SMARTDRESS

ADAPTIVE ELECTRODE TIP DRESSING TECHNOLOGY

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Adaptive electrode tip dressing technology

- **Resistance spot welding is a well established process for joining sheet metal**
- **Yet problems with electrode tip maintenance are still a major source of lost production in automotive assembly lines**
- **Setting up tip dressing schedules when starting up a new production line is both time consuming and costly**
- **High rates of electrode wear mean that spot welding of aluminium is not considered economical by most OEMs**

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www.smartdress-project.eu

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- **TWI is involved in an EC funded Framework 7 project aimed to address these issues**

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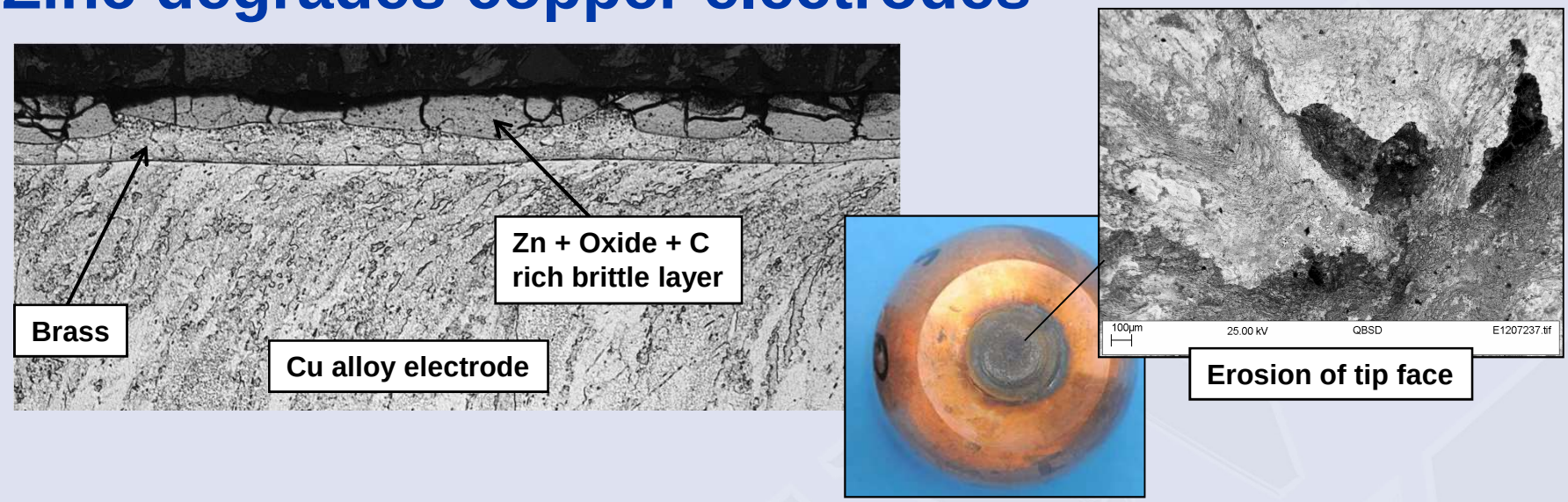
Production life of electrodes

- **Zinc degrades copper electrodes**



- **Typical material removal in tip dressing ~0.1 - 0.3mm**

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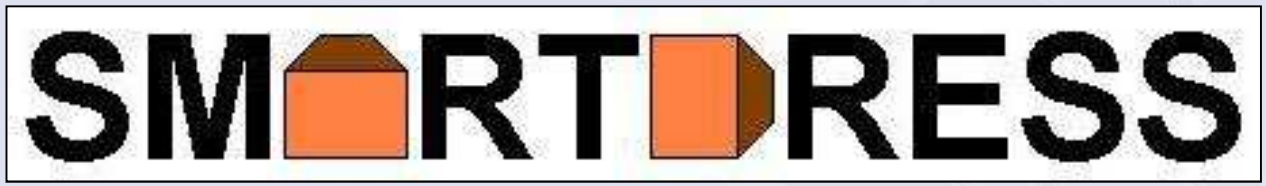
SmartDress system

