

Management of Subcontractors

1 Task Force

On average, 40% of production cost is due to material procurement; therefore, subcontractor management is extremely important. It follows that a substantial portion of quality problems is related to the subcontractor. Establishment of a partnership is essential in order for both parties to succeed in their business.

The subcontractor should make a positive contribution to design, production, and cost reduction. Emphasis should be placed on the total material cost, which includes that of price and quality. In order to ensure high quality, ISSI QA and relevant engineering departments are performing on-site process monitoring via a task force unit as shown in Figure 1.

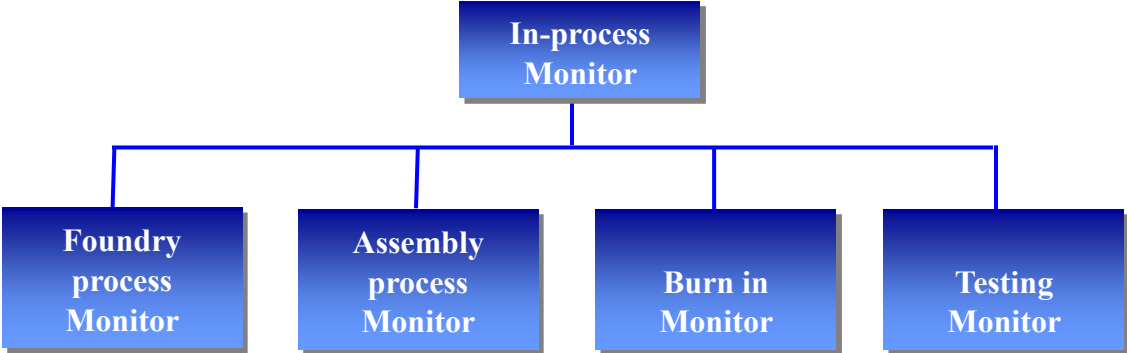


Figure 2-1

2 Methodology

Subcontractor management activities include:

- 1) Subcontractor qualification & Approved Vendor List control
- 2) Control of bill of material (BOM) and process
- 3) Package IQC
- 4) Monthly key process Cpk¹ (> 1.67) report
- 5) Reliability monitoring (plus de-lamination, die crack, and cratering check)
- 6) Foundry/ Assembly/ Testing house rating
- 7) Monthly/ Quarterly meeting with key subcontractors

¹ Cpk is an index of process capability. It measures the process stability with respect to the standards over a certain period. To calculate Cpk, it is necessary to calculate another index, Cp, which measures the data bias toward the standard center.

$$C_p = \frac{(\text{upper limit} - \text{lower limit})}{6\sigma} \text{ and}$$

$$C_{pk} = \frac{|\text{standard limit closest to the average value} - \text{average}|}{3\sigma}$$

where σ is the standard deviation

- 8) In-process monitor
- 9) Process control (Man, Machine, Material, Method)
- 10) Product output (inspect good and reject parts in each stage)
- 11) ISSI finding and reporting
- 12) Subcontractor's action and continuous improvement
- 13) Review FMEA (corrections effectiveness validation)
- 14) Regular and non-regular on side audit

3 Quality Rating / Audit

Subcontractor quality ratings provide an objective measurement of a subcontractor's performance. This measurement will lead to a subcontractor review, allocation of business, and identification of the areas for quality improvement. ISSI subcontractor management team conducts monthly review meeting on subcontractors' performance, product quality and relevant business. It is not only monthly review but also quarterly rating and ranking review meeting at ISSI. In order to continuously improve product quality, ISSI team informs rating and ranking to individual subcontractors in order to ask for improvement actions particularly if the rating is lower than 70%.

ISSI audit team is mainly composed of senior QA engineer, QS engineer and relevant PE, RE, TD, PC engineering people. QA is the leader of annual audit team when performing audit at subcontractor site. Audits are planned at beginning of every year. The annual audit schedule is the basis of the audit plan. Also, a random audit could be performed in case of anomaly or occurrence of a serious product quality problem.

The vendor quality ratings are based on certain measures and are weighted as follows:

Element	Point Value
1. Quality Contribution	40
2. Technology	15
3. Flexibility/ Service	15
4. Cost	15
5. Delivery	15

4 Supplier Relationship

Subcontractor relationship is vital to product quality. In ISSI, bi-directional communication/meetings with suppliers are periodically held to review if the supplier performance follows ISSI's requirements closely. The key communication items are defined in the following diagram (Figure 2-2):

