





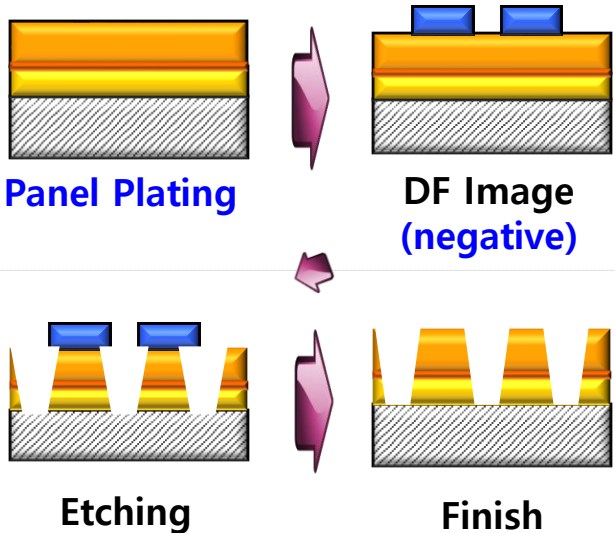
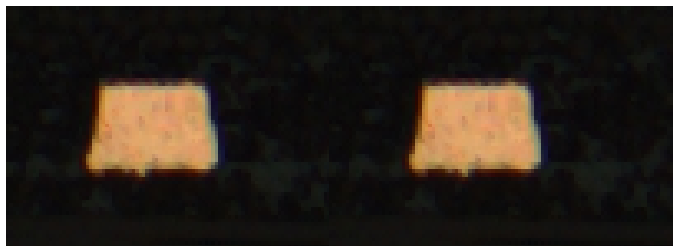
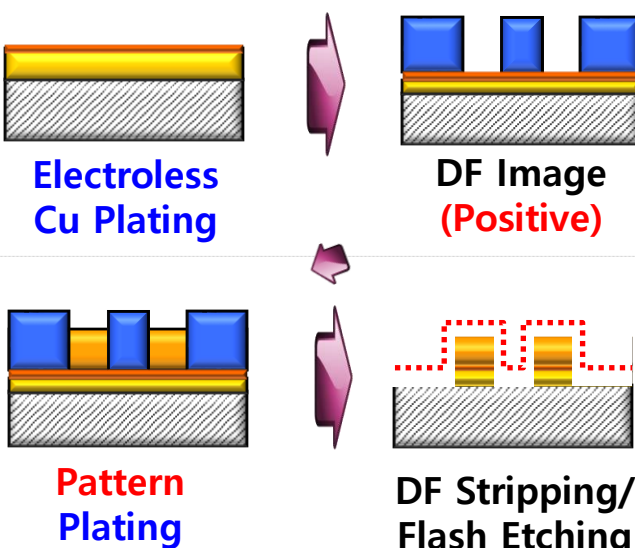