Deterioration of electrode tip quality responsible for the majority of down time in automotive assembly lines

Reduced frequency of electrode tip changes improves profitability

Slow and costly optimisation of electrode tip dressing during line start-up up phase



Monitoring system:

- Senses electrode tip wear
- Initiates tip repair
- Signals damage to tip dresser

New dresser development for minimal material removal during dressing

Learning operation mode automatically optimises tip dressing schedules during line start-up

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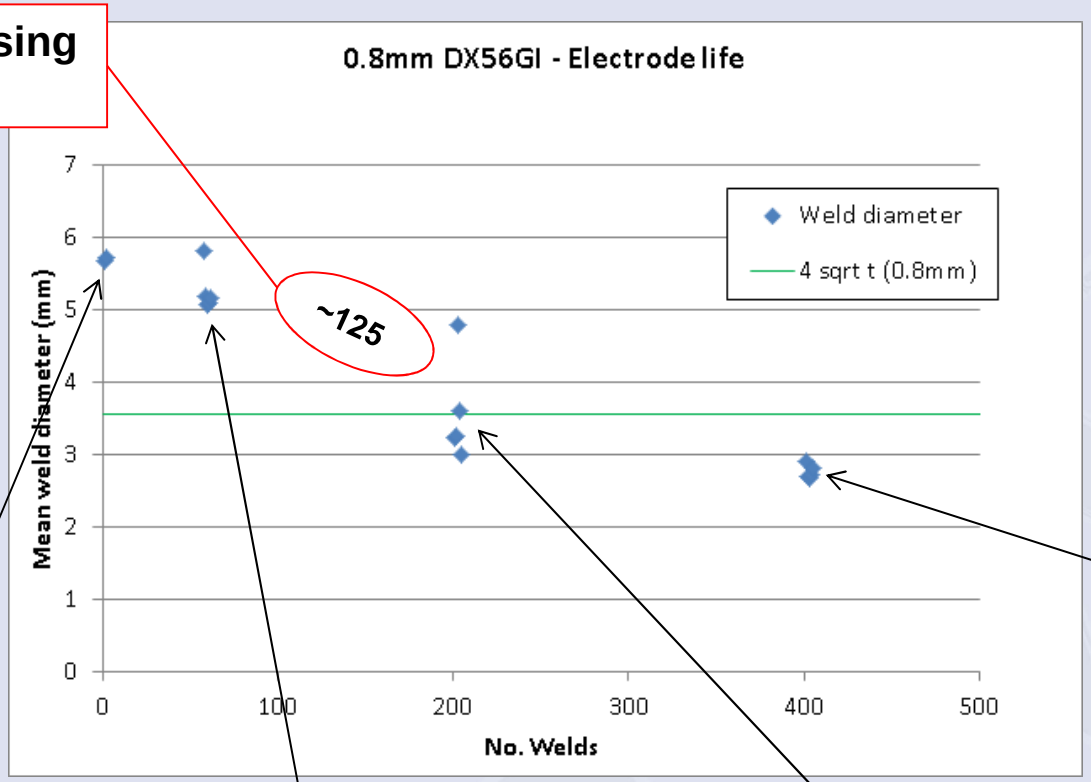
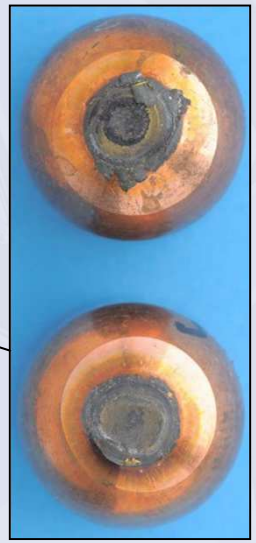
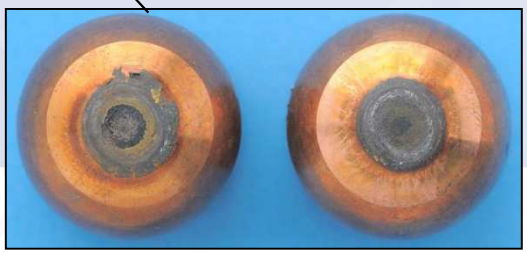
Conventional spot welding of steel sheet: 0.8mm GI – 0.8mm GI

