

WILKINS, A ZURN COMPANY: DEMAND FORECASTING

Professors Carol Prahinski and Eric O. Olsen prepared this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.

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On Monday, January 10, 2005, as Bernie Barge, the newly promoted inventory manager at the Wilkins plant in Paso Robles, California, prepared for the forecasting meeting scheduled for the following day, he wondered if he could find an easier and possibly more reliable means of forecasting the sales demand.

BACKGROUND

Wilkins Regulator Company had built its strength on high-quality products for the plumbing, municipal waterworks, fire production and irrigation customer markets, ranging from water pressure reducing valves and backflow preventers to anti-scald shower valves. The general plumbing customer market represented approximately half of its sales revenue and the irrigation customer market represented approximately a quarter of its sales revenue. Chris Connors, the plant's general manager and Barge's supervisor, had targeted the fire protection and municipal waterworks customers as opportunities for growth.

Zurn Industries acquired Wilkins in 1971. In 1998, Zurn merged with U.S. Industries Bath & Plumbing Products Co., and changed its name to Jacuzzi Brands in 2003. From the most recent Jacuzzi Brands 2004 Annual Report, Barge read:

Demand for our products is primarily driven by new home starts, remodeling and construction activity. Accordingly, many external factors affect our business including weather and the impact of the

broader economy on our end markets. Weather is an important variable for us as it significantly impacts construction. Spring and summer months in the U.S. and Europe represent the main construction season for . . . commercial and industrial markets. As a result, sales in our bath products and plumbing products segments increase significantly in our third and fourth fiscal quarters as compared to the first two quarters of our fiscal year. The autumn and winter months generally impede construction and installation activity.

Our plumbing products business is dependent upon commercial and institutional construction activities and is, therefore, affected by macroeconomic factors, such as the unemployment rate and the availability of financing. Despite the cyclical nature of the U.S. commercial and institutional construction market, which experienced declines in revenue of approximately 14 per cent in fiscal 2002, approximately six per cent in fiscal 2003 and a slight rebound in fiscal 2004, sales of our commercial and institutional products have continued to grow at a rate that exceeds that of the industry. We have achieved this growth through favorable pricing, product innovation and targeted marketing programs.

Connors provided Barge with additional insight into the complexities involved in forecasting demand:

There are lots of uncontrollables. Uncontrollables included the weather, competitors' product introductions and our own product introduction. Sometimes, we cannibalize our own sales — intentionally — and, sometimes, unintentionally. Other influences on the demand include marketing strategies, such as price promotions and, in the irrigation market segment, an early-buy program that encourages customers to place their orders in the early spring.

CURRENT FORECASTING PROCESS: THE FORECAST MASTER

Each quarter, Connors and Rick Fields, the sales/marketing manager, developed the quarterly demand forecasts for each product family. Barge, in his newly created position, would also participate in the forecast development. Based on their knowledge of industry trends, competitive strategies and sales history, they would estimate the sales for the next five or six quarters. Barge commented:

Rather than forecast the total quarterly sales volume for a product family, we forecast the average anticipated sales per week for the quarter for each product family. We have about 25 different

product families and each product family has what we call a planning bill. To start the process, however, we start with what we call the forecast master. The forecast master is a spreadsheet that lists the average weekly sales history for each product family by quarter and year since 1999. For each product family, we divide the total quarter's actual sales by 13 weeks per quarter to determine the average weekly sales per quarter. Then, we plug in our expected demand for the next five or six quarters. These numbers represent our best estimate. This information is then used to calculate the average dollars per unit and average gross profit per unit, which is used by our accounting and finance group to develop various budgets.

A portion of last quarter's forecast master is shown in Exhibit 1 for two product families: Pressure Vacuum Breakers (PVBs) and Fire Valves. PVBs were a type of backflow prevention device, which was designed to prevent the reverse flow of water and other substances into the water source. PVBs were used predominantly by the irrigation market segment.

Fire valves, a type of pressure reducing valve, were designed to reduce or regulate water pressure in residential, commercial and industrial applications. In addition to having just signed on a new customer, Connors anticipated high growth in the fire valve market since Wilkins was introducing a number of new product extensions designed to increase market share. One such product extension was the development of fixed-setting fire valves. Wilkins' current fire valves had adjustable settings, which were set by the installer. Some regulatory agencies, however, were concerned about improper installation or modification to the valves and were now requiring fixed setting valves to improve safety.