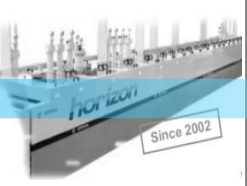





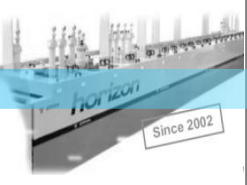










MSAP(Pattern Fill Plating) Concept

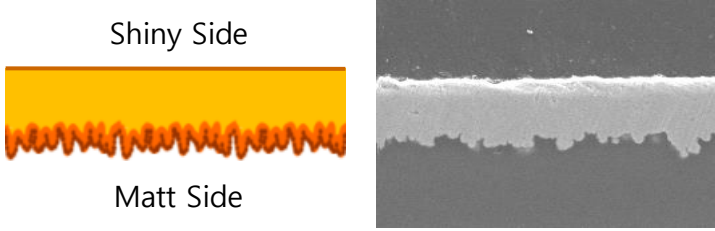
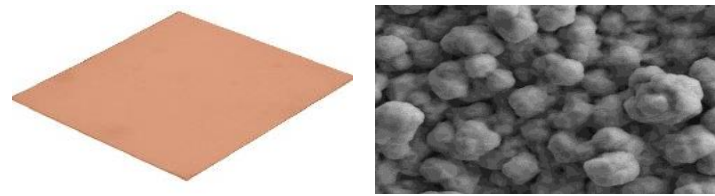
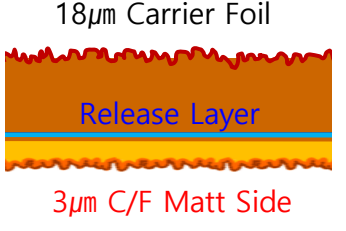
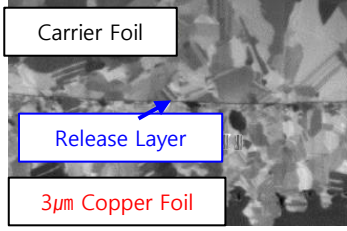
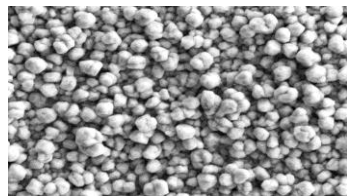



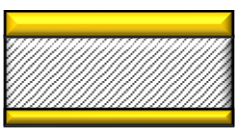
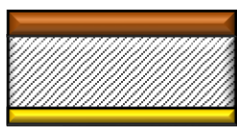
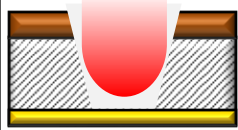




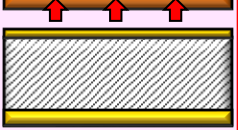

MSAP : Modified Semi Additive Process

Division	Tenting Process	MSAP(Pattern Fill) Process
Definition	Full Panel Plating → DF Image	DF Image → Pattern Plating
Process  <ul style="list-style-type: none">  절연층  Base Cu  화학동  전해동  Dry Film 	 <p>Panel Plating → DF Image (negative)</p> <p>Etching → Finish</p> 	 <p>Electroless Cu Plating → DF Image (Positive)</p> <p>Pattern Plating → DF Stripping/Flash Etching</p> 



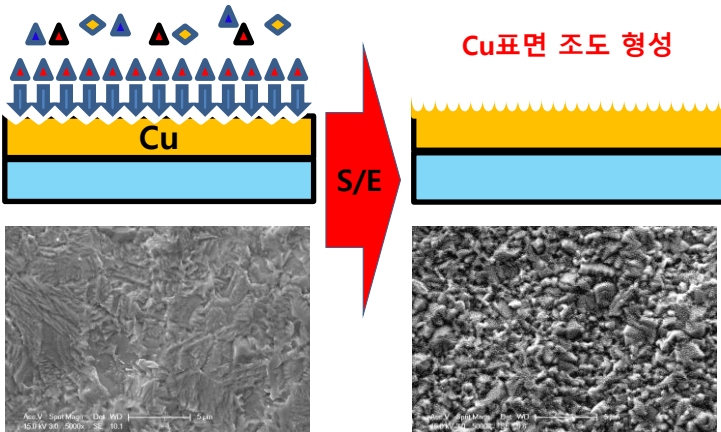
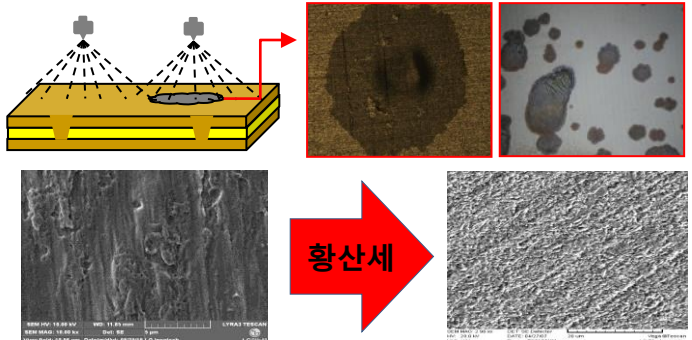
□ Tenting Process & Pattern Fill Process

