



# TestGeni - An Intelligent Automation Tool for ATE Engineers



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# Introduction

Time is money in semiconductor industry

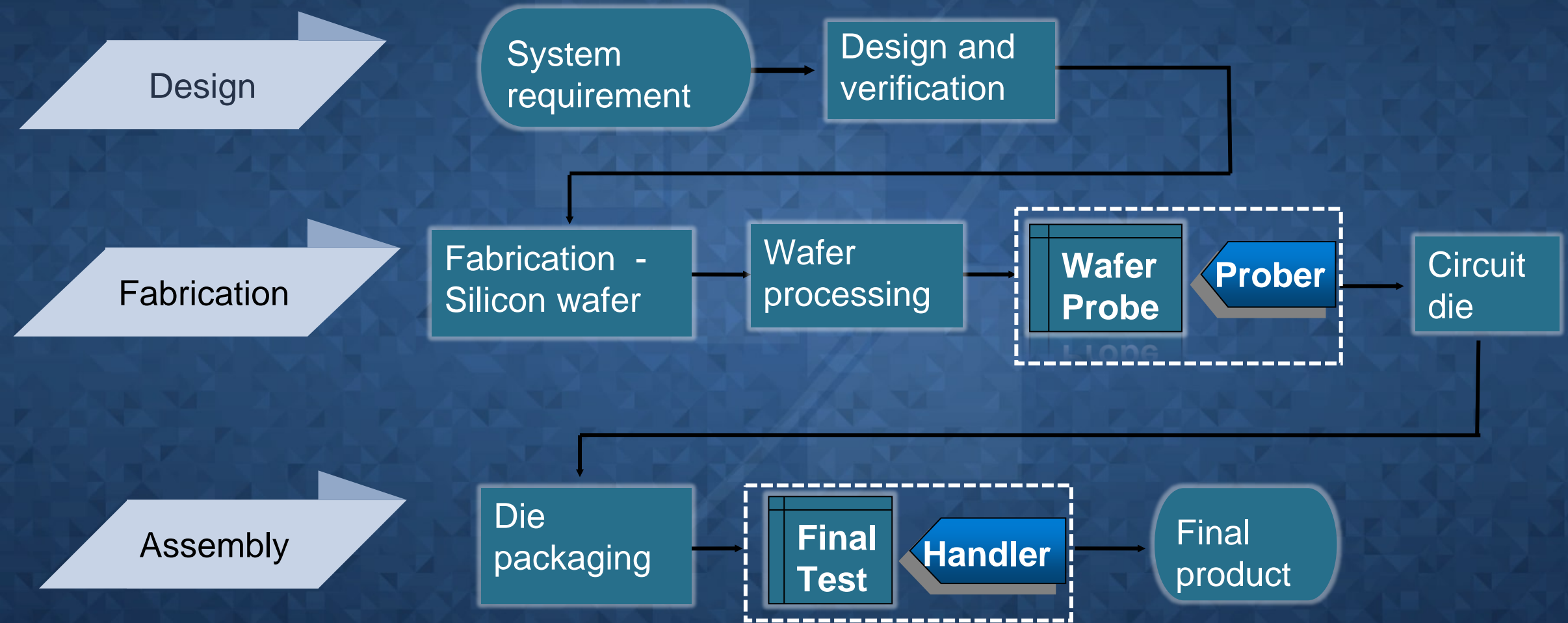


One of the biggest challenges of post silicon validation is time reduction in program development and testing

Automation: An intelligent solution reducing the manual efforts

Caliber intends to provide the best possible automation in test program generation even in the absence of tester tool