Tip dressing required







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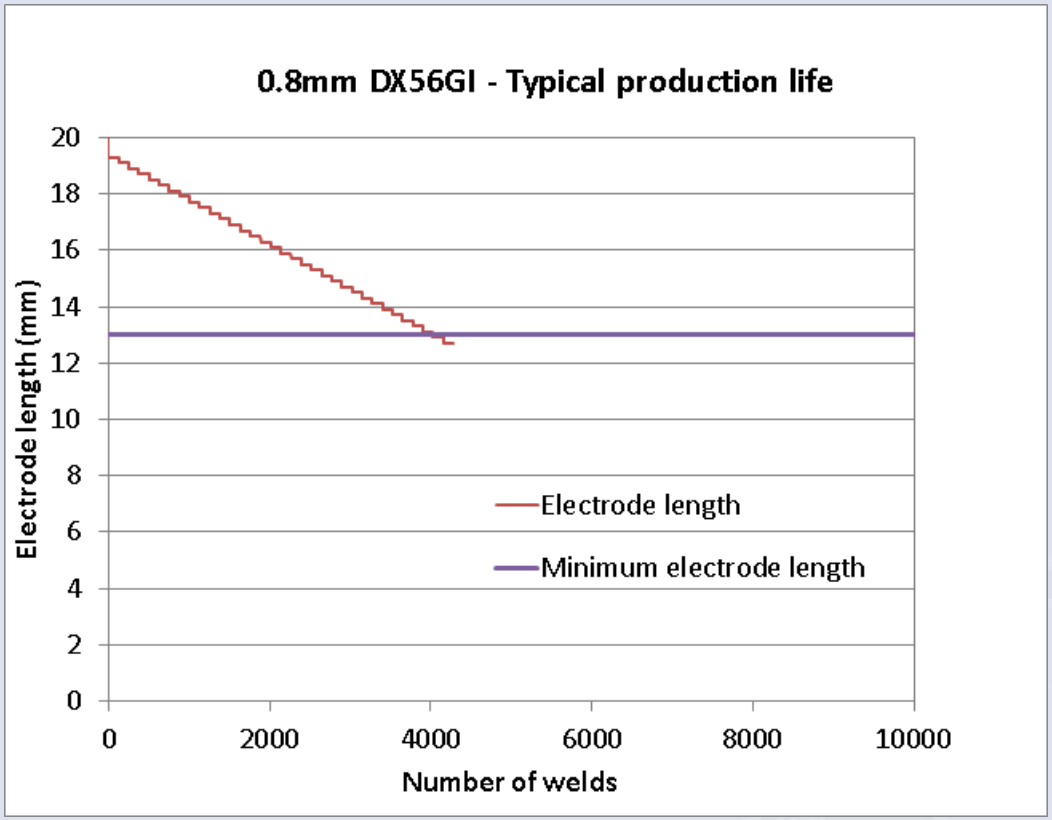
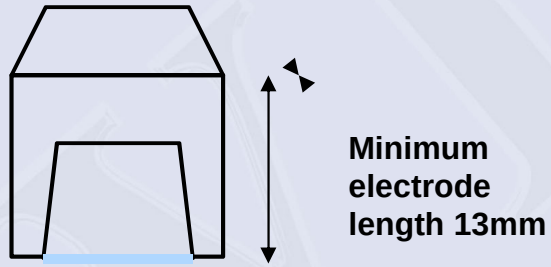
Electrode production life of 0.8mm DX56GI





- Expected production life of electrodes in 0.8mm DX56 GI ~3800 welds
- Optimal electrode dressing of GI steels can achieve 3000 – 8000 welds