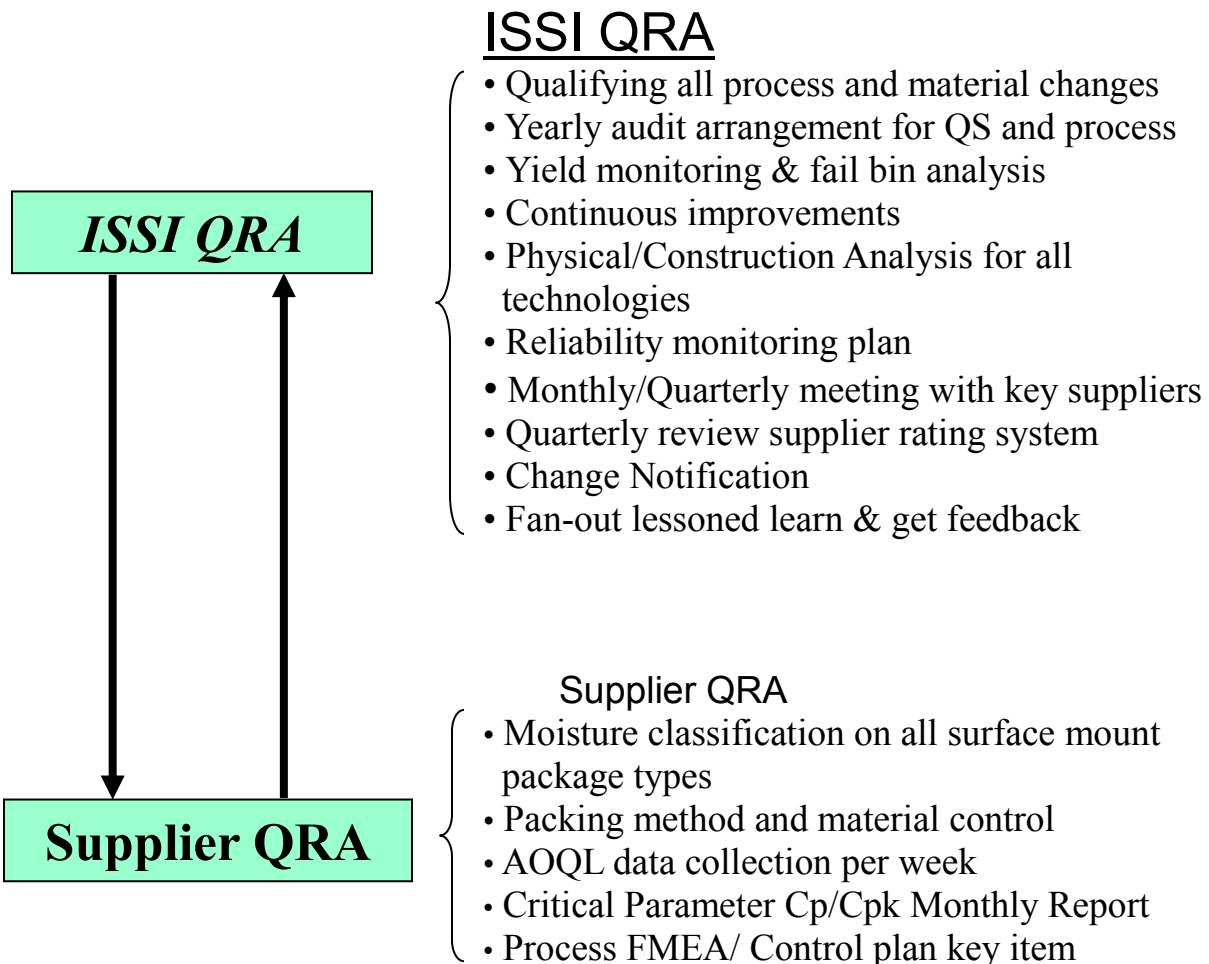


Figure 2-2 Supplier Relationship

5 Subcontractor process control

Following the process flow, the quality control flow along with the process control plan are established for producing either mature packages or advance packages at subcontractor manufacturing process. In order to avoid potential failure, the key characteristics are linked with the living document FMEA which will be reviewed regularly.

ISSI products are manufactured following a developed process control flow and quality control flow. Also, the subcontractor QC staff monitors in-line process and product performance based on defined quality control plan and inspection/test criteria. In case of nonconforming product, subcontractor quality team follows defined procedure to dispose nonconforming product and inform ISSI QA staff if severe quality discrepancy is found.

ISSI QA team is responsible for subcontractor management. The team coordinates with subcontractor in reviewing both process stability and product quality periodically.

If any product quality discrepancy is found, corrective action or improvement action is required. The effectiveness of correction will be tracked and verified in a timely manner by ISSI QA team depending on the severity of the nonconforming event.

6 Production line ESD control/ management

Electrostatic Discharge (ESD) is well known in the semiconductor industry that the IC component could be severely damaged if the ESD program is not well maintained. The ESD protection/wiring was built during the facility construction. In compliance to standard ANSI S20.20/JESD 625/JEDEC JS-001 and JS-002, ESD protection is widely applied in the production line such as personnel conductive garments, footwear, gloves, wrist strap, ESD flooring system, worktable mat, ionizer to neutralize the charge, conductive container. Also, there is an “ESD protected area” sign and a lock gate system installed at front door of ESD sensitive area.

Subcontractors including Foundry Fab, Assembly, Final testing and Packing houses have defined regular monitor schedule to check the personnel grounding and the connection of grounding of machine/working table/stock shelf and mobile push cart in the ESD sensitive area. Also, the ESD resistance is required to be measured and reviewed periodically.

ISSI QA staff is well trained on ESD related knowledge and have practical experiences in the production line. ESD protection is one of check items to be verified when ISSI QA conducts on-site audit. The ESD verification will be commenced once there is ESD damaged product suspected until the concern can be eliminated.