

ISS(EFB) Battery

For MAZDA

2012. 12. 05

SEBANG GLOBAL BATTERY CO LTD

Content

Content

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ISS Battery Design Concept



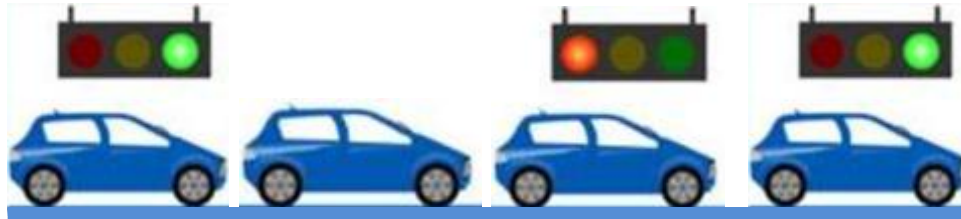
Development Schedule



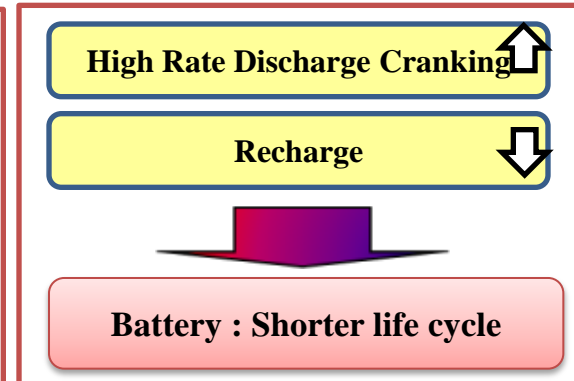
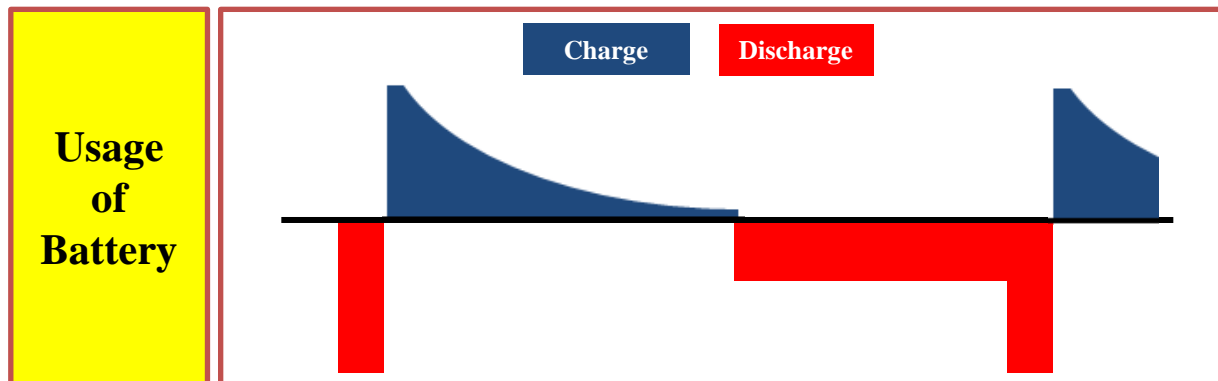
Global ISS (EFB) Battery

ISS Battery Design Concept

Idling Start-Stop System & Battery Design



| | | | | | |
|---------------|-------|-----|------|-------|----------------------------------------------------------------------|
| Engine | Start | Run | Stop | Start | 4~6% up of Fuel Efficiency (Less CO ₂ emission) |
|---------------|-------|-----|------|-------|----------------------------------------------------------------------|