Division	Process					
Tenting	Oxide	Hot press	CNC/Laser	Desmear	화학동	판넬 Plating
						
	DF 전처리	Exposure	Etching	AOI	<p style="color: red;">Drill/MLB/PSR/ENIG</p> <p style="color: blue;">→ Same Equipments and Same Process</p>	
Pattern Fill <Plating/DF Etc same Equipment>	Oxide	Hot press	CNC/Laser	Desmear	화학동	전처리
					 <p style="background-color: yellow; color: red; text-align: center;">전용</p>	 <p style="background-color: yellow; color: red; text-align: center;">전용</p>
	Exposure	Development	Pattern Fill	DF Stripping	Flash Etching	AOI
 <p style="background-color: yellow; color: red; text-align: center;">전용</p>	 <p style="background-color: yellow; color: red; text-align: center;">전용</p>	 <p style="background-color: yellow; color: red; text-align: center;">전용</p>	 <p style="background-color: yellow; color: red; text-align: center;">전용</p>	 <p style="background-color: yellow; color: red; text-align: center;">전용</p>		

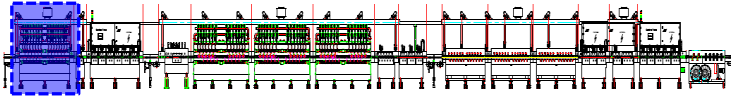

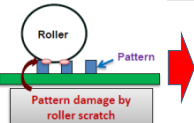
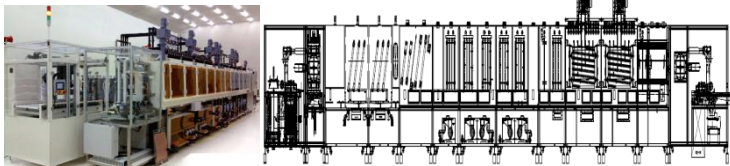

