Tektronix®

VND Worldwide Manufacturing

Design for Manufacturability Guidelines

MISSION

To develop and implement a worldwide manufacturing engine that delivers competitive advantage for our business and customers.

Our objective is to meet customer's expectations by maximizing their value and minimizing their risk.

OPERATING PRINCIPLES

- Embrace concurrent engineering
- Focus on simplicity
- Drive continuous improvement
- Only add cost that customers value and are willing to pay for
- NPI co-located with development
- Single face to customer
- Encourage personal development

STRATEGY

Leverage core competencies to meet worldwide customer expectations, provide competitive advantage and meet Tektronix financial expectations.

- Maximize *future* competitive advantage through concurrent engineering
- Leverage a worldwide blend of manufacturing resources to deliver competitive advantage
  - Partner with best in class suppliers for industry standard systems and modules
  - Internally manufacture that which leverages our core competencies
  - Partner with outsource manufactures to leverage their complimentary core competencies
  - Leverage regional configuration sites to provide customer responsiveness or local value added

KEY DRIVING FORCES

- Video industry at inflection points
  - Analog to Digital
  - Tape to Disk Storage
  - High Definition TV
- Customer demand for systems solutions
- Rapidly fluctuating product volume and mixes
- Constant cost competitiveness
- Products and systems designed/ developed in multiple locations
- Increasing use of common industry standards and platforms
- Continual migration of functionality from HW to SW
- Rapid integration of new technologies

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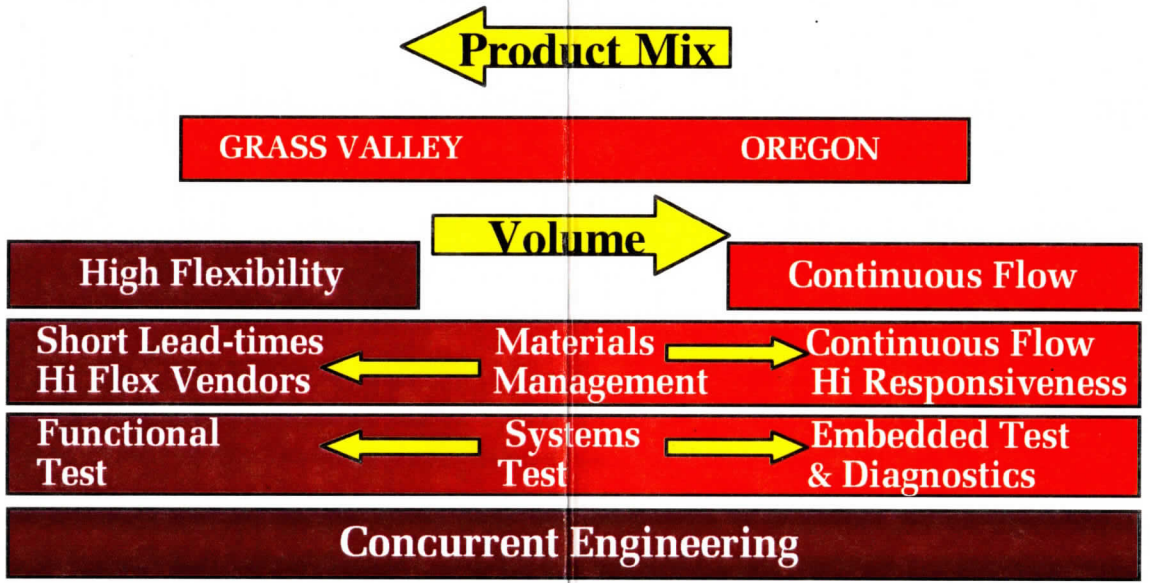
CORE COMPETENCIES



DESIGN FOR MANUFACTURABILITY

Customer Orders *Strategies:* Consistent Easy	Error free Simple Standard Configurations		*Implementation:* Simplified product structure Options S/W enabled	Clean shippable orders before final configuration and test	Customer Configuration management
Suppliers *Strategies:* Industry standard components Common components No increase in supplier base	No increase in part count No sole-sources Manufacturing inventory less than 15% of net sales	Complimentary lifecycles e.g Part⇔product e.g. processes⇔product Strategic partnerships	*Implementation:* No designs to extreme specifications Single sources encouraged	Design for preferred vendors Share common parts across product lines	
PCB Assembly *Strategies:* Fast Error-proof / obvious Simplify Consistent and repeatable Lowest cost	Quick verification and feedback Scaleable (volume) Standard configurations Industry standard processes Electronic data transfer	Modular / reuse SW query (S/N,F/W revision, P/N) Strategic partnerships	*Implementation:* Boards fully machine insertable No IC sockets Designs on approved CAD tools, supporting CAD standards	Designed for VND DFM requirements Consistent board and panel sizes Fixtureless assembly	Common LED schemes Tek P/N Robust ESD sensitivity design
PCB Test *Strategies:* Correlation to system test Early detection / high coverage	Fast Objective Consistent and repeatable Automate and simplify	Lowest cost Scaleable (volume) Standard test configurations Modular / no interdependency	*Implementation:* Boards fully auto-testable (embedded diagnostics)	Ship from stock for option and single board orders (not dependent on system test) Known good boards in stock	Standards switchable Devices in-board programmable
Final Assembly *Strategies:* Fast Error proof / obvious Simplify Consistent and repeatable Lowest cost	Quick verification and feedback Scaleable Safe / ergonomic environment		*Implementation* Simplified product structures "Snap together" mechanical enclosures(no alignment / tolerance problems) Hardware P/Ns limited	Common frames Common construction of control panels Autoswitching power supplies Ergonomic assembly and disassembly	Common cable lengths Common connector schemes Weight and size restriction
Systems Test *Strategies:* Fast Objective Automate and simplify	Early detection / high coverage Consistent and repeatable Lowest cost	Minimize troubleshooting Scaleable	*Implementation:* Systems fully auto-testable(embedded diagnostics) No proprietary protocol	All specs met before ER (thorough S/W, H/W, accelerated testing) Consistent control protocol	Compliance conformance Consistent GUIs Test time less than 1 week
Configure *Strategies:* Mix and match, plug and Play Automate	S/W-based Late in process as possible Standard Configurations	Quick functional and order validation, and feedback	*Implementation:* Customer configuration management	Ship from stock for option and single board orders (not reliant on system test)	Known good boards in stock Options S/W enabled
Shipping *Strategies:* Safe environment	Localization kits Error proof	Robust packaging (multi-ship) Consistent and repeatable	*Implementation:* Auto-switching power supplies		
Customer Installation *Strategies:* Easy	Package recycleability / disposal	Plug and play	*Implementation:* Design for recycleability	Web-based manuals (or CD-Rom)	On demand hard copy
Customer Service *Strategies* Fast time to repair (ease α MTBF) Quick and easy error detection	Easy to isolate FRU Deterministic fault detection Upgradability strategy Backward Compatibility	Defined strategy as part of product spec(redundancy, preventative maintenance, etc.)	*Implementation:* Board level service exchange Disk-based updates Devices in-board programmable	Ergonomic assembly and disassembly Event and error logging Common LED schemes	Robust ESD sensitivity design
Worldwide Distribution and Configuration *Strategies:* Localization kits	Simplify Manifest / bill structure		*Implementation* Simplified product structures	Multi-ship package Auto-switching power supplies	