Self Correcting Manufacturing

By
Elango Ramanathan

Automation Director
Tech mold Inc.

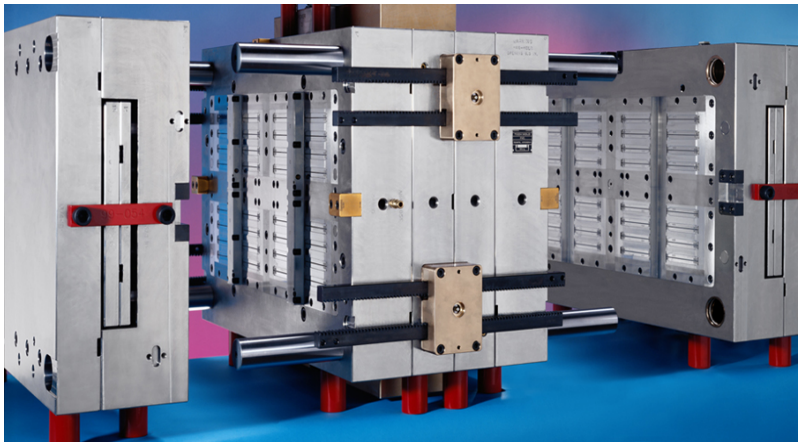
elango.ramanathan@techmold.com
(480) 968 8691

Premium Partners:

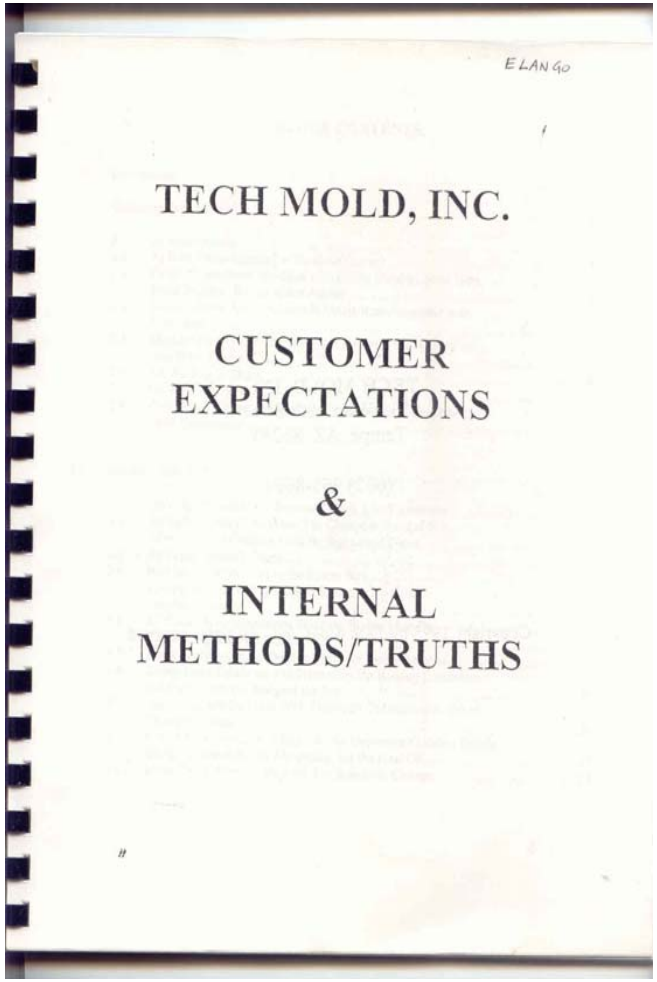
Tech Mold Inc.

- Established in 1971
- Global Reputation
- Ultra-Precision
- High Cavitations
- Runner less
- Total Component Interchangeability
- Dimensional Accuracy
- Fully Detailed Drawings
- Multiple Molds

TECH MOLD
INC.
TEMPE, ARIZONA



Tech Mold Inc.



Truth # 14

Each component is inspected, on it's own merit immediately after each machining operation is completed