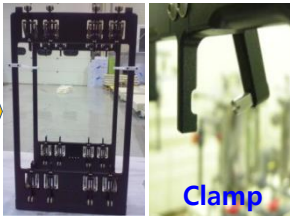

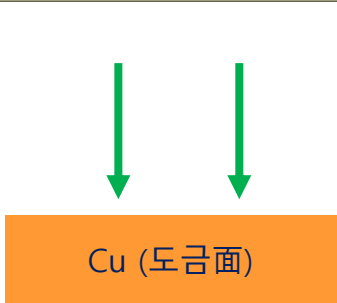
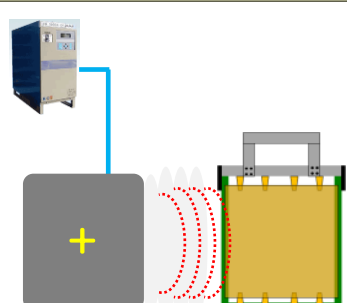
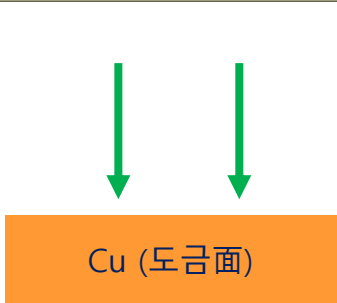
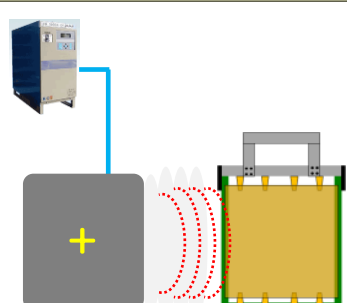
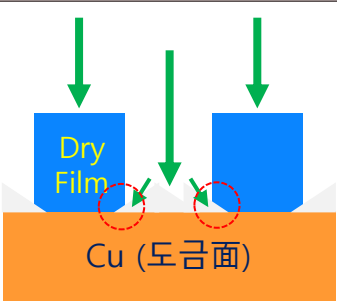
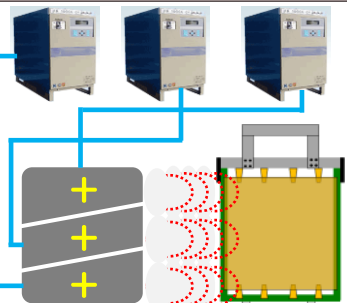
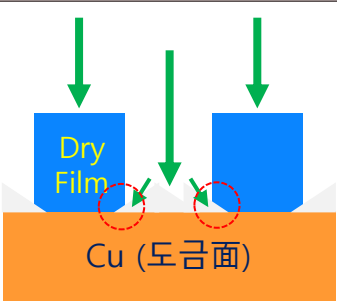
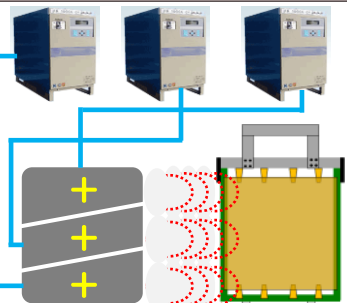
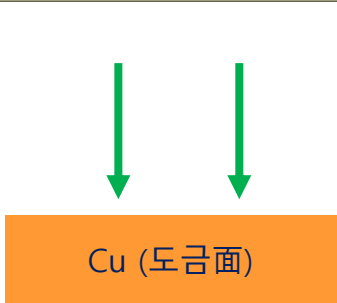
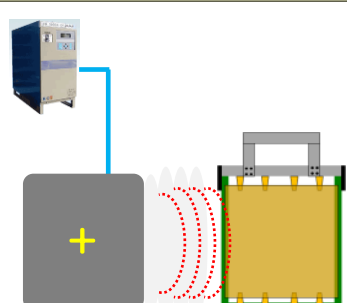
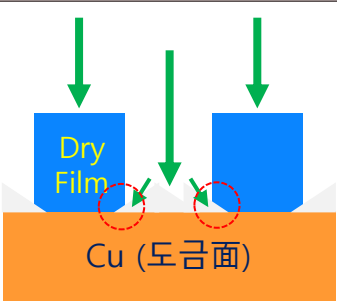
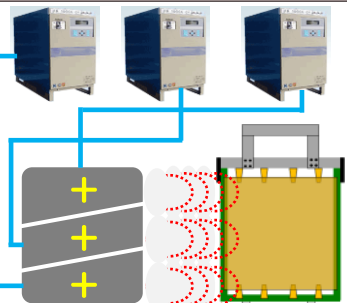
MSAP/Tenting Major Process

Division	Tenting	MSAP(Pattern Fill)
<p>Material <Cu foil></p>	<p>• 8μm C/F (VLP) - ILJIN</p> <p>Shiny Side</p>  <p>Matt Side</p> 	<p>• 3μm C/F (ULP)+ Carrier - Mitsui</p> <p>18μm Carrier Foil</p>  <p>Release Layer</p> <p>3μm C/F Matt Side</p>  <p>Carrier Foil</p> <p>Release Layer</p> <p>3μm Copper Foil</p> 
<p>Carrier Cu Detach</p>	<p>Press → Oxide → DLD</p>       <p>Laminating Surface Treatment Laser Process</p>	<p>Press → Carrier C/F Detach → DLD</p>       <p>Lamination Carrier Separation Laser Process</p>

