916
17	7481	6742
18	6910	6289
19	6305	6024
20	6116	5965
21	5698	5636
22	6105	6052
23	7350	7079
24	7980	7614

