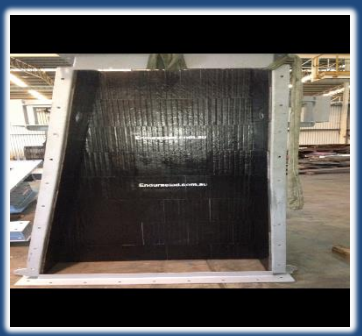
ENDURACLAD
INTERNATIONAL

Forming Enduraclad International (ECI) Overlay Wearplates

July 2020



The standard range of ECI overlay plates can be cold and hot formed into a variety of shapes (including, as an example, curves, pipes, square to round transitions and conical sections) either using rollers or brake press. Our premium range, including tungsten chromium overlay plate has limited formability. When forming our premium range its recommended contacting our technical department.

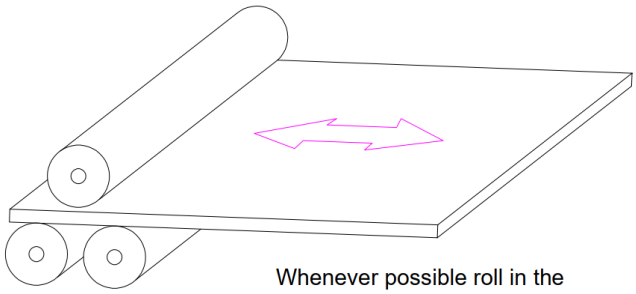
When designing with Enduraclad Overlay (CCO) plate several factors must be taken into consideration. Unlike mild steel or an alloyed quenched and tempered plate, CCO plate does not stretch or compress - this can lead to a developed plate size not being adequate. Also, if the incorrect force or angle is used when forming a plate, the stored energy from the fusion process can be released and will become volatile.

Note:

The recommendations below are not exhaustive and should be considered as guidelines only. Where a radius is required that is outside the guidelines stated within this document, please contact Enduraclad International, technical department.

General Guidelines for processing Enduraclad Overlay

- When using rollers protect the top roll with a sleeve to prevent damage of the Hardfacing, or use a mild steel sheet over the Hardfacing to protect the rollers
- Wherever possible plates should be formed with the weld beads aligned in the direction of rolling



Whenever possible roll in the direction of the overlay beads.

CONTACT US

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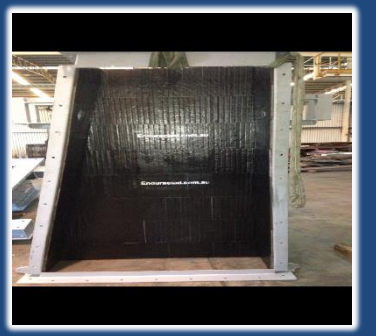
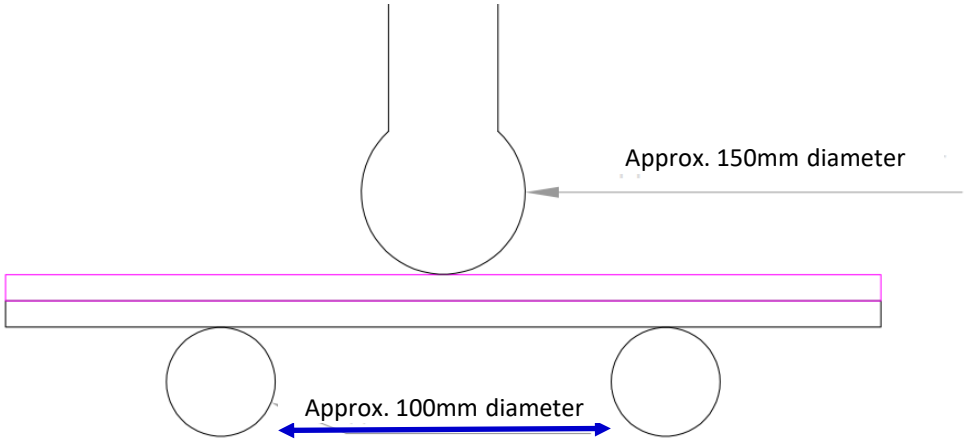
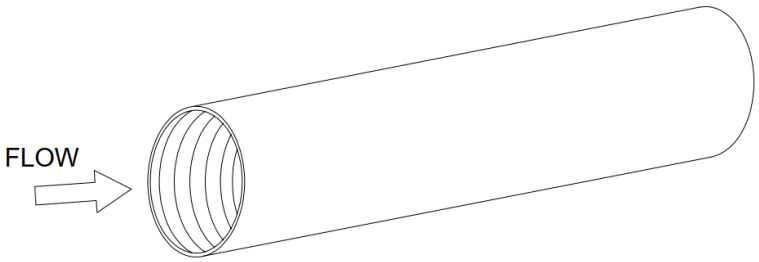