CURRENT FORECASTING PROCESS: THE PLANNING BILL

Each product family had its own planning bill. Barge described the planning bill:

There are five important components to each planning bill. First, the planning bill contains the sales history for each product within the family. We have quarterly sales history that goes back to 1989. If I dig into the old files, I can go back even further. Second, for the last four quarters, the planning bill calculates the average number of units sold within that product family each day within each quarter. For example, for our first fiscal quarter of 2005, which started on October 1, 2004, we sold 48,159 units within the PVB product family [as shown in Exhibit 2]. Since the quarter had 58 days, the planning bill will calculate that we sold a daily average of 830 units. We will also calculate the average daily sales for the last four quarters; for the PVBs, it was 1,205.

Third, the planning bill contains our projection on the average daily sales for that family that we think we will sell in the next 12 months. This number came from the forecast master and is one of the key determinants of the forecast by product. With the PVB product family, for example, we think our sales will have a moderate growth rate predominantly due to industry growth and some problems at one of our competitor's manufacturing facilities. Last quarter, we forecasted that we would sell an average of 1,400 units each business day in the next 12 months [as shown in the far right column of Exhibit 3].

Fourth, we disaggregate the family forecast into each product based on the per cent of sales of the product family. To do this, we first calculate the proportion of unit sales that each product currently represents within the family. We call this the "raw per cent." Then, we try to forecast the percent of family sales that the product will represent in the future, which we call the "planning bill per cent." It can get pretty complicated. If we have new products, we have to factor in the effect that they may have on our existing products. Plus, with new products, we also have to project growth without any historical data.

The fifth key piece of information in the planning bill is the calculation of the annual sales forecast for each product within the family. We use a couple of key pieces of information: The planning bill per cent is multiplied by 250 days in a year and by the daily sales forecast for the family, which are 1,400 units in this situation.

The sales history for a select group of products is shown in Exhibit 2. The planning bills for the PVBs and fire valves, as of October 2004, which was the beginning of the 2005 fiscal year, are shown in Exhibit 3 and 4, respectively.

FORECASTING PERFORMANCE

When contemplating the forecast accuracy, Barge said, "I don't have a clue on how well we have been doing. I think we are doing OK at the aggregate level, but we probably have some swings in our accuracy level at the individual product level." For the first quarter of 2005, Connors and Fields had forecasting sales of 53,560 PVB units and 559 fire valve units. According to Exhibit 2, actual sales were 48,159 PVB units and 580 fire valve units.

IMPLEMENTATION CONCERNS

Barge wondered if he could use statistical forecasting methods to ease the forecasting process and perhaps improve the reliability of the sales forecast. If Barge was going to recommend a new forecasting method, he considered how he should gain buy-in from Connors and other managers at the plant. He knew that Connors considered it important to use judgment in developing the sales forecast. For example, if Connors believed that the industry was entering a mild recession, he wanted to make sure the demand forecast reflected the anticipated economic downturn.

Barge also wondered how to incorporate the occasional price promotions that were used to sell off excessive finished goods inventory. He knew that if management reduced the price, Wilkins was going to sell more units and be more competitive.

Barge frequently joked that the fire valves were leading economic indicators. Although he said it jokingly, he wondered if there was some truth in it. Since the product was used in new construction, an increase in product sales would indicate that the construction industry was in an upswing. To help determine the demand forecasts, he wondered if he could use the United States economic information, such as the unemployment rate data (see Exhibit 5), the bank prime loan rates (see Exhibit 6) or the number of new housing starts (see Exhibit 7). Barge knew that less than one per cent of the PVB sales were outside the United States and he didn't remember any fire valves having been sold outside of the United States.

Finally, he wondered how to forecast new products, such as the new fixed-pressure fire valves. Although he could use the historical sales of the adjustable-pressure fire valves, both he and Connors believed that the new fixed-pressure valves would have dramatic growth, which Barge did not think could be captured by the historical sales data of the older products.

As Barge reflected on his preparation for tomorrow's meeting, he wondered what he should recommend to Connors and how to address any potential implementation concerns.

The Wilkins series of cases is dedicated to Dr. Michael F. Pohlen, Professor Emeritus of Operations Management, Alfred Lerner College of Business, University of Delaware.