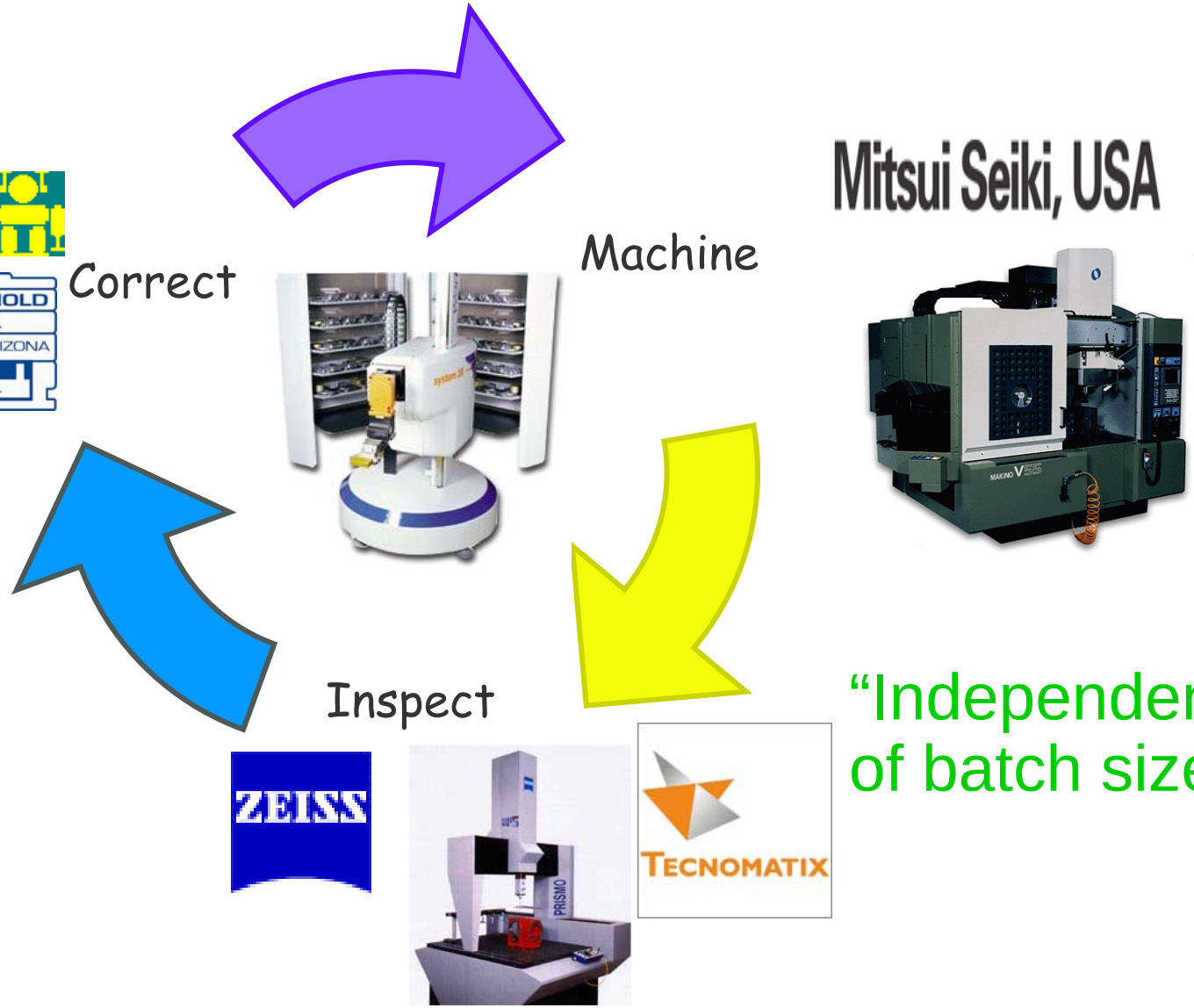
Bill Kushmaul
President – Tech Mold

Art of Mold making

Inspecting on the machine

- Thermal issues - Mounting probe on the side
- Mill should make chips
- Limited no of probes
- Can not scan because MP700 is a touch trigger probe