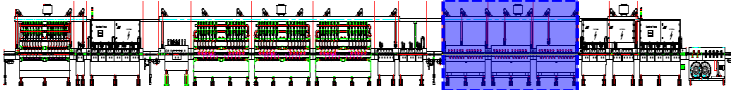

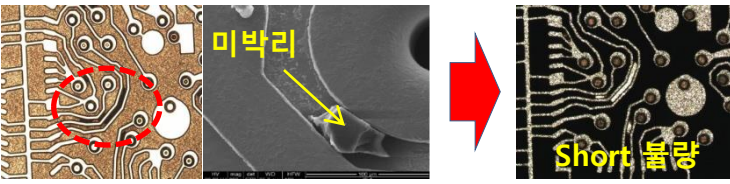
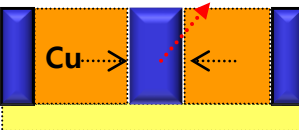

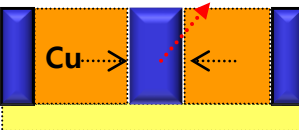

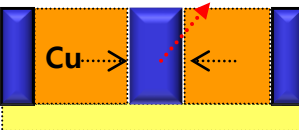

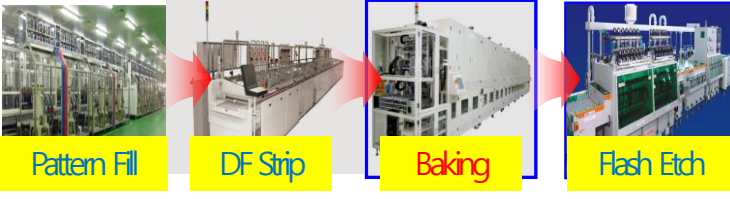
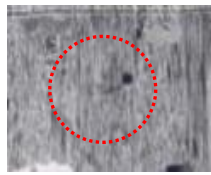
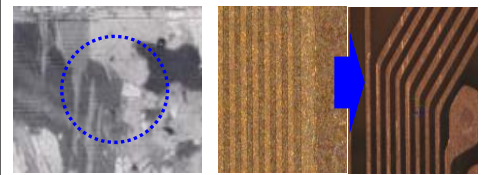
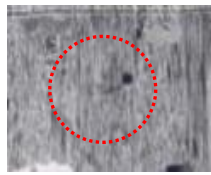
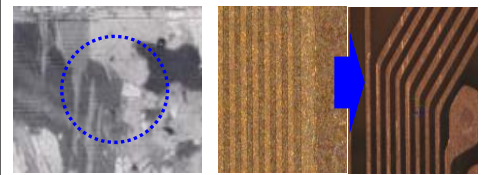
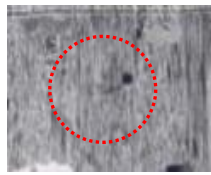
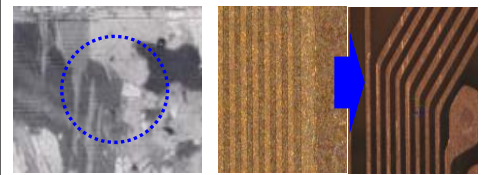
MSAP/Tenting Major Process

Division	Tenting	MSAP(Pattern Fill)
Chemical Cu Plating	 <p>화학동 ↓ 전기동</p> <p>화학동 두께 0.3~0.6μm Conventional Ion Type 약품</p>	 <p>화학동 ↓ DF ↓ 전기동</p> <p>화학동 두께 0.6~1.0μm 전용 Line, 전용 약품 필요</p>
DF Pretreatment	<p>목적 : 조도형성을 통한 Dry-Film 밀착력 증대</p>  <p>Cu S/E Cu표면 조도 형성</p>	<p>목적 : 표면 이물 및 표면 산화 제거</p>  <p>황산세</p> <p>※ 조도 미흡에 의한 Film 밀착력 ↓ → MSAP 전용 Dryfilm 적용 (RD-1225 등)</p>