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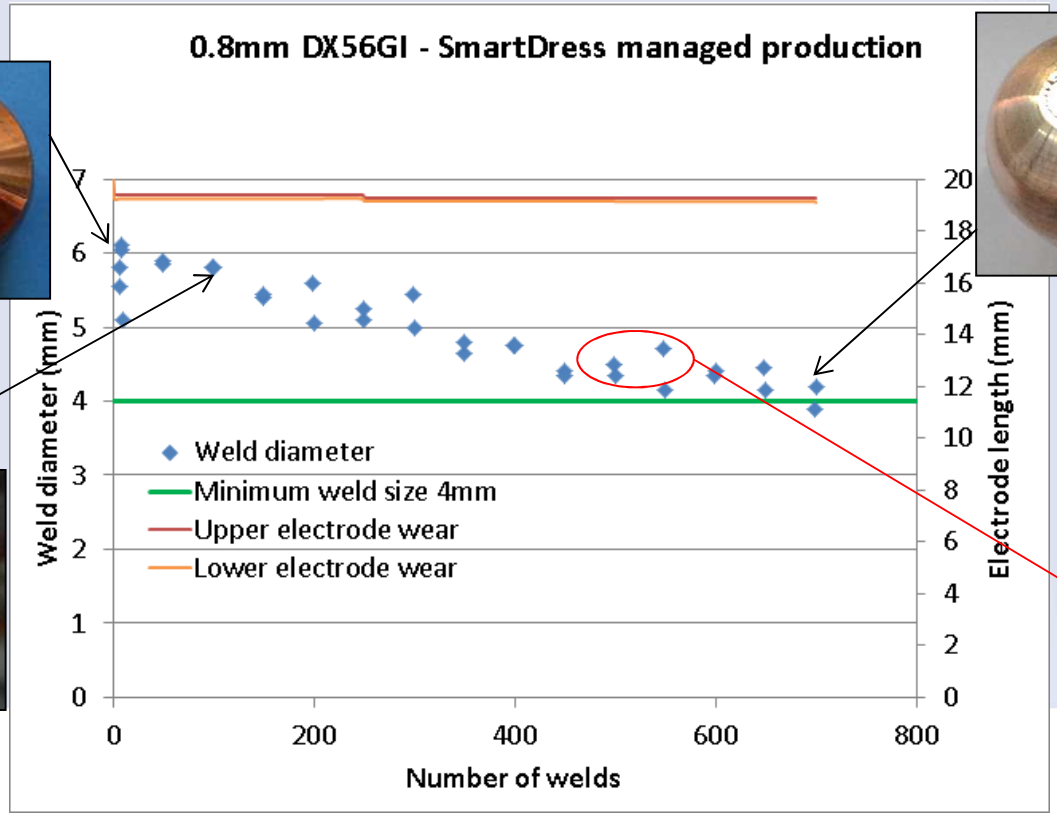
SmartDress trial

- New approach allows frequent ‘cleaning’ with minimal material removal
- More consistent weld quality is achieved



