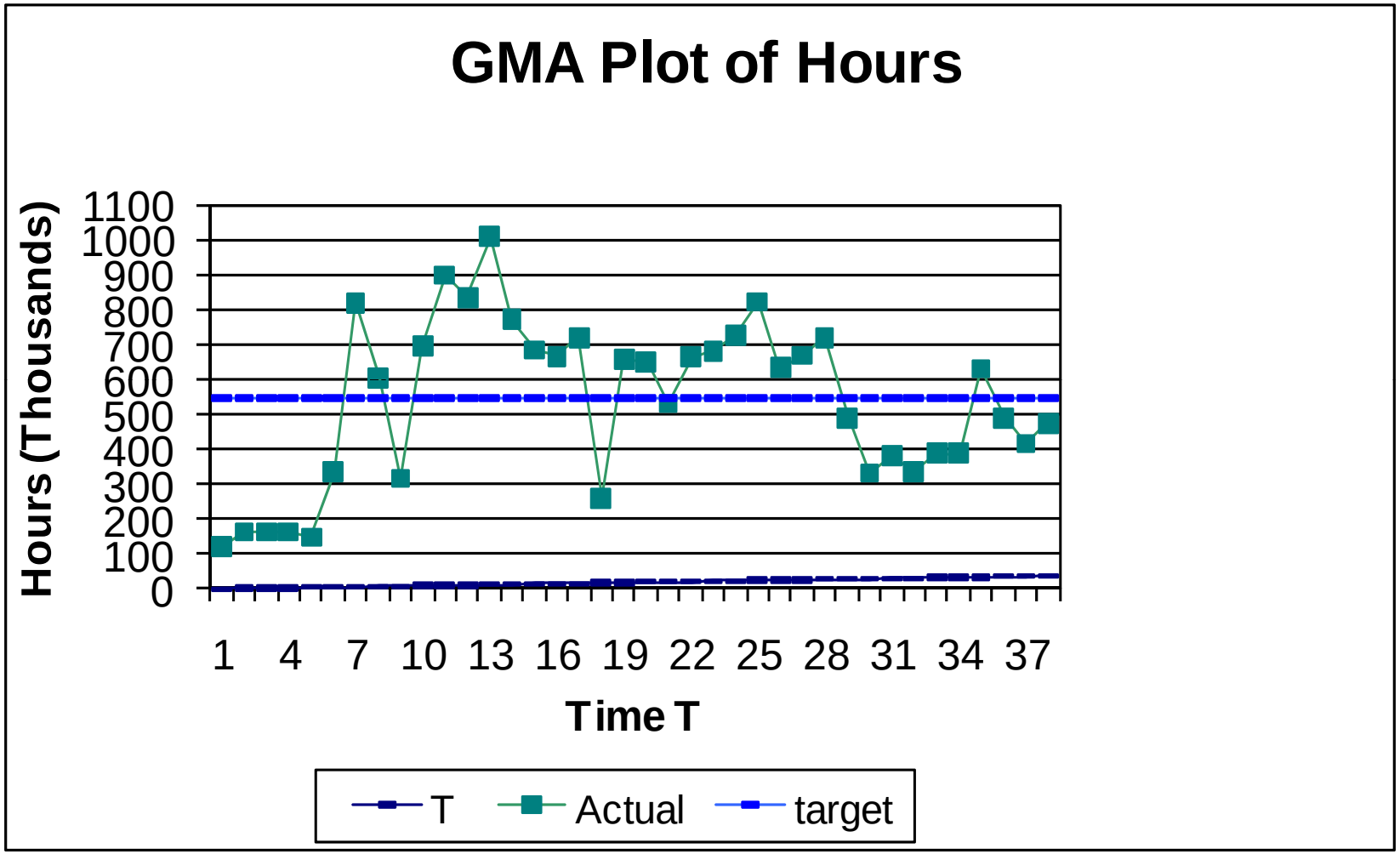

GMA Plot of Hours
Hours (Thousands)
1100
1000
900
800
700
600
500
400
300
200
100
0
1
4
7
10
13
16
19
22
25
28
31
34
37
Time T
T
Actual
target