Exhibit 1

FORECAST MASTER AS OF OCTOBER 7, 2004

WILKINS REGULATOR DIVISION UNIT SALES PER WEEK BY QUARTER
 HISTORY THROUGH Q IV 2004 FORECAST BEGINNING QI 2005
 REVISED OCTOBER 7, 2004 Final FILE: FCSTMASTER

PROD LINE	FISCAL YEAR	Q I	Q II	Q III	Q IV	YEAR TOTAL
PVB	1999	1788	3748	5115	3167	179,634
	2000	2097	4008	5532	3123	191,880
	2001	2116	3523	5921	3374	194,136
	2002	2352	4092	6824	3968	224,072
	2003	2721	4449	7184	4531	245,506
	2004	3029	5786	9451	4231	292,465
	2005	4120	7480	9341	5983	350,012
	2006					
	2007					
	2008					
	2009					
	2010					
FIRE VALVE	1999	36	43	18	13	1,432
	2000	47	32	34	24	1,777
	2001	21	45	19	38	1,608
	2002	36	38	28	43	1,886
	2003	42	27	25	11	1,357
	2004	22	26	28	29	1,371
	2005	43	51	51	51	2,550
	2006					
	2007					
	2008					
	2009					
	2010					

Note: Numbers in **bold** font represent actual weekly unit sales, averaged over the quarter.

Source: Company files.

Exhibit 2

SALES HISTORY FROM THE PLANNING BILLS
(as of January 10, 2005)

Year	Qtr	PVB 12-720	PVB 34-720	PVB 1-720	PVB 34-420	PVB 1-420	Total	Fire Valve Z2105	Fire Valve Z3000	Fire Valve Z3000IL	Fire Valve Z3004	Fire Valve Z3004IL	Total
2001	1	2108	6716	10688	7158	842	27512	122	77	1	20	50	270
2001	2	2516	11510	21688	7034	3050	45798	139	240	0	144	67	590
2001	3	2954	18438	40814	9026	5736	76968	54	138	3	25	32	252
2001	4	2224	10456	19510	7254	4414	43858	78	275	36	59	49	497
2002	1	1788	9464	9824	6968	2536	30580	18	301	-35	48	132	464
2002	2	2512	12942	21848	9156	6740	53198	224	133	0	35	103	495
2002	3	3540	21640	48936	8134	6454	88704	138	175	0	15	42	370
2002	4	3666	11650	24640	6958	4676	51590	193	251	10	50	63	567
2003	1	3546	11270	12400	5208	2948	35372	124	213	2	32	170	541
2003	2	5596	15322	23692	6806	6424	57840	112	150	3	46	40	351
2003	3	5948	19424	47904	10446	9666	93388	25	64	139	26	77	331
2003	4	4892	13310	26990	7960	5754	58906	37	57	3	18	22	137
2004	1	4311	10214	13851	7397	3609	39382	79	108	49	23	26	285
2004	2	6637	20983	31507	9043	7049	75219	71	105	52	26	90	344
2004	3	7823	27492	66644	11233	9676	122868	68	151	2	62	77	360
2004	4	6652	19535	17337	7496	3976	54996	54	114	84	44	86	382
2005	1	6235	28020	11163	384	2357	48159	85	199	140	66	90	580

Note: Data reflects total units sold within the fiscal quarter

Source: Wilkins Plant Data

Exhibit 3

PLANNING BILL FOR PVBS
 (as of October 3, 2004)

WILKINS DIVISION
PLANNING BILL: PVB
 Revised 10/03/04

cc: Steve, Jim, Cyd, Neal, Terri, Ed, Lisa

PART NO	Q I	Q II	Q III	Q IV	RAW	PLAN	FORECAST
	UNIT	UNIT	UNIT	UNIT			12-Month
	SALES	SALES	SALES	SALES			DEMAND
	09/28/03	01/04/04	04/04/04	07/04/04		BILL	
	01/04/04	04/03/04	07/03/04	10/02/04	%	%	1400/DAY
12-720	4311	6637	7823	6652	8.7%	10.6%	37100
34-720	10214	20983	27492	19535	26.7%	25.1%	87850
1-720	13851	31507	66644	17337	44.2%	44.1%	154350
34-420	7397	9043	11233	7496	12.0%	12.0%	42000
1-420	3609	7049	9676	3976	8.3%	8.2%	28700
TOTAL	39382	75219	122868	54996	100.0%	100.0	350000
DAYS	64	65	64	63			250
UNIT/DAY	615	1157	1920	873			1400
TOTAL				292465			350000
DAYS				256			250
UNIT/DAY				1142			1400

Source: Wilkins Plant Data.