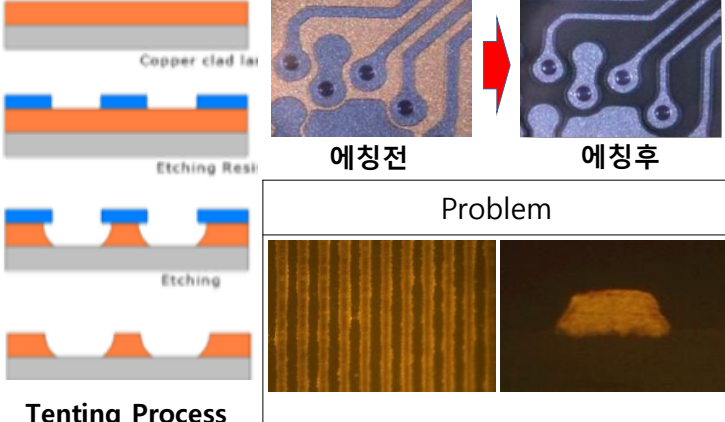
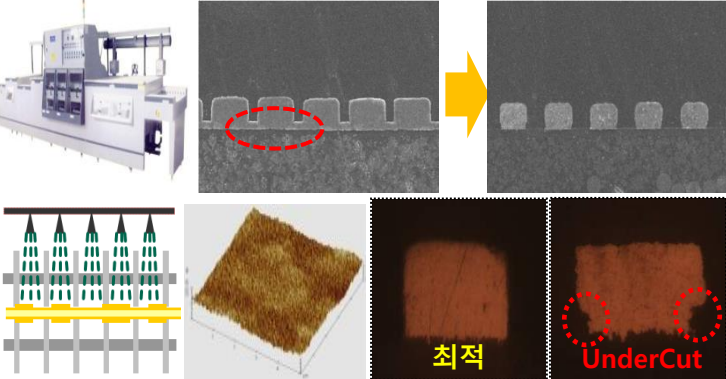










MSAP/Tenting Major Process

Decision	Tenting	MSAP(Pattern Fill)								
DF Development	<p style="text-align: center;">현상 後 Etching Inline 연결 (수평 장비)</p>  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>현상단 기능</p>  <p>현상액 spray 노광부</p> <p>미노광 부분의 Dry-Film을 K_2CO_3 약품으로 제거</p> </div> <div style="text-align: center;"> <p>수평장비 문제점</p>  <p>Roller Pattern Pattern damage by roller scratch</p> <p>컨베이어와 접촉으로 인한 미세 회로 불량 증 가</p> </div> </div>	<p style="text-align: center;">현상 後 Unloading (수직 장비)</p>  <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Robot Arm</p>  </div> <div style="text-align: center;"> <p>Clamp</p>  </div> <div style="text-align: center;"> <p>수직 이송</p>  </div> </div> <p style="text-align: center;">Jig Clamp 적용으로 Non Contact 상태에서 수직 이송</p>								
Electric Cu Plating	<table border="1" style="width: 100%; text-align: center;"> <tr> <th style="background-color: #ffffcc;">산탈지</th> <th style="background-color: #ffffcc;">유산동</th> </tr> <tr> <td>  <p>Cu (도금面)</p> <p>Copper部 Cleaning</p> </td> <td>  <p>일체형 일반 Insoluble Anode</p> </td> </tr> </table>	산탈지	유산동	 <p>Cu (도금面)</p> <p>Copper部 Cleaning</p>	 <p>일체형 일반 Insoluble Anode</p>	<table border="1" style="width: 100%; text-align: center;"> <tr> <th style="background-color: #ffe6e6;">산탈지</th> <th style="background-color: #ffe6e6;">유산동</th> </tr> <tr> <td>  <p>Dry Film</p> <p>Cu (도금面)</p> <p>Dry Film Attack 방지 전용 산탈지 사용</p> </td> <td>  <p>3단 분리형 Anode 상중,하 두께 Control</p> </td> </tr> </table>	산탈지	유산동	 <p>Dry Film</p> <p>Cu (도금面)</p> <p>Dry Film Attack 방지 전용 산탈지 사용</p>	 <p>3단 분리형 Anode 상중,하 두께 Control</p>
산탈지	유산동									
 <p>Cu (도금面)</p> <p>Copper部 Cleaning</p>	 <p>일체형 일반 Insoluble Anode</p>									
산탈지	유산동									
 <p>Dry Film</p> <p>Cu (도금面)</p> <p>Dry Film Attack 방지 전용 산탈지 사용</p>	 <p>3단 분리형 Anode 상중,하 두께 Control</p>									