Conventional tip dressing required

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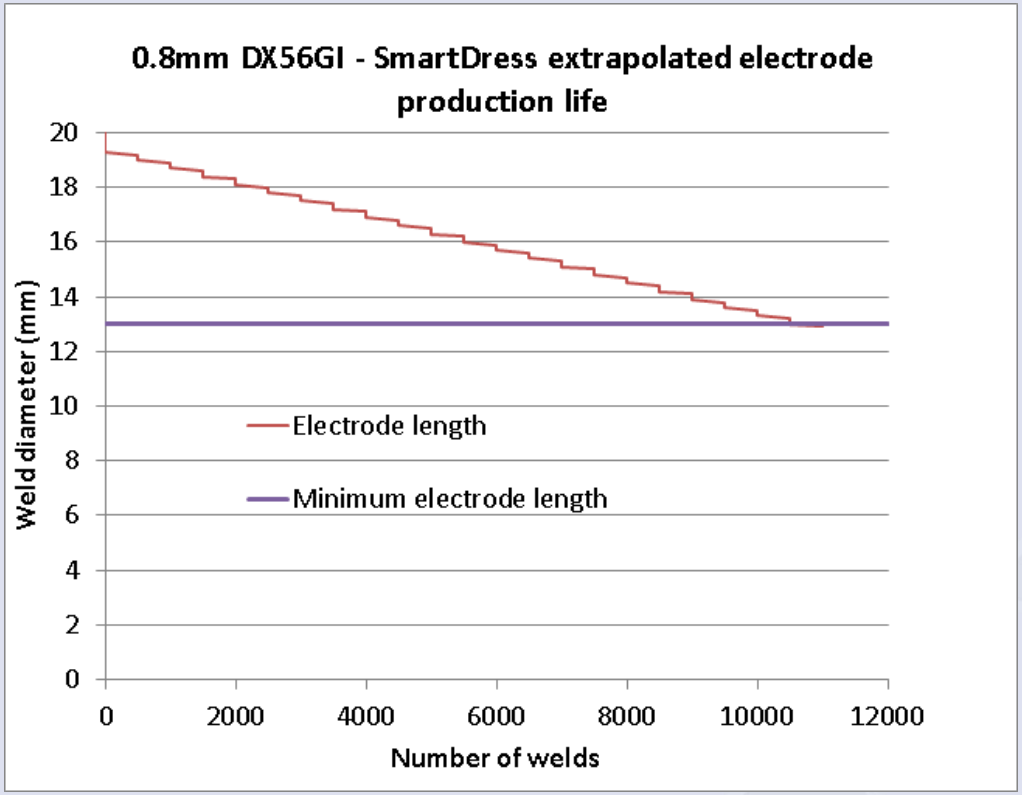
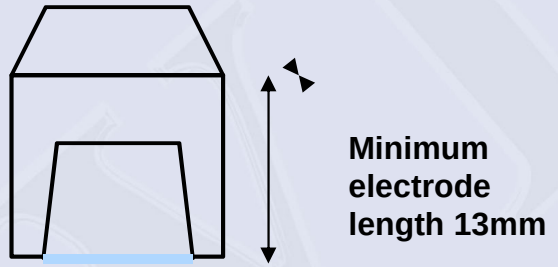
Projected production life





- Expected production life of electrodes in 0.8mm DX56 GI ~10500 welds
- This is an improvement by a factor of 3 in this difficult to weld material combination

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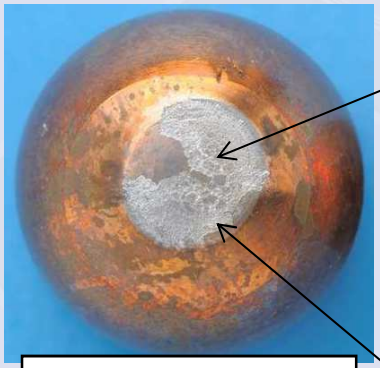
Spot welding aluminium - Challenges

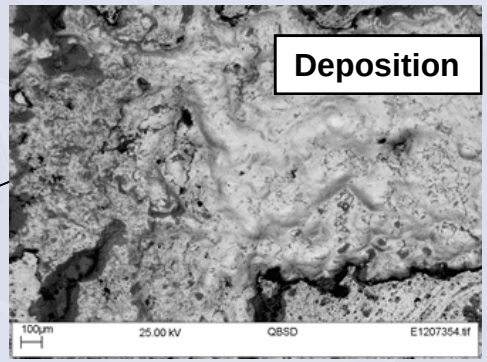
- Aluminium results in rapid electrode wear
- At elevated temperatures copper alloys easily with aluminium
- Very little spot welding of aluminium is used in car production