Self correcting Manufacturing

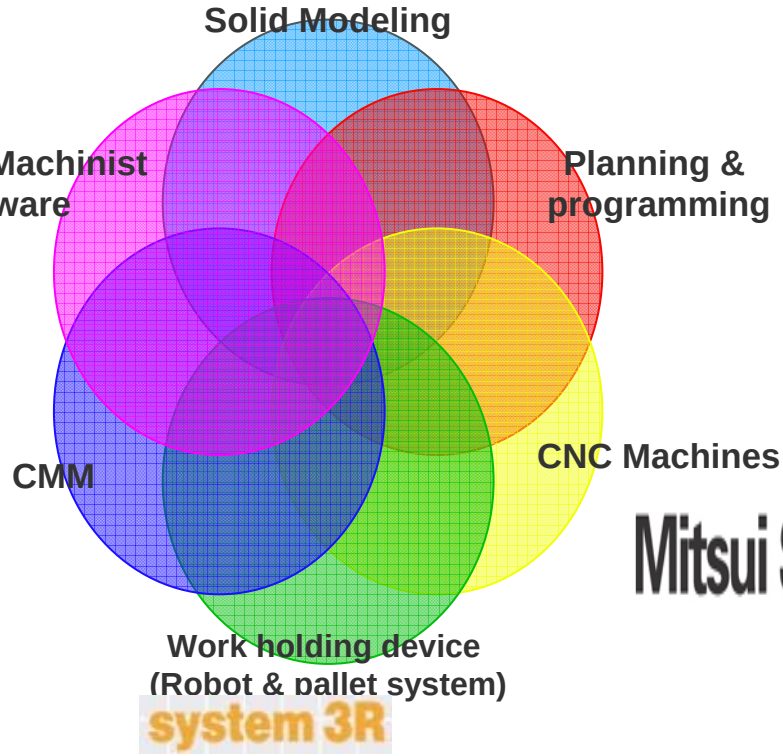


"Process controlled quality"

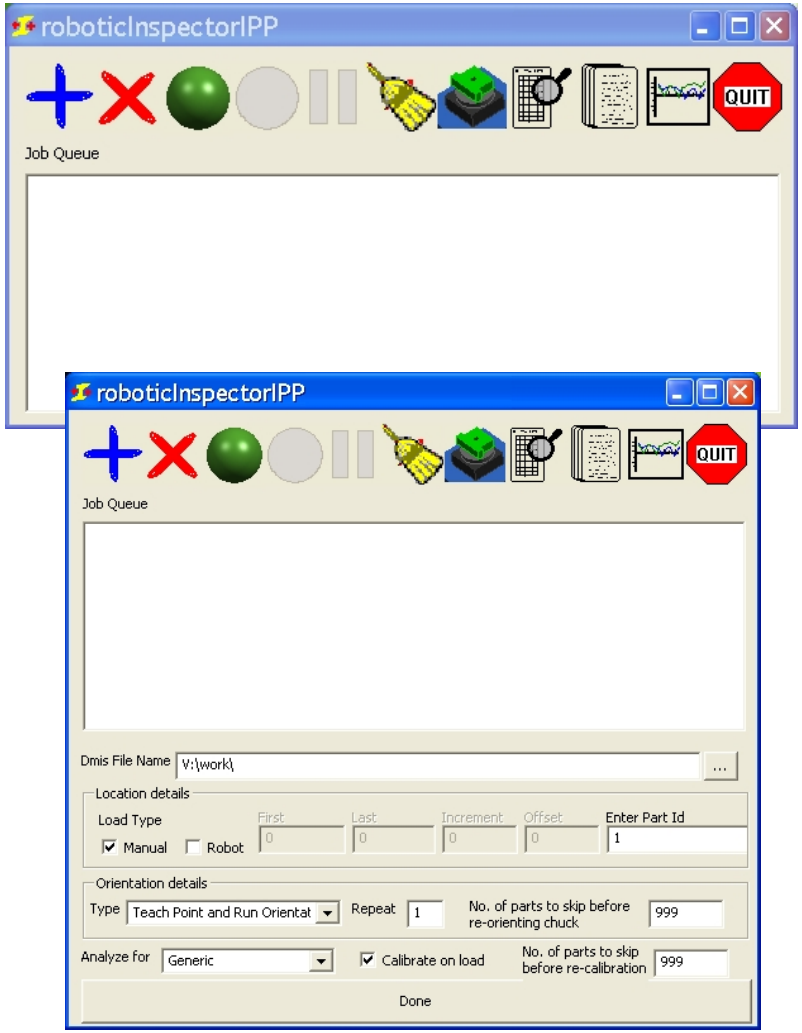
"Independent of batch size"