MSAP/Tenting Major Process

Division	Tenting	MSAP(Pattern Fill)				
<p>DF Stripping</p>	<p style="text-align: center;">부식 後 Inline 연결</p>  <p style="text-align: center;">Develop → Etching → Stripping</p> <p>▶ Stripping Mechanism</p>  <p>[박리 前] [박리 中-팽윤(팽창)] [박리 後] [박리 後]</p>	<p style="text-align: center;">도금 後 잔여 Dry-Film 제거</p>  <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Problem</th> <th style="width: 50%;">개선 방안</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  <p>DFR 미박리</p> <p>Cu → ←</p> <p>도금시 팽창 → 미박리 발생</p> </td> <td style="text-align: center;">  <p>박리 디스미어</p> <p>전용박리액 사용 및 디스미어 Inline</p> </td> </tr> </tbody> </table>	Problem	개선 방안	 <p>DFR 미박리</p> <p>Cu → ←</p> <p>도금시 팽창 → 미박리 발생</p>	 <p>박리 디스미어</p> <p>전용박리액 사용 및 디스미어 Inline</p>
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 <p>DFR 미박리</p> <p>Cu → ←</p> <p>도금시 팽창 → 미박리 발생</p>	 <p>박리 디스미어</p> <p>전용박리액 사용 및 디스미어 Inline</p>					
<p>Baking</p>	<p style="text-align: center;">N/A</p>	 <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Baking 前</th> <th style="width: 50%;">Baking 後</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">  <p>Cu조직 불안정</p> </td> <td style="text-align: center;">  <p>Cu조직 안정화 → 에칭성 향상</p> </td> </tr> </tbody> </table>	Baking 前	Baking 後	 <p>Cu조직 불안정</p>	 <p>Cu조직 안정화 → 에칭성 향상</p>
Baking 前	Baking 後					
 <p>Cu조직 불안정</p>	 <p>Cu조직 안정화 → 에칭성 향상</p>					

MSAP/Tenting Major Process

Division	Tenting	MSAP(Pattern Fill)									
Flash Etching	<p>After Developing exposing Copper Etching</p>  <p>에칭전 에칭후</p> <p>Problem</p> <p>Tenting Process</p>	<p>After stripping Copper Seed Layer vertical etching</p>  <p>이방성 Etching 및 High Uniformity 요구</p>									
Loader System	<p>Apply Vertical/ Horizontal</p>  <p>제품 및 공정 특성별 Lo/Un SYSTEM 적용중</p>	<p>Apply Robot Arm and Rack</p> <table border="1" data-bbox="1120 901 1850 1172"> <thead> <tr> <th>Robot Arm</th> <th>Rack</th> <th>Horizontal BOX</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>Before vertical Devel.</td> <td>Develop ~ Baking</td> <td>All process</td> </tr> </tbody> </table> <p>취급 주의 공정 특수 Lo/Un SYSTEM 구축 필요</p>	Robot Arm	Rack	Horizontal BOX				Before vertical Devel.	Develop ~ Baking	All process
Robot Arm	Rack	Horizontal BOX									
											
Before vertical Devel.	Develop ~ Baking	All process									