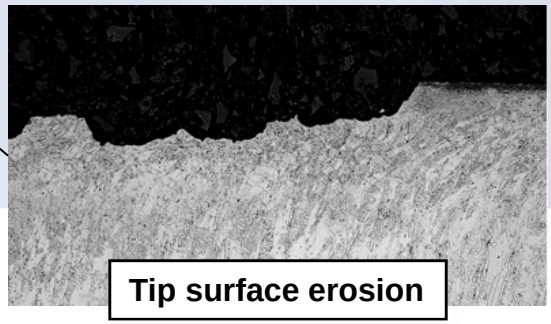
10 welds in Al6XXX

20 welds in Al6XXX



30 welds in Al6XXX





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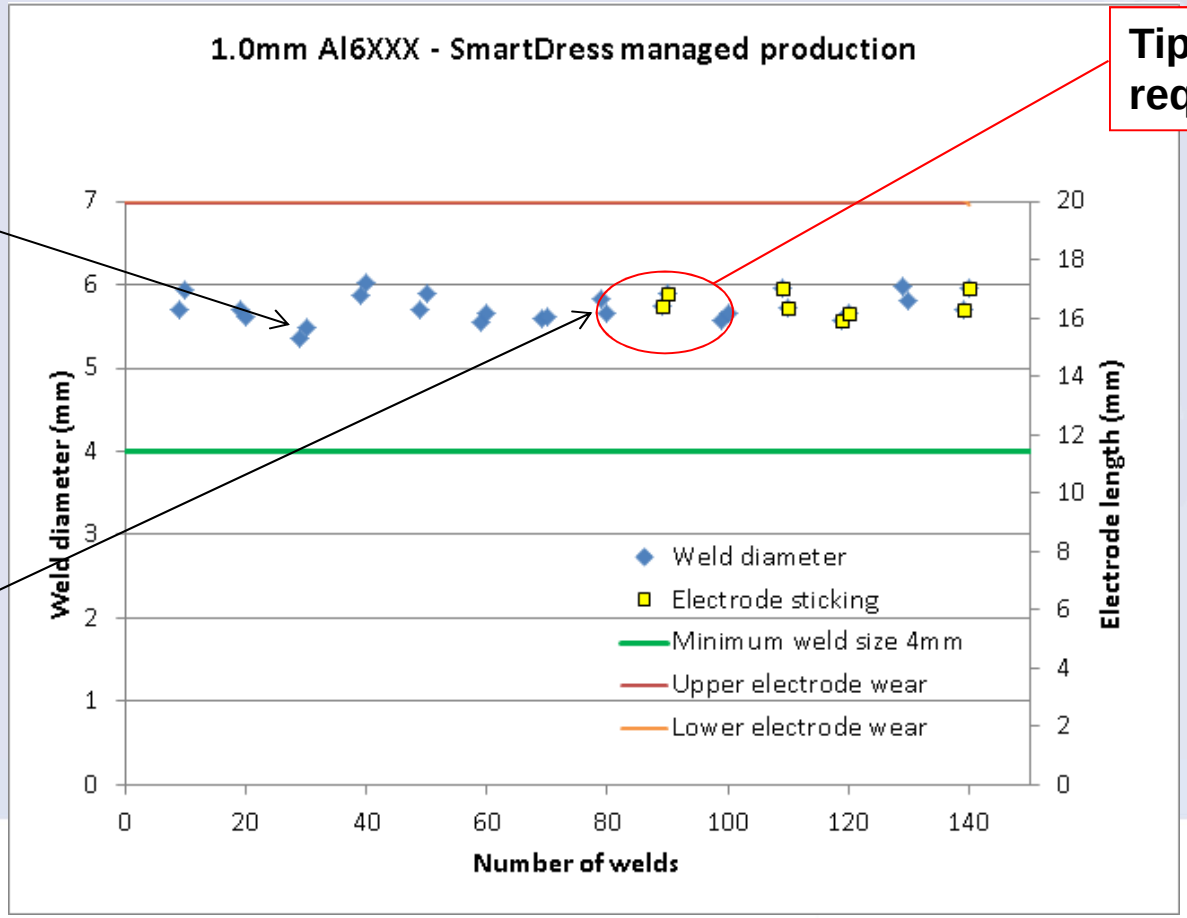
SmartDress trial