SCM cell at electrode manufacturing

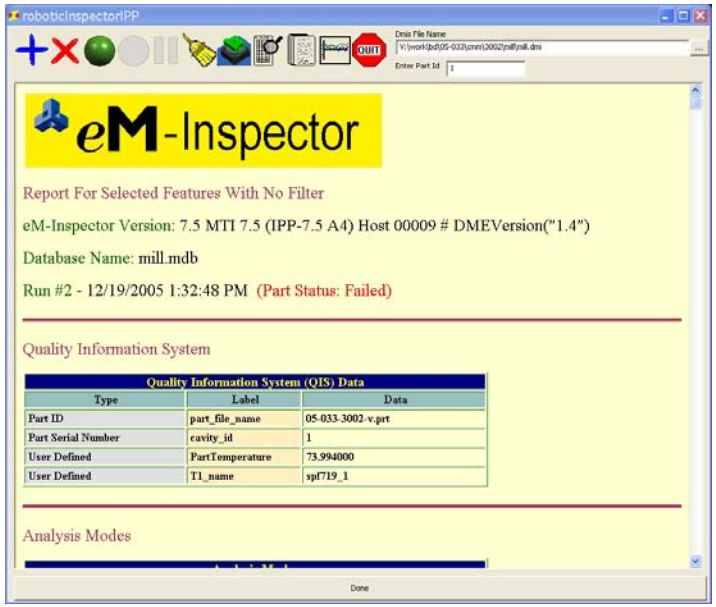
Components of SCM



RoboticInspectorIPP



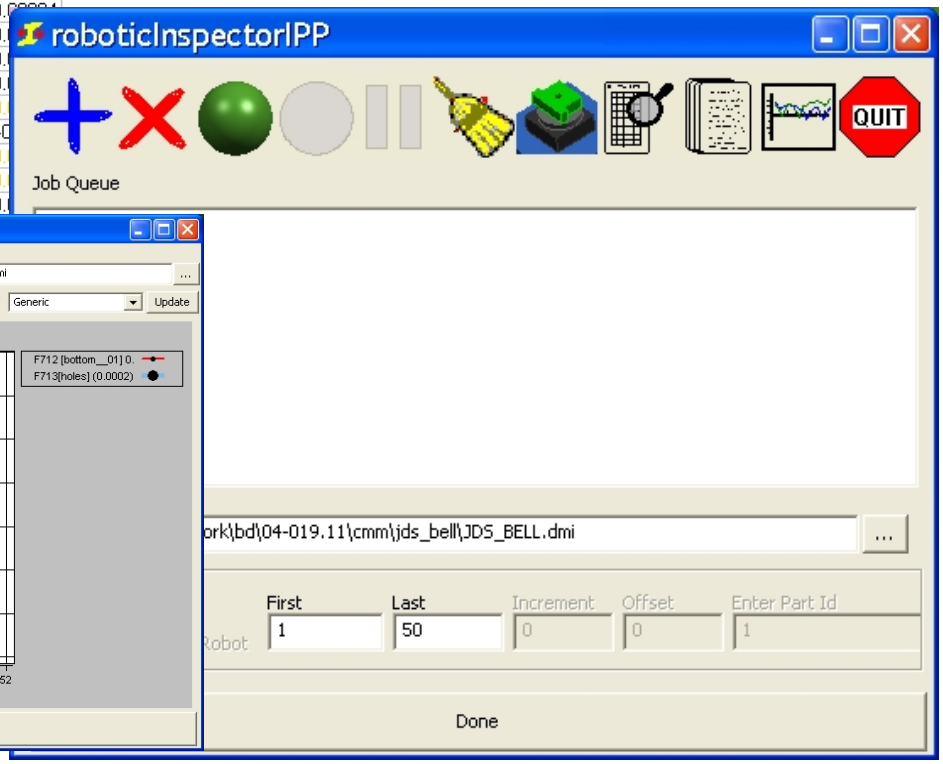
- CMM automation software
- Unattended inspection
- Automatic cluster change
- Machinist friendly
- Tells machinist how to make good parts