# Post silicon validation in IC manufacture cycle



# Basic program development flow

**Pin Configuration**  
(Pins, Groups, Ports, Utility, Ganging)

**Level**  
(Voltages and current levels of a waveforms)

**Timing**  
(Waveform and its timing definition)

**Pattern**  
(Expected input and output vector)

**Primary Setup**  
(Framed with the help of Product Datasheet)

**Test Method**  
(Program the test instruments to force & to measure)

**Test Suite**  
(Complete setup to perform a test)

**Test Flow**  
(Different test suites for different parameters)

**Test Table**  
(Judgemental purpose)



**Data Log**

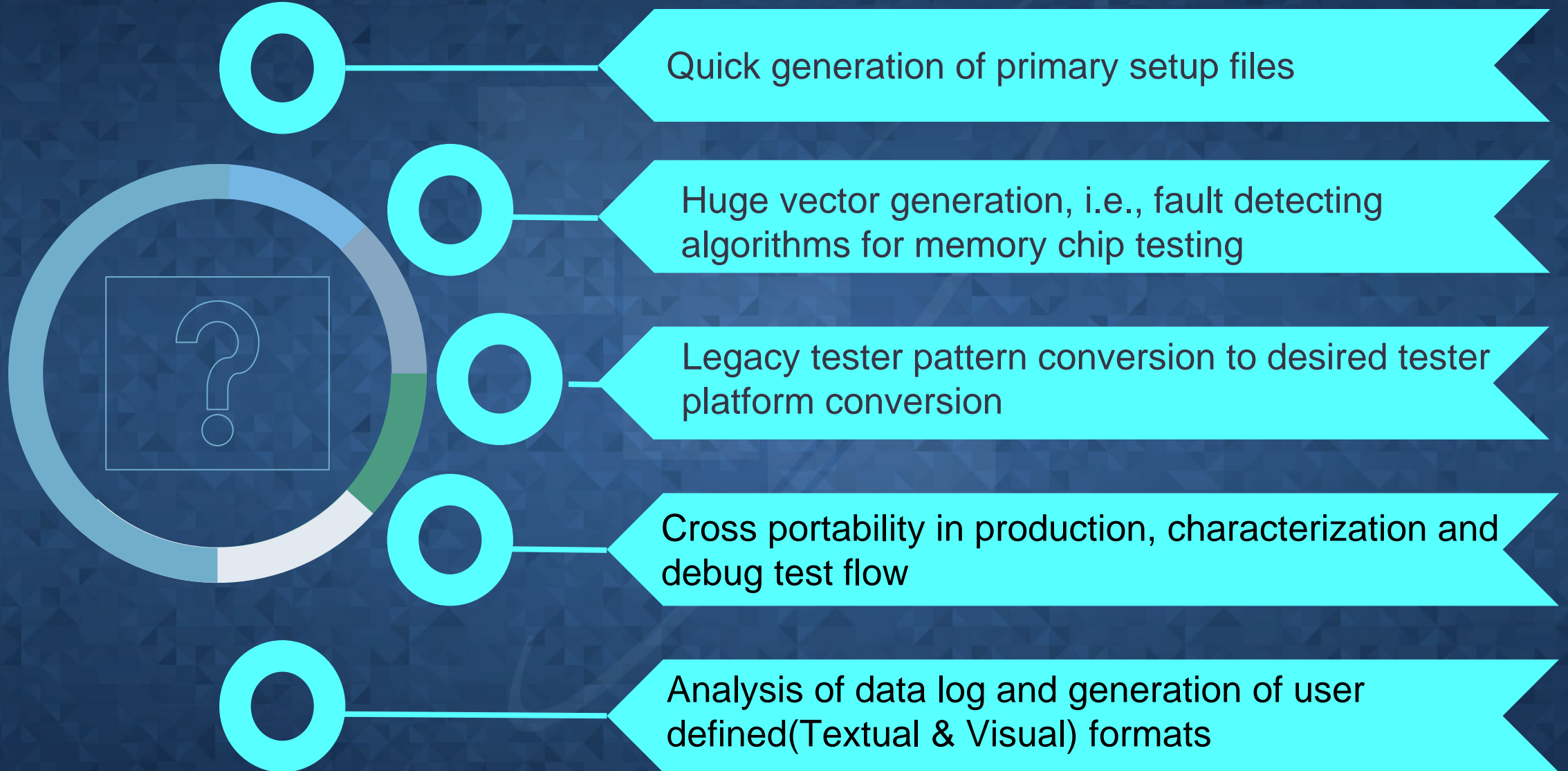
\*.stdf

\*.edl

\*.dlog

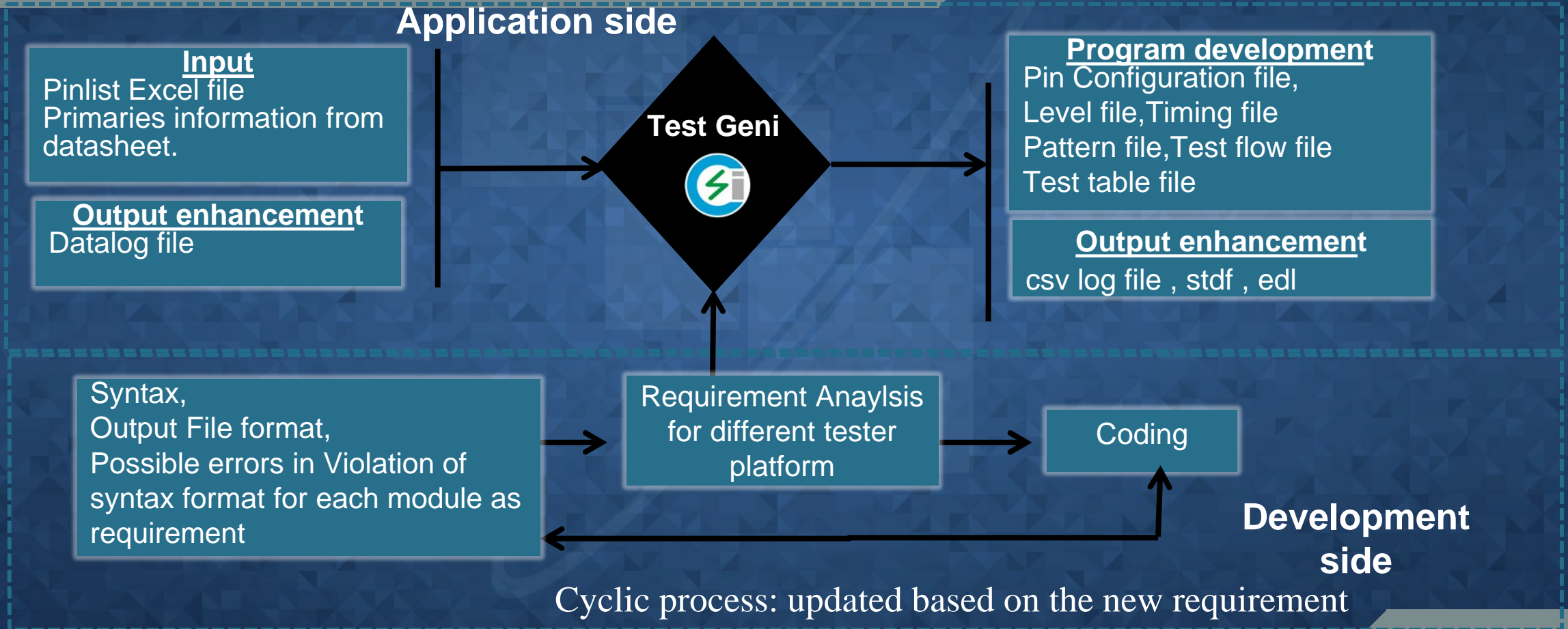
\*.bin

# Why TestGeni?





# Prototype model of TestGeni





# Automation: Primaries development

Converts excel file into a loadable pin config file supported by tester tool

Time reduction in feeding pins for primary setup file

Customizable with any kind of pin-info to tester compatible pin config

Select PinList file C:/Users/user/Downloads/single-site-list.xlsx Browse

	A	B	C	D
	Pin name	Pin no	Pin Type	Channel no
1	10E	50	IO	107
2	1A1	47	IO	107
3	1A2	46	IO	107
4	1A3	44	IO	107
5	1A4	43	IO	106
6	20E	48	IO	106
7	2A1	41	IO	105
8	2A2	40	IO	108
9	2A3	38	IO	107
10	2A4	37	IO	105
11	30E	25	IO	108
12	3A1	36	IO	103
13	3A2	35	IO	107
14	3A3	34	IO	105
15	3A4	32	IO	103
16	40E	24	IO	107
17	4A1	30	IO	10311

Open File

Look in: D:\TEST\_GENI

- My Computer
- user
  - Multi-site-Static.xlsx
  - Multisite-avi64.xlsx
  - single-site-list.xlsx