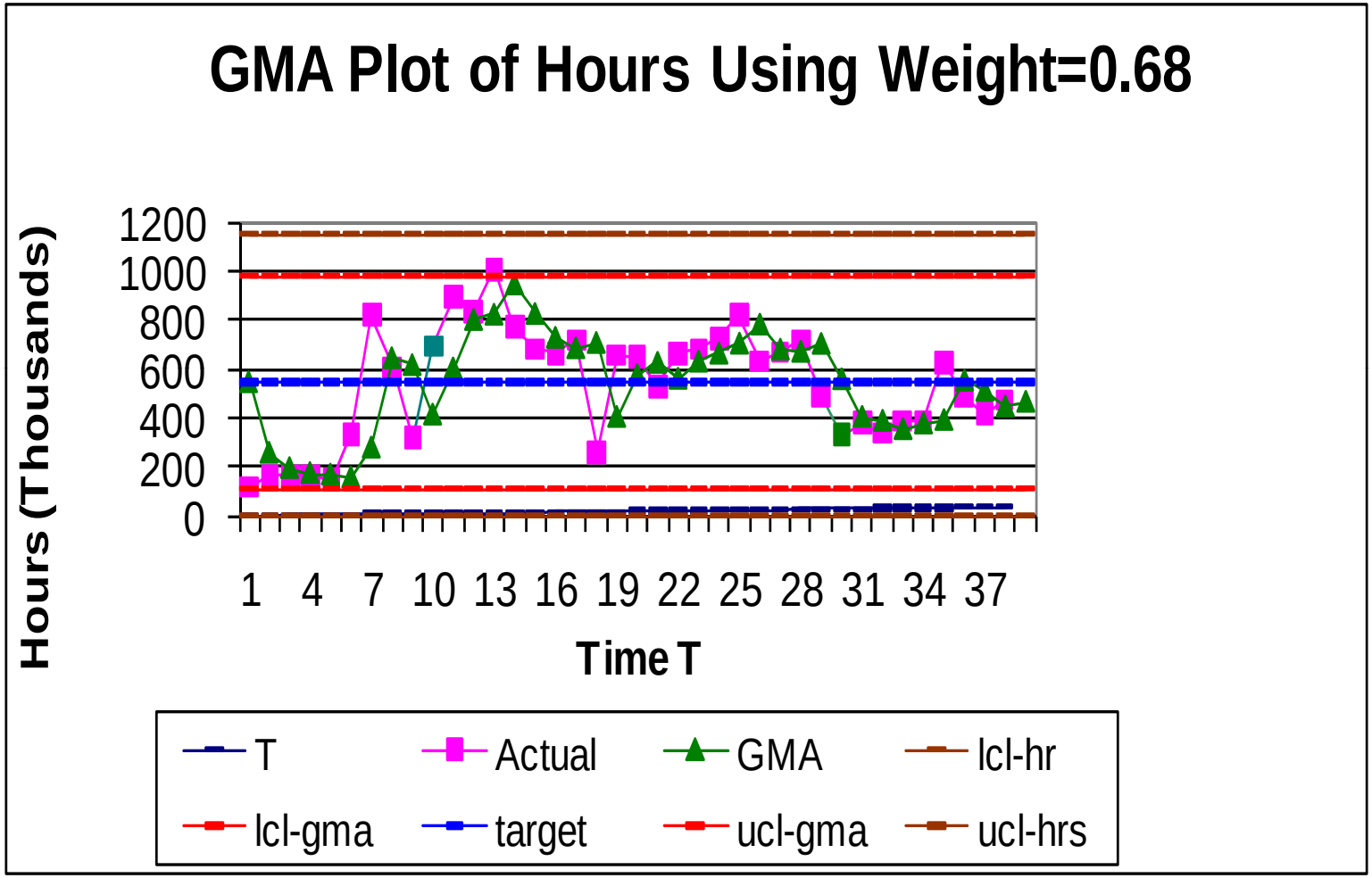
Engineering Production Hours Data

Weight (w) 0.68

T	Actual	GMA	Error (Actual-GMA)	lcl-hrs	lcl-gma	target	ucl-gma	ucl-hrs
1	120	547.5	-427.5	0	112.51	547.5	982.49	1153.55
2	164	256.8	-92.8	0	112.51	547.5	982.49	1153.55
3	164	193.7	-29.7	0	112.51	547.5	982.49	1153.55
	Additional	Data Lines For T = 4 - 12						
* 33	388	354.2	33.8	0	112.51	547.5	982.49	1153.55
34	389	377.19	11.81	0	112.51	547.5	982.49	1153.55
35	630.5	391.87	238.63	0	112.51	547.5	982.49	1153.55
36	492	554.14	-62.14	0	112.51	547.5	982.49	1153.55
37	417	511.88	-94.88	0	112.51	547.5	982.49	1153.55
38	476	447.36	28.64	0	112.51	547.5	982.49	1153.55
39	Forecast	466.84		0	112.51	547.5	982.49	1153.55

=447.36+0.68*(476.00-447.36)

* Baseline Period


GMA Plot of Hours Using Weight=0.68
Hours (Thousands)
1200
1000
800
600
400
200
0
1 4 7 10 13 16 19 22 25 28 31 34 37
Time T
T
Actual
GMA
lcl-hr
lcl-gma
target
ucl-gma
ucl-hrs

Recent and Future Trends