General Guidelines for processing Enduraclad Overlay cont'd..

- Very severe bends should be performed perpendicular to the overlay pass
- During some of the forming processes the overlay may crack and require repair, this is normal for Enduraclad Overlay plate
- Pressing – The forming die is recommended to have a diameter not less than 50mm. Several dies of varying diameters should be considered depending on the final radius / shape required.



- Pipes – Pressing / rolling should be performed so the weld overlay is perpendicular to the flow of material through the pipe.



- Cones and square to round sections should be pressed to achieved correct radius.

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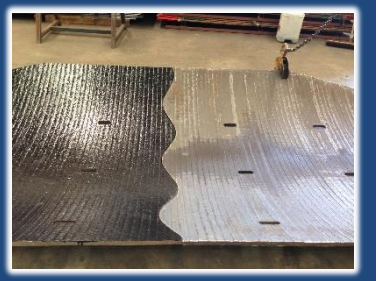

Cold Forming

Suitable plate forming limits – minimum bend radii millimetres.

Thickness Overlay on Mild Steel	Convex External Hardfacing			Concave Internal Hardfacing		
	ECI60, ECI80, ECI90	CTC6000	Emex	ECI60, ECI80, ECI90	CTC6000	Emex
4 on 6	400			150		
6 on 6	500			150		
6 on 8	400			150		
8 on 8	1000	1200+	+	400	500+	+
9 on 10	800	1000+	+	300	400+	+
12 on 12	1000	1200+	+	300	400+	+
17on12	1000	1200+	+	300	400+	+
20on12	1200	1400+	+	450	550+	+
25on12	*	*	*	*	*	*
34on12	*	*	*	*	*	*
40on12	*	*	*	*	*	*
50on12	*	*	*	*	*	*
50on20	*	*	*	*	*	*

* - For heavy plate sections please contact Enduraclad International Technical Department

+ - Subject to application for all enquiries please contact Enduraclad International Technical Department

Hot Forming

For all austenitic grades offered by ECI, applying hot forming temperatures should not exceed 600 C will ensure that there are no significant changes in the properties of the plate. Forming can be assisted by the application of localized heat, using a broad flame oxy- gas torch.

Note:

ECI90 is a martensitic grade, therefore applying heat above 150^{O}C should be avoided.

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Convex

Convex (Hardfacing to the outside diameter) forming has the effect of increasing and/or widening the stress relief cracks within the alloy facing. Experience shows that this should not present problems if the minimum recommended radius is not exceeded. Above this figure there is an increasing chance of spalling and crack propagation into the carbide steel/substrate.

Concave

Concave (Hardfacing to the inside diameter) forming puts the alloy into compression and substrate into tension and has the effect on closing stress relief cracks within the alloy facing. The high compressive strength of the overlay combined with the ductility of the substrate allows far smaller diameters to be formed. The mild steel thickness will influence the final radius when rolling the Hardfacing to the inside diameter. Where a tighter radius is required consideration should be given to increasing the thickness of the mild steel, as it is the mild steel that “stretches” to accommodate the rolling / bending for very tight radius parts.

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