Pin Name	Pin number	Channel Number	Channel Number_2	Channel Number_3
avi1clr	20	32901	32902	32903
avi1clk	21	32904	32905	32906
avi2clr	22	33001	33002	33003
avi2clk	23	33004	33005	33006
1clr	2	10603	10402	10403
1ck	1	10808	10404	10405
2clr	12	10501	10311	10312
2ck	13	10805	10414	10413
1qa	3	10605	10406	10205
1qb	4	10702	10301	10305
1qc	5	10616	10408	10407
1qd	6	10513	10303	10207
2qa	11	10608	10416	10415
2qb	10	10705	10302	10306
2qce	9	10802	10309	10308
2qd	8	10512	10304	10307
VCC	14	42901	22502	22505
Utility_1		UT1804	UT102	UT104

File name:

Files of type: Excel File (\*.xls \*.xlsx) Cancel





# Automation: Primaries development

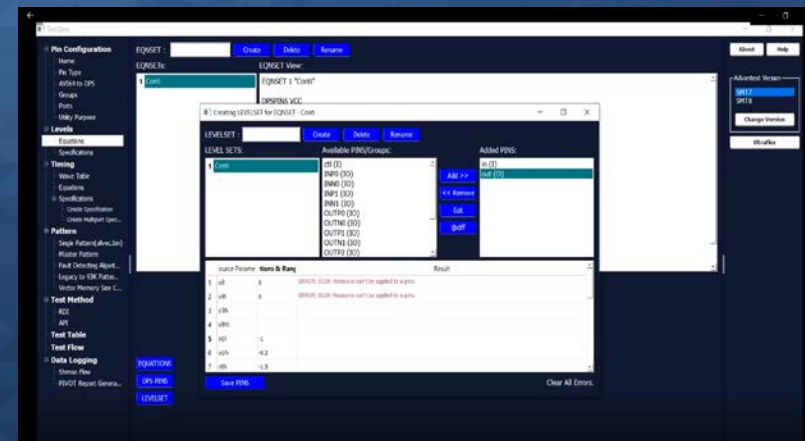
User friendly GUI interface in generating primaries and avoids the manual syntax errors

Reduces time in test program development

Supports multiple tester platform

```
EQNSET 1 "LEV_EQUNSET_CONT_DPSSSHORT_01"
SPECS
    VCC [V]
    VIL [V]
    VIH [V]
    VOL [V]
    VOH [V]
    IOL [mA]
    IOH [mA]
    VT [V]
DPSPINS VCC
vout= VCC
vout_frc_rng=7
iout_clamp_rng=500
ilimit=500
t_ms=4
offcurr=act
#connect_state= UNGANG
LEVELSET 1 "LEVSET1_CONT"
PINS cont_pins

vil=VIL
vih=VIH
vol=VOL
voh=VOH
vt=VT
iol=IOL
ioh=IOH
```