Exhibit 4

PLANNING BILL FOR FIRE VALVES
(as of October 12, 2004)

WILKINS DIVISION

cc: Jim, Cyd, Steve, Ed, Terri, Brad, Pete, Lisa

PLANNING BILL: Fire Valves

Revised 10/12/04

PART NO	Q I UNIT SALES	Q II UNIT SALES	Q III UNIT SALES	Q IV UNIT SALES	RAW %	PLAN BILL %	FORECAST
	09/28/03 01/04/04	01/04/04 04/03/04	04/04/04 07/03/04	07/04/04 10/02/04			12-Month DEMAND 10.2/DAY
Z2105	79	71	68	54	19.8%	21.2%	540
Z3000	108	105	151	114	34.9%	38.8%	990
Z3000IL	49	52	2	84	13.6%	11.8%	300
Z3004	23	26	62	44	11.3%	8.2%	210
Z3004IL	26	90	77	86	20.4%	20.0%	510
TOTAL	285	344	360	382	100.0%	100.0	2,550
DAYS	64	65	64	63			250
UNIT/DAY	4	5	6	6			10.2
TOTAL				1371			2550
DAYS				256			250
UNIT/DAY				5			10.2

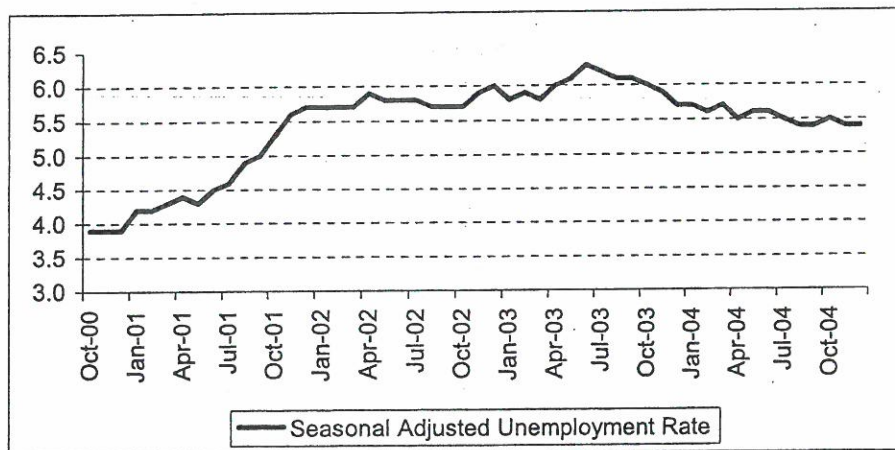
Source: Company files.

Exhibit 5

UNEMPLOYMENT RATE IN THE UNITED STATES

	Unemployment Rate (%)
Oct-Dec 2000	3.90
Jan-Mar 2001	4.23
Apr-Jun 2001	4.40
Jul-Sep 2001	4.83
Oct-Dec 2001	5.53
Jan-Mar 2002	5.70
Apr-Jun 2002	5.83
Jul-Sep 2002	5.73
Oct-Dec 2002	5.87
Jan-Mar 2003	5.83
Apr-Jun 2003	6.13
Jul-Sep 2003	6.13
Oct-Dec 2003	5.87
Jan-Mar 2004	5.67
Apr-Jun 2004	5.57
Jul-Sep 2004	5.43
Oct-Dec 2004	5.43

United States Unemployment Rate



Note: Data reflects the seasonal adjusted unemployment rate for people 16 years and over. The quarterly data represents the unweighted average of the monthly data.

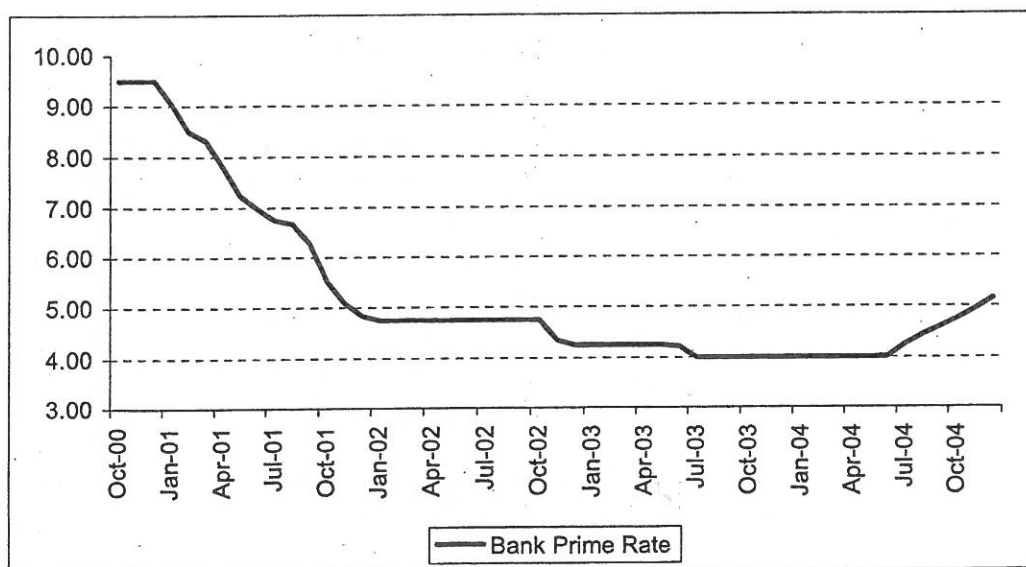
Source: U.S. Department of Labor, Bureau of Labor Statistics.