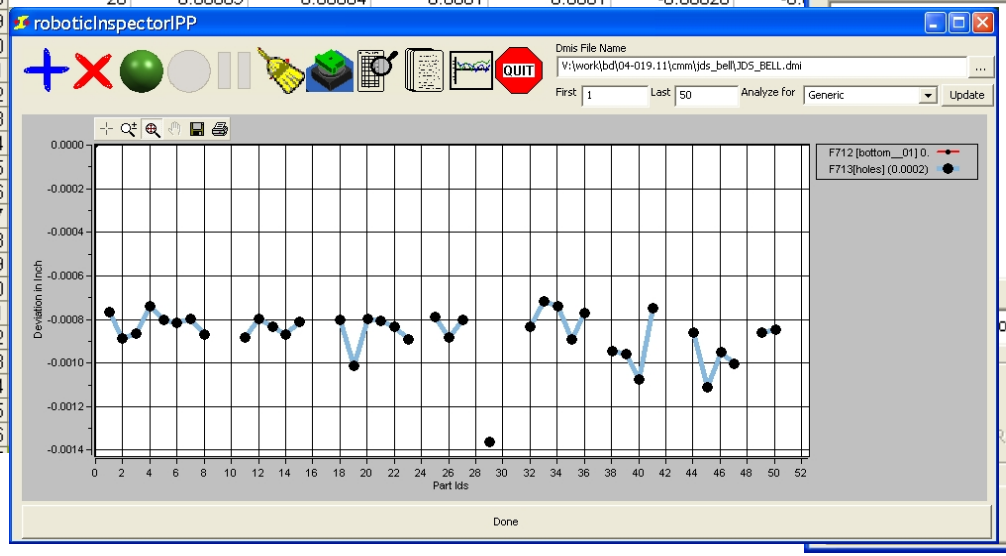


RoboticInspectorIPP

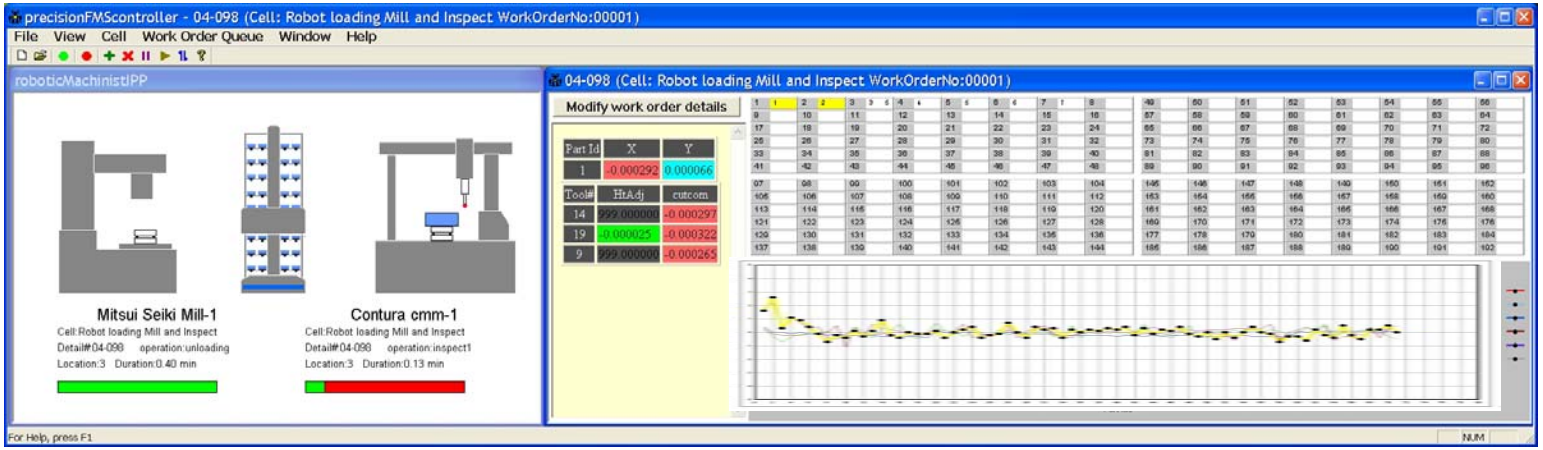
87	37	-0.00002	0.00006	0.00007	0.00012	-0.00006	-0.00002
88	38	-0.00007	-0.00007	-0.00004	0.00016	-0.00009	0.00011
89	Cavity Id	709 (.0002) S	708 (.0002) SF	707 (.0002) S	706 (.0002) SF	705 (.0002) SF	703 (.0002) SP
90	1	0.00005	0.00012	0.00019	0.00024	-0.00033	0.00005
91	3	0.00016	0.00002	0.00008	-0.00003	-0.0003	-0.00019
92	4	0.00012	-0.00012	-0.00003	0.00007	-0.00028	-0.00044
93	5	0.00019	0.0001	0.00015	0.00014	-0.00029	-0.00039
94	6	-0.00008	0.0001	0.00019	0.0002	-0.00032	0.0001
95	7	-0.00014	0.00019	0.00017	0.00035	-0.0003	-0.00006
96	8	0.00007	0.00002	0.00011	0.00019	-0.0003	-0.00033
97	9	0.00058	-0.00021	-0.00002	-0.00007	-0.00028	-0.00057
98	10	0.00027	-0.0001	0.00013	0.00004	-0.00029	-0.00009
99	11	0.00021	-0.00004	0.00005	0.00005	-0.00029	-0.00022
100	12	0.00013	0.00002	0.00009	0.00023	-0.0003	0.
101	13	-0.00034	0.00005	0.00012	0.00033	-0.00028	0.
102	14	0.00008	0.00004	0.00013	0.00015	-0.00025	-0.
103	15	0.00016	-0.00005	0.00006	-0.00007	-0.00028	-0.
104	16	0	0.00016	0.00031	0.00035	-0.00031	-0.
105	17	-0.00004	0.00004	0.00007	0.00025	-0.00032	-0
106	18	0.00019	0.00003	0.00006	0.00012	-0.00026	-0
107	19	0.00027	0.00003	0.00013	0.00007	-0.00032	-0
108	20	0.00009	0.00004	0.0001	0.0001	-0.00028	-0.