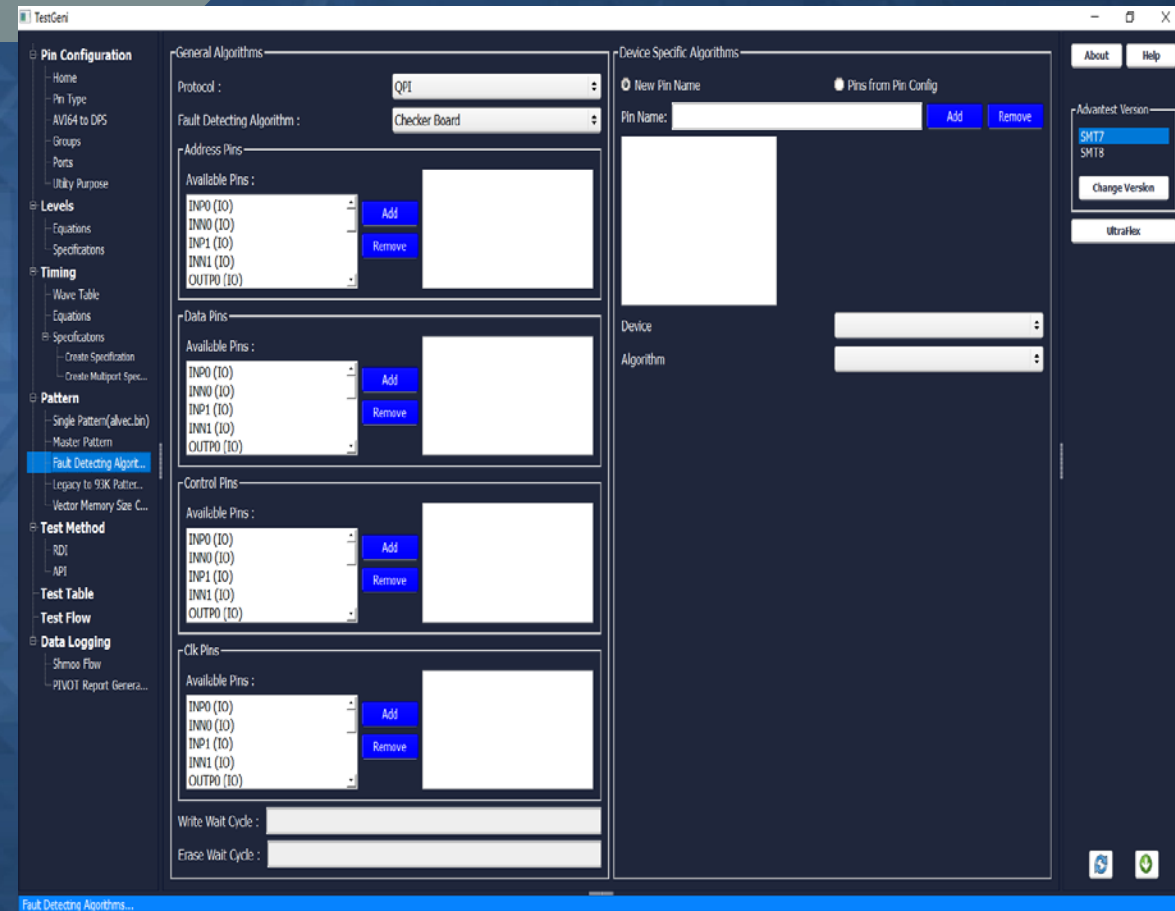


# Vector generation

Easy generation of huge vectors with the help of algorithms.

Incorporation of protocol based pre-defined fault coverage algorithms.

Vector generation for NOR, NAND Flash memory device specific algorithms





# Expeditious pattern conversion

Legacy tester pattern to desired tester pattern conversion

Sample conversion from a legacy tester platform to V93000-SM7 patterns

Swift conversion in a single click

The screenshot displays the TestGeni software interface. On the left, a tree view under 'Pattern' has 'Legacy to 93K Patter...' selected. The main window shows a list of test vectors (e.g., Cal\_vector, Opens\_shorts, data\_ret0) and their corresponding converted patterns (e.g., R1 dvc\_1 0001111000000000000000XX0000E). A 'fun\_pg\_mx - Notepad' window is open, showing the converted pattern for 'fun\_pg\_mx' in a hex-like format. The interface includes fields for 'Input File Path' (D:/vaishnavi/IP/LinkedIn\_Content/fun\_mux.pat) and 'Output Folder Path' (D:/vaishnavi/IP/LinkedIn\_Content/output). A status bar at the bottom reads 'Vector Converted Successfully!!!'. On the right side, there are buttons for 'About', 'Help', 'Change Version', and 'UltraFlex'.



# Vector memory size calculator

Firmware commands are essential to find the size of vector memory.

TestGeni facilitates user friendly GUI interface with vector and configuration file

Selected pin, port, vector wise memory size calculation

The screenshot shows the TestGeni software interface. The left sidebar contains a navigation menu with categories: Pin Configuration, Levels, Timing, Pattern, Test Method, Test Table, Test Flow, and Data Logging. The main window displays the 'Vector Memory Size Calculation' results. It includes fields for 'Select PMF File' and 'Select CFG file', both with 'Browse' buttons. Below these are 'FILE NAMES' and 'PORT NAMES' sections. The 'PORT NAMES' section lists: SUPPLY\_PIN, DIGITAL\_PINS, and CONTI. The 'PIN NAMES' section lists: CS, DO, WP, DI, CLK, HOLD, VCC. The results are presented in four tables: 'Calculated PORT memory', 'PORT's not found', 'Calculated PIN memory', and 'PIN's not found'. The 'Calculated PORT memory' table shows:

	1	2
1	SUPPLY_PIN	18960
2	CONTI	18960
3	DIGITAL_...	25392

The 'Calculated PIN memory' table shows:

	1	2
1	DO	15432
2	CLK	10016
3	DI	12336
4	WP	12768
5	CS	16520

The 'PIN's not found' table shows:

	1	2
	VCC	

The interface also includes 'About' and 'Help' buttons, 'Change Version' and 'UltraFlex' options, and a 'Reset' button at the bottom right.