Exhibit 6

BANK PRIME LOAN RATE IN THE UNITED STATES

	Bank Prime Loan Rate (%)
Oct-Dec 2000	9.50
Jan-Mar 2001	8.62
Apr-Jun 2001	7.34
Jul-Sep 2001	6.57
Oct-Dec 2001	5.16
Jan-Mar 2002	4.75
Apr-Jun 2002	4.75
Jul-Sep 2002	4.75
Oct-Dec 2002	4.45
Jan-Mar 2003	4.25
Apr-Jun 2003	4.24
Jul-Sep 2003	4.00
Oct-Dec 2003	4.00
Jan-Mar 2004	4.00
Apr-Jun 2004	4.00
Jul-Sep 2004	4.42
Oct-Dec 2004	4.94

Rate of Interest in Money and Capital Markets



Note: Figures are based on the rate posted by majority of top 25 (by assets in domestic offices) insured U.S.-chartered commercial banks. Prime is one of several base rates used by banks to price short-term business loans. Not seasonally adjusted. Quarterly figures are based on the unweighted average of the monthly rates, which include each calendar day in the month.

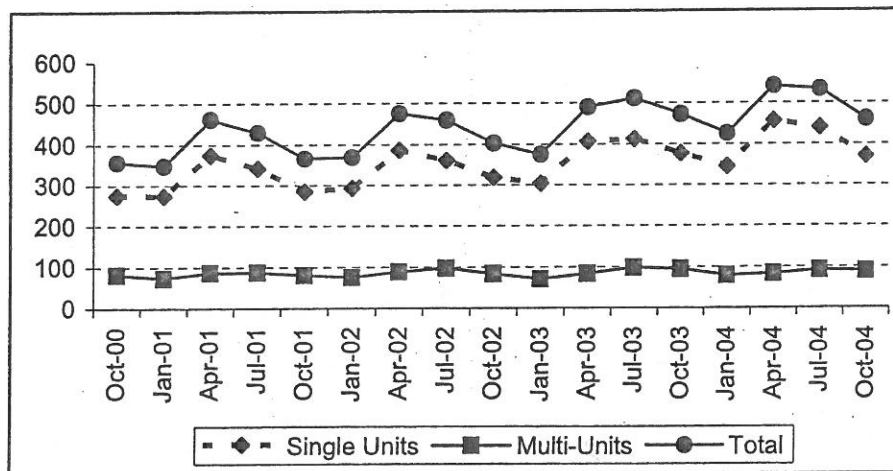
Source: Federal Reserve Statistical Release, H.15, Selected Interest Rates.

Exhibit 7

NEW PRIVATELY OWNED HOUSING UNITS STARTED IN THE UNITED STATES
(in 000s)

	Single-Unit Housing Starts	Multi-Unit Housing Starts	Total Housing Starts
Oct-Dec 2000	275	82	357
Jan-Mar 2001	274	74	348
Apr-Jun 2001	374	87	461
Jul-Sep 2001	341	88	429
Oct-Dec 2001	285	81	366
Jan-Mar 2002	293	76	369
Apr-Jun 2002	386	89	475
Jul-Sep 2002	361	98	459
Oct-Dec 2002	319	84	403
Jan-Mar 2003	304	71	375
Apr-Jun 2003	406	84	490
Jul-Sep 2003	412	99	511
Oct-Dec 2003	377	95	472
Jan-Mar 2004	345	80	425
Apr-Jun 2004	456	84	540
Jul-Sep 2004	440	92	532
Oct-Dec 2004	370	90	460

New Privately Owned Housing United Started



Source: U.S. Census Bureau: Manufacturing, Mining and Construction Statistics