- ***Create excel reports***
- ***Show deviation in graphs***
- ***Reports can be customized for different customers***





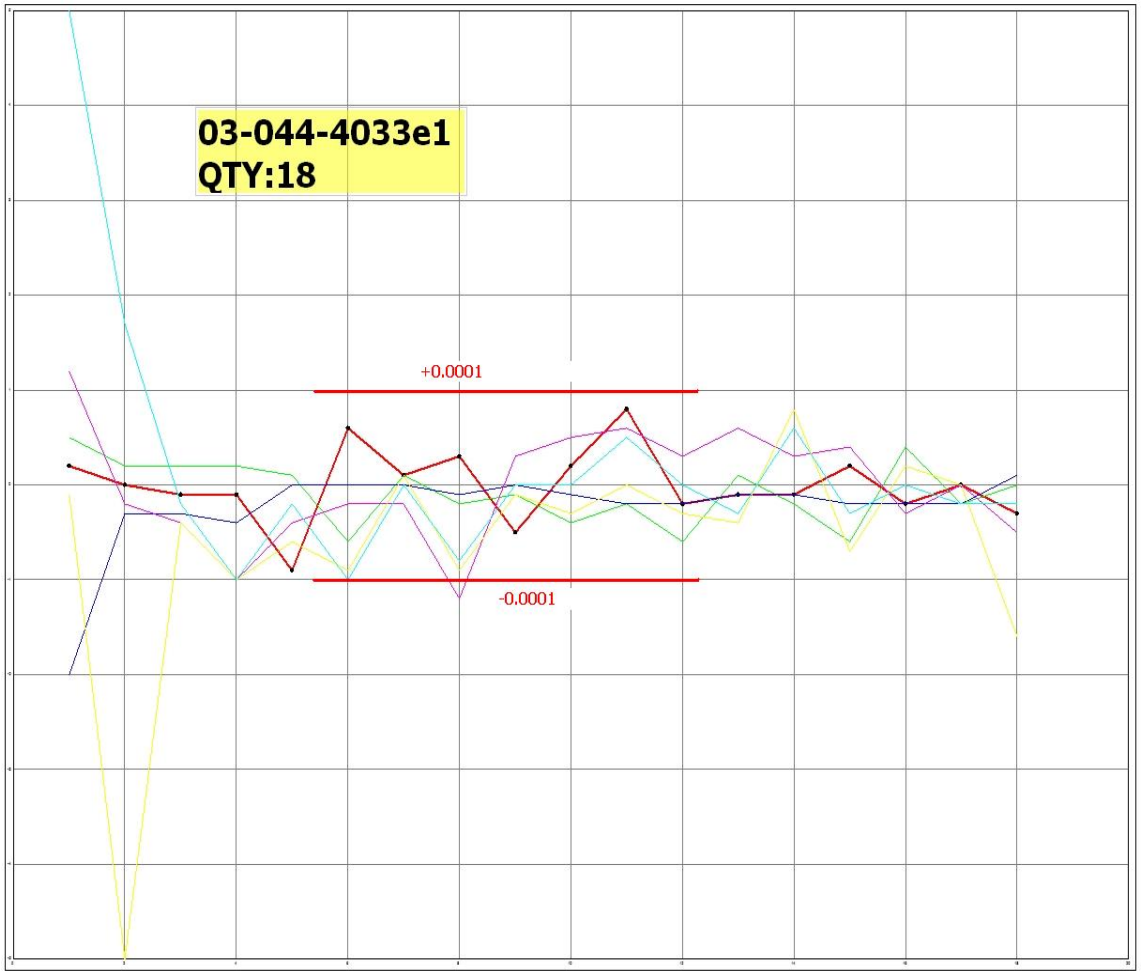
RoboticMachinistIPP



- *SCM software*
- *Controls CMM/Robot/CNC machine*
- *Closed loop correction*
- *Always makes electrodes within 0.0002”/0.0003” (0.005/0.008mm)*
- *Switches jobs for 24/7 operation*
- *Graphically show the activities on the machine/CMM/Robot*
- *Shows the good and bad parts*
- *Shows deviation for every tool*
- *Cut Air controls*
- *Shows the deviation in graph*