- Frequent ‘cleaning’ prevents aluminium contamination
- Weld quality is consistent



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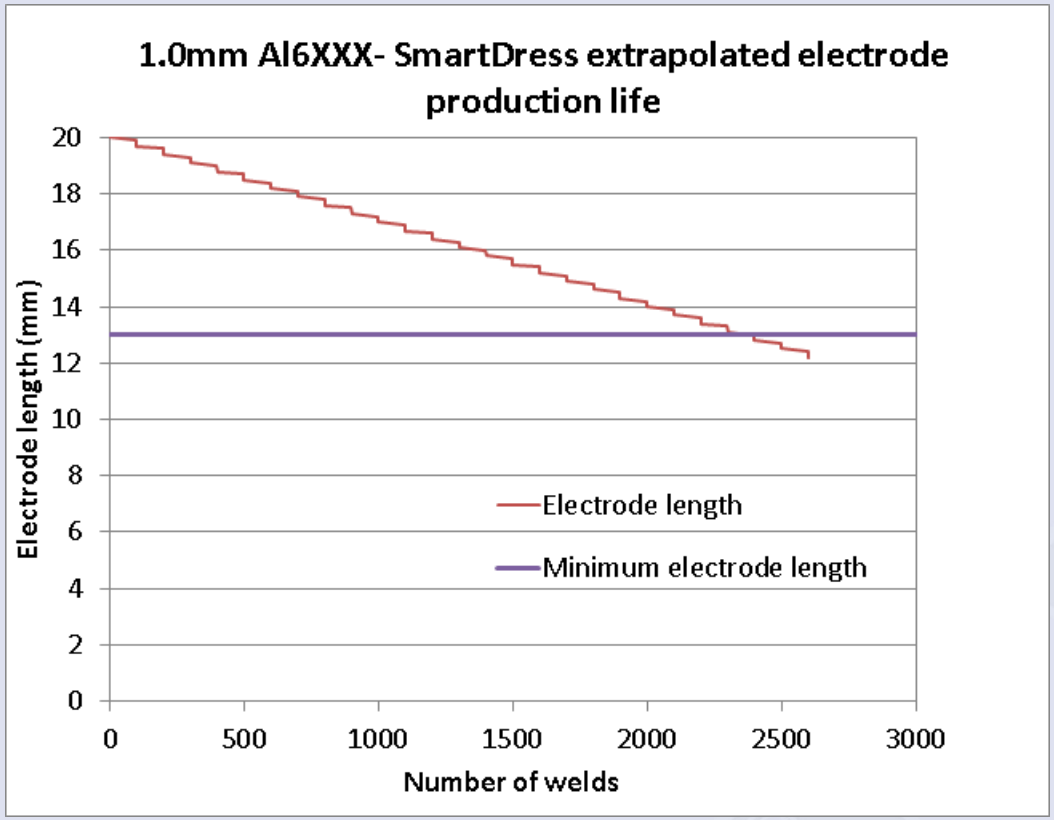
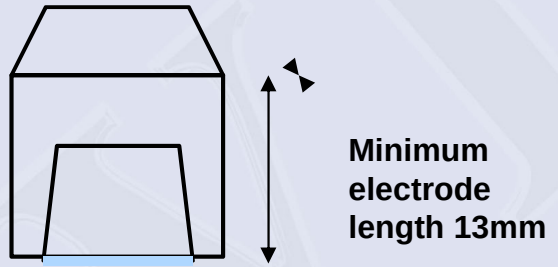
Projected production life





- Expected production life of electrodes in 1.0mm Al6XXX ~2300 welds
- Spot welding of aluminium can become economical

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SmartDress - Summary

- Initial results with the SmartDress system indicate that up to 3 times as many welds can be made with a single pair of electrodes in zinc coated steels
- This means pair of electrodes can last up to 3 production shifts
- SmartDress can enable economical high volume spot welding of aluminium

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