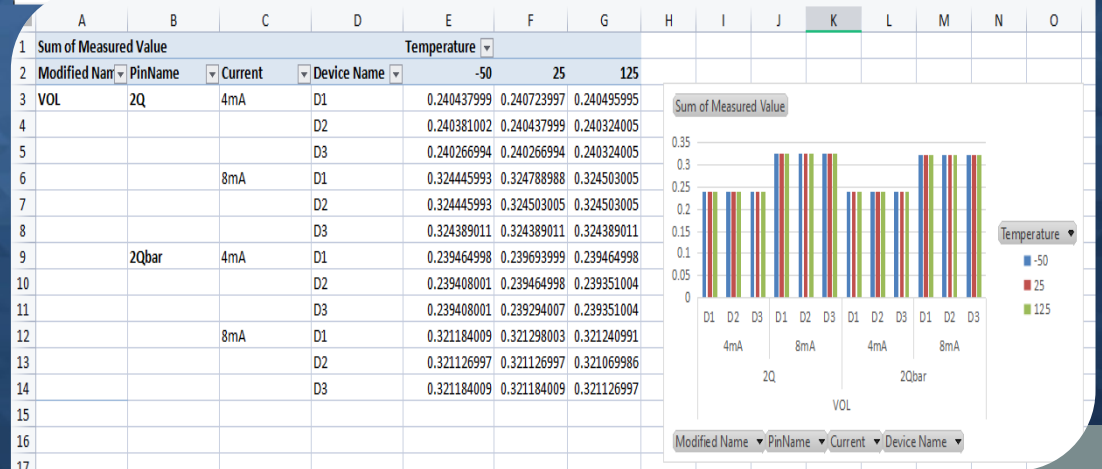
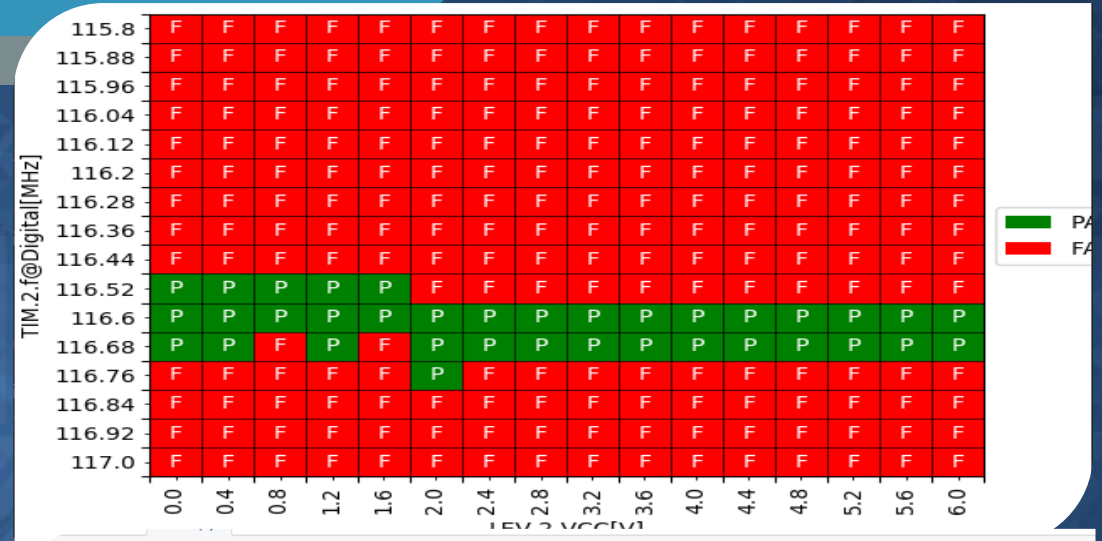


# Datalogging

Converting stdf file into an expansive csv file with easily accessible and organised parametrics