Results from job-1

Results from job-2

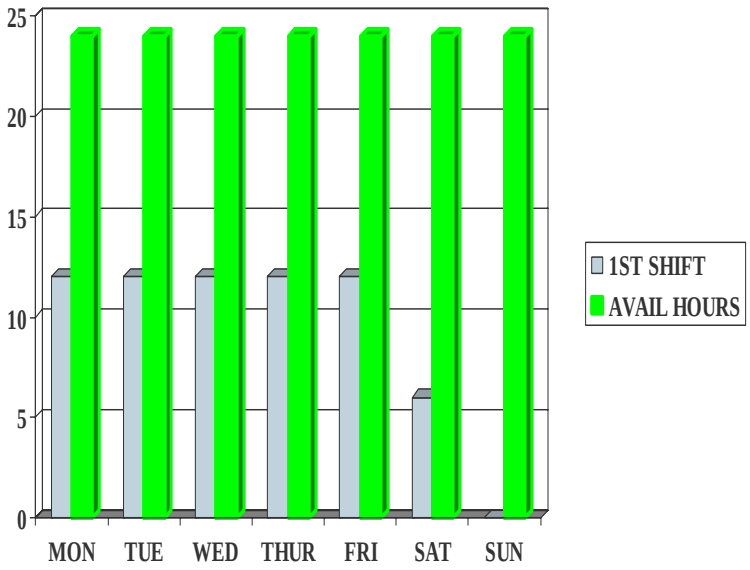


Benefits of SCM

Mold Manufacturing

- 4 parts or 400 parts produced with same quality
- *Predictable run time*
- *Enhanced planning execution*
- *Process does not stop 24/7* Operation
- Tool life management
- Productivity gains
  - Increased daytime production
    - No meetings, lunches or distractions
  - Evening and weekend production
    - 60hrs (12hrs per night)
    - 40 hrs per weekend
- 68 vs 168 Machine hours per week

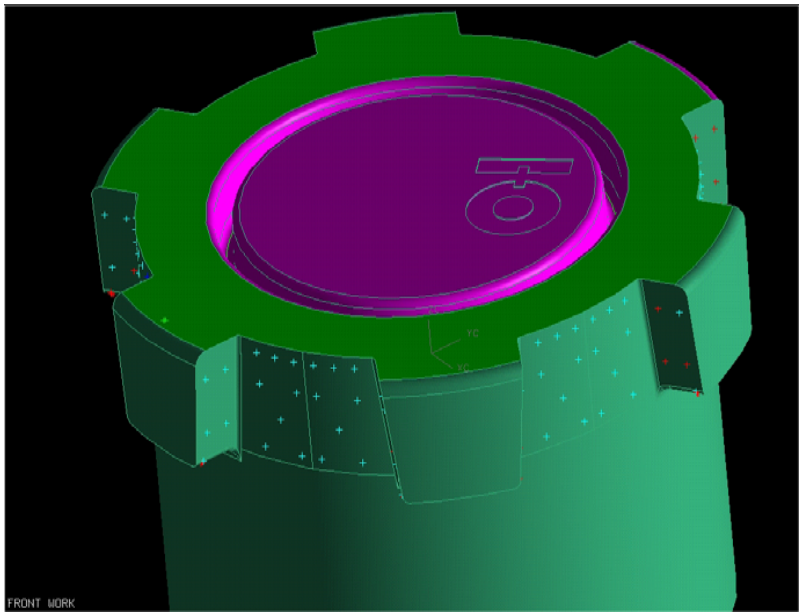
247% GAIN



Benefits of SCM

Mold Quality

- **100% inspection without extra cost**
- **Inspection results are captured and retained for future analysis**
- **Automatic creation of mold inspection reports.**
- **Reduce fixture induced errors**
  - Magna sine
- **Inspected immediately after manufacturing**
- **Analysis preformed the same way again and again**
- **Virtual gages**
  - No need to make go/no-go gages
  - Does not depend on how tightly gage fits