ISS Battery

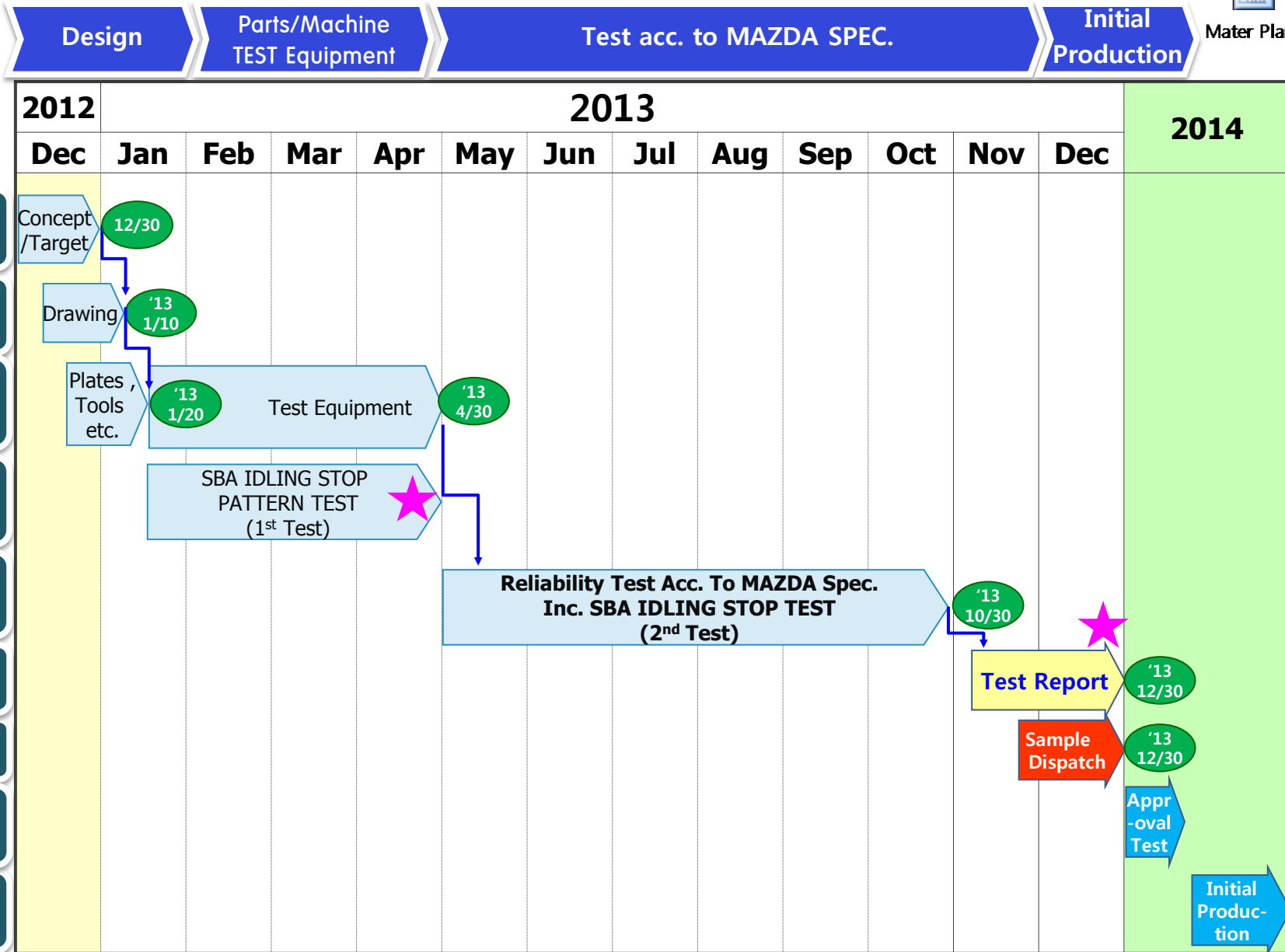
- Required Characteristics**
- Good charge acceptance
 - Better endurance

- EFB Technology**
- Reactive Surface area ↑
 - Prevent sulfation problem
 - Strong active materials by special additives
 - Improve Conductivity and anti-corrosion