- Debate between SPC and Adjustment Control
- SPC detects shifts in assumed, stable processes (monitor)
- Adjustment responds to assumed, unstable processes (regulator)

Statistical Process Control (SPC)

SPC is really not process CONTROL but is actually RESEARCH control

SPC tells investigators when process change occurred so that their causes can be found, countermeasures may be implemented

Removing sources of change reduces process variability that improves stability

SPC minimizes errors of false process-change signals (and missed real-change signals)

Adjustment Control

- Adjustment control minimizes product/process variation
- Achieves “ideal” stability by signaling when and how much adjustment to make on one (or more) “known” and “unknown” control variables that affect processes that vary over time

Adjustment Control cont.

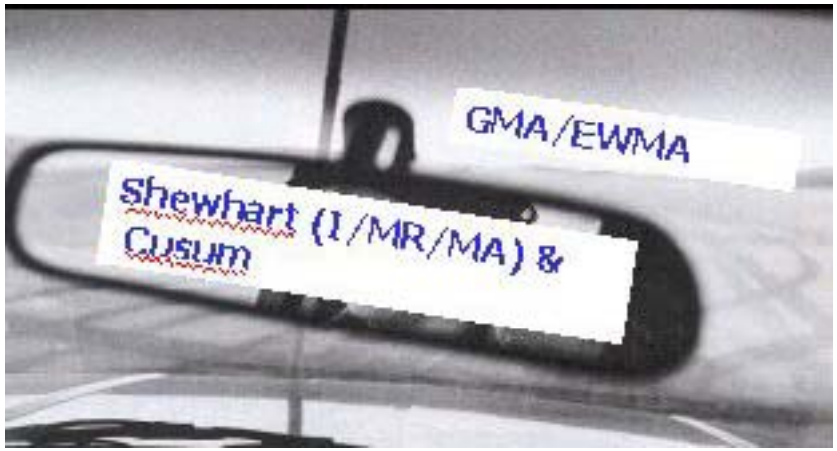
Optimum adjustment limits are not 3-sigma limits as in SPC, but use GMA/EWMA forecast limits