Data and test time crunching for quick reporting

Shmoo plot generation from datalog file

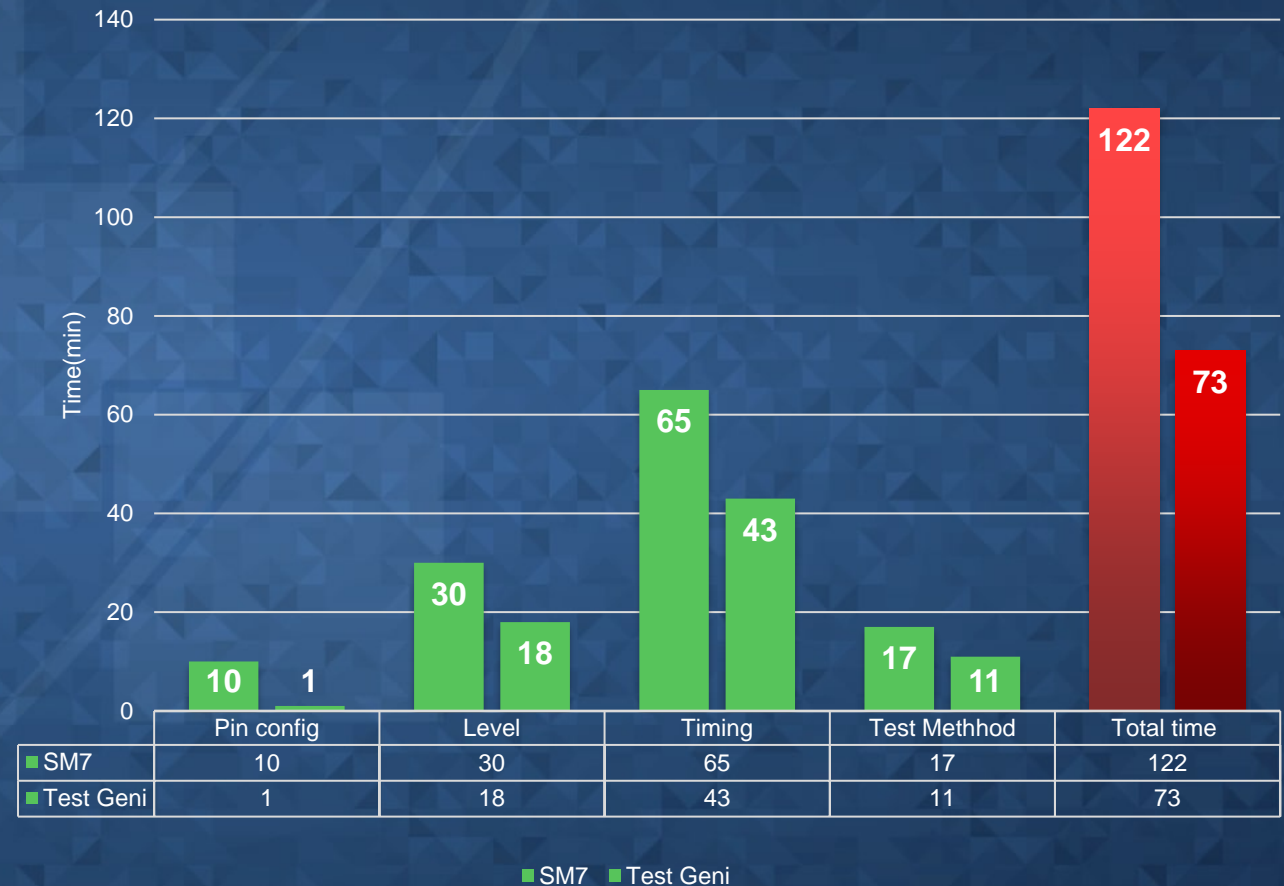


# On Target

## Use case

- ✓ Real time product: Digital ASIC
- ✓ Tester platform: Advantest 93k
- ✓ Version : SM7
- ✓ Test program development is implemented in both tester tool and TestGeni.
- ✓ Approximately 41.6% of time is saved using TestGeni

## Development Time



# Conclusion and future work

- TestGeni helps in possible automation needed for test program development and analyses the test data which reduces the man hours
- Incorporating new tester platforms for portability and other advanced features is in progress to reduce the development time further

# Q & A