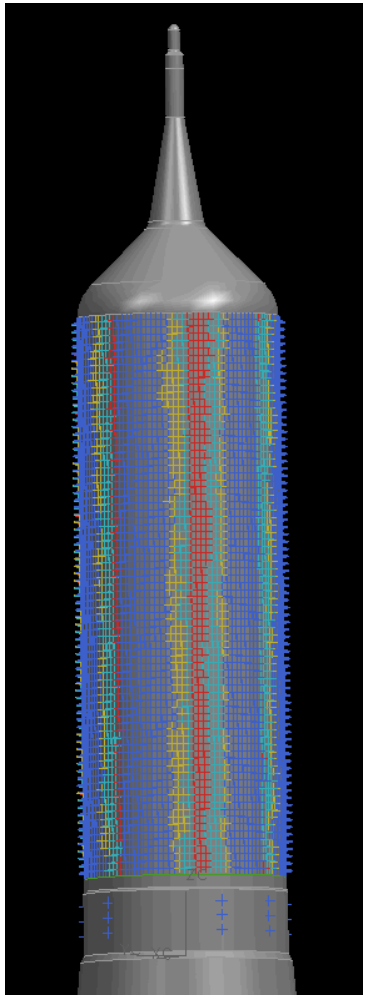
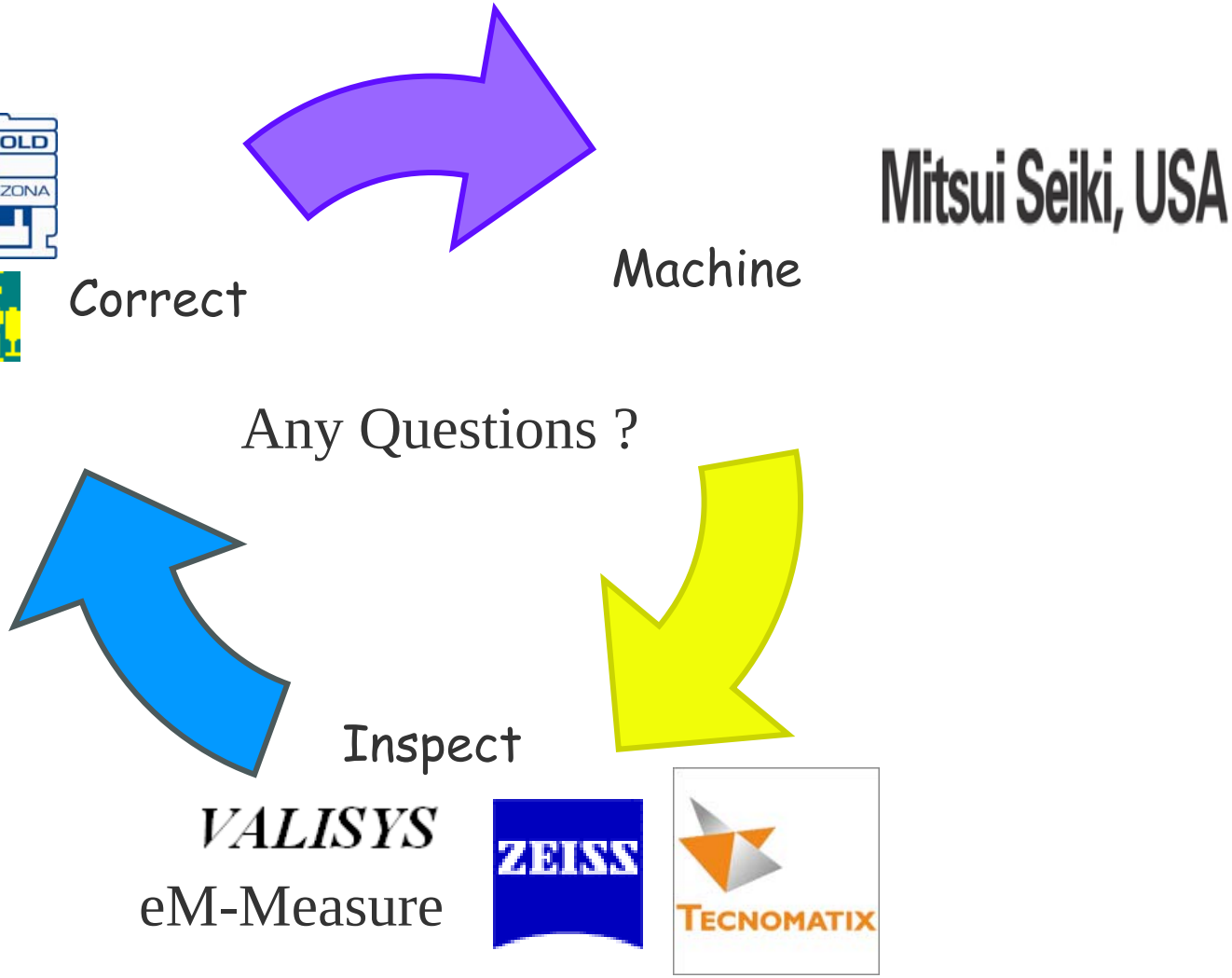


Benefits of SCM

- **Capturing the manufacturing process**
  - Manufacturing process is completely captured in electronic Databases
  - Mold building knowledge is retained databases.
  - Quality is now wholly dependant on process
  - Repeat jobs use exact same manufacturing techniques
- **Developed processes will be used in more than one location**
- **Uniform design/manufacturing/inspection system across the group of companies**
- **Softwares developed for one company can be used in other companies**
- **Single automation strategy for all companies in group**
- **Molds designed in one location can be manufactured in another**
- **Mold quality relatively less dependent upon operator skills**

Benefits to our customers

- ***Consistency on molds***
- ***Unprecedented Quality of molded parts***
- ***Repeat runs are guaranteed to be exactly the same***
- ***Speed to Market***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