Development Schedule



Mater Plan

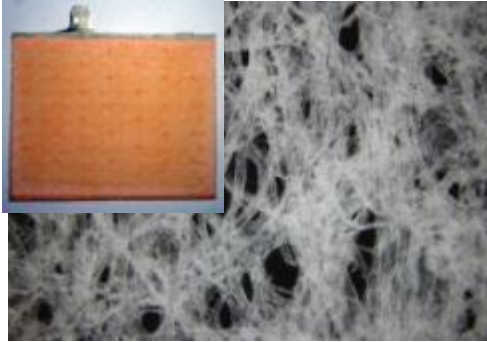
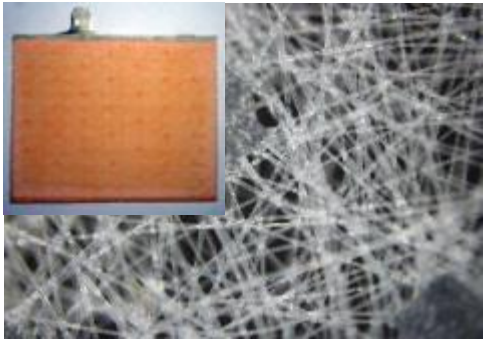
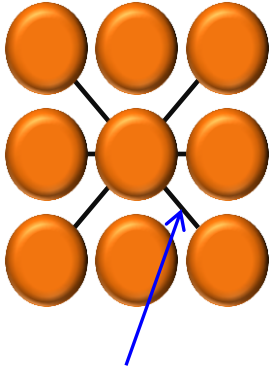
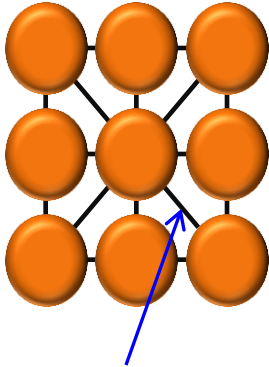


- Plan for Developing
- Design/ Drawing
- Parts/ Machine Tools for Process
- Pre-test for ISS Performance
- Reliability Assurance Test(GBC)
- Test Report
- Sample Dispatch
- Approval Test (MAZDA)
- Initial Production

Initial Production



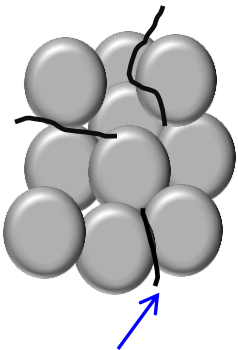
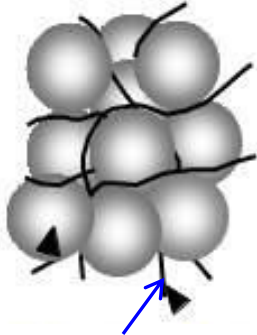
Global ISS(EFB*) Battery_Characteristic

Reinforced Deep Cycle Life_ Positive plate

| Content | Before | After | Remark |
|------------------------------------------------------|---------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| Shrinkage Special Tissue |  Paper |  Special Tissue | Active material Fixing until the end of life |
| Active Material Bonding Agent (Fiber Flock) |  Fiber |  Fiber | |

Global ISS(EFB*) Battery_Characteristic




Reinforced Stop & Start Life_ Negative plate

| Content | Before | After | Remark |
|-------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-------------------------------|
| Roll Expanded Negative Grid |  <p>Cast Strip</p> |  <p>Roll Strip</p> | Anti-Corrosive Negative Grid |
| Increase Carbon and Additives |  <p>Conductive Additive</p> |  <p>Conductive Additive</p> | Charge Acceptance Improvement |

Global ISS(EFB*) Battery_Line Up

*EFB: Enhanced Flooded Battery

GBC Line-up : JIS Type EFB

| JIS type EFB (under developing) | | Q85 | S95 | T110 |
|---------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Outer appearance | |  |  |  |
| Voltage | | 12V | 12V | 12V |
| 20Hr rate Capacity (Ah) | | 65 | 70 | 95 |
| Cold Cranking Amps (CCA) | | 550 | 680 | 760 |
| Dimensions (L×W×H×TH) | | 232×173 ×204×225 | 260×173 ×204×225 | 306×173 ×204×225 |
| Endurance | Idling Start/Stop (SBA spec. 30000 cycle) | 30,000 | 35,000 | 38,000+ |
| | Light load cycle life (JIS spec. 3,400/3,800/4,700cycle) | 6,800 | 7,600 | 9,400 |
| Water Consumption(g/Ah) (EN spec. 1g/Ah) | | 0.8~0.9 | 0.8~0.9 | 0.8~0.9 |
| Weight(kg,max.) | | 17.5 | 20.0 | 23.0 |
| SOP | | 2013.3 | 2013.3 | 2013.3 |