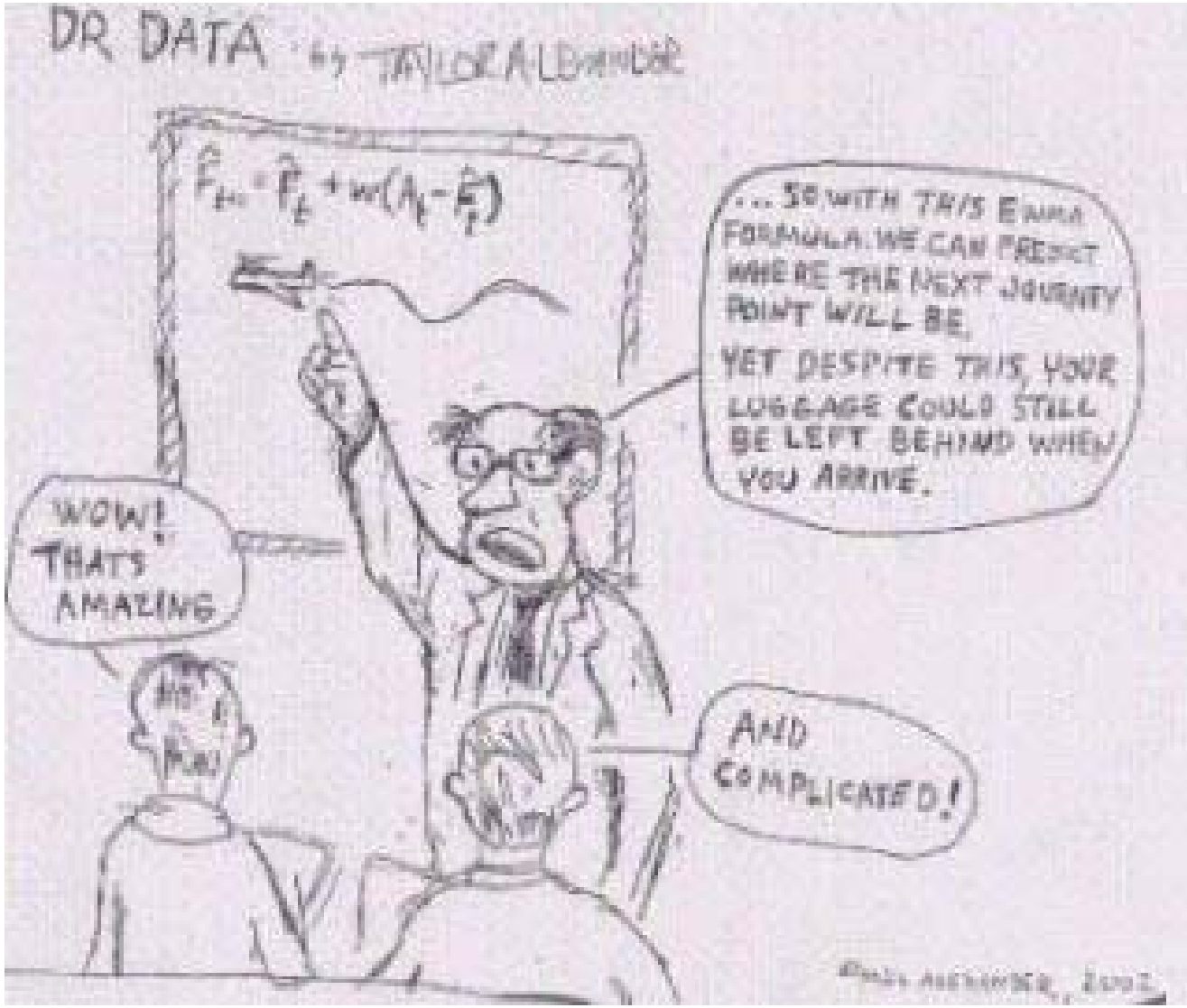
Box-Jenkins' Adjustment Methodology represents a robust blend of SPC and GMA/EWMA that achieves optimal "ideal" process control

“Management in the Western World have too long been driving the automobile by keeping an eye on the rear view mirror…”

(W.E. Deming, 1986, “Drastic Changes for Western Management,” Report No. 14, Center for quality and Productivity Improvement, University of Wisconsin-Madison)

Effective Drivers View Roads Past and Roads Yet to Come




DR DATA
$\hat{F}_{t+1} = \hat{F}_t + w(A_t - \hat{F}_t)$
... SO WITH THIS EMMA FORMULA WE CAN PREDICT WHERE THE NEXT JOURNEY POINT WILL BE.
YET DESPITE THIS, YOUR LUGGAGE COULD STILL BE LEFT BEHIND WHEN YOU ARRIVE.
WOW! THAT'S AMAZING
AND COMPLICATED!