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Coils deformation
Wire rod mill - Ostrava

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October, 15th

Agenda



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Prepare

Diagnose

Design

Implementation

The problem statement worksheet has been finalized



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Problem definition:

How can we decrease the occurrence of physical deformation of wire coils during collection and binding?

Context:

This defect results in downgrading the product – In 2015, 2% of the production was downgraded.

Decision maker: David Rochovansky.
Sponsor: Alan Dornak.

Timeframe till end of PDCA:

Validation of proposal on October, 15th.

Stakeholders:

Plant manager.
Line manager.

How will success be measured?

1.4% of downgraded product due to physical deformation.

Boundary Conditions and potential difficulties:

No additional workforce - No or only limited CAPEX.
Lack of expertise in the group.

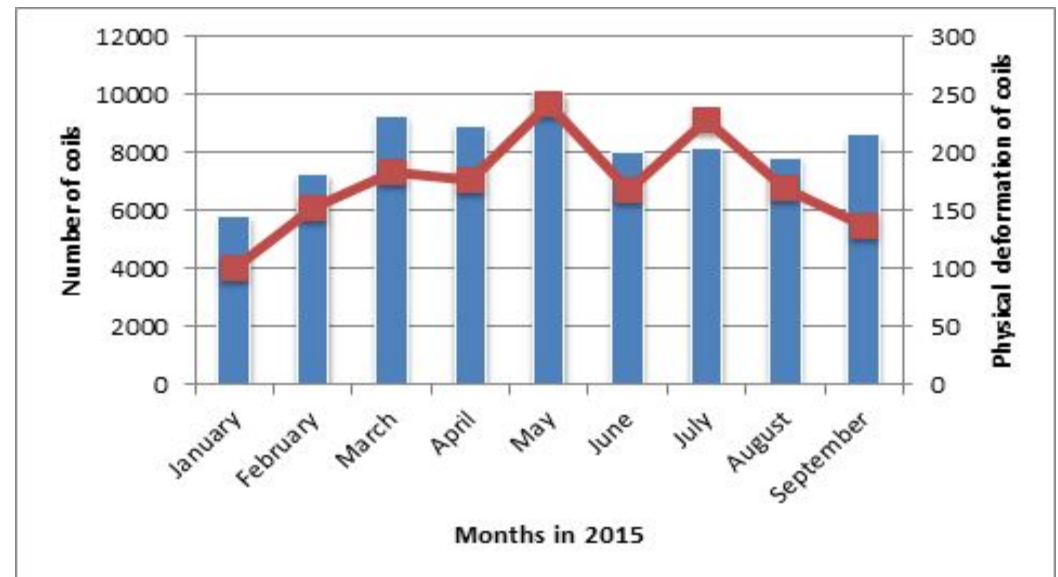
Description of the problem: Deformation of coil



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- In 2015, 2.1 % of the total production is affected by this quality defect. Analysis per criteria not done (data per line, steel grade, ... not available);
- Mostly, the inner part of the coil is affected. No specific position identified (data not available);
- The problem is expected to occur during collection of the wire (gap between bell and thorn). Problem is random, no frequency linked with particular event (ie maintenance event).



Description of the problem has been completed through the shopfloor observation & some interviews

Agenda



Prepare

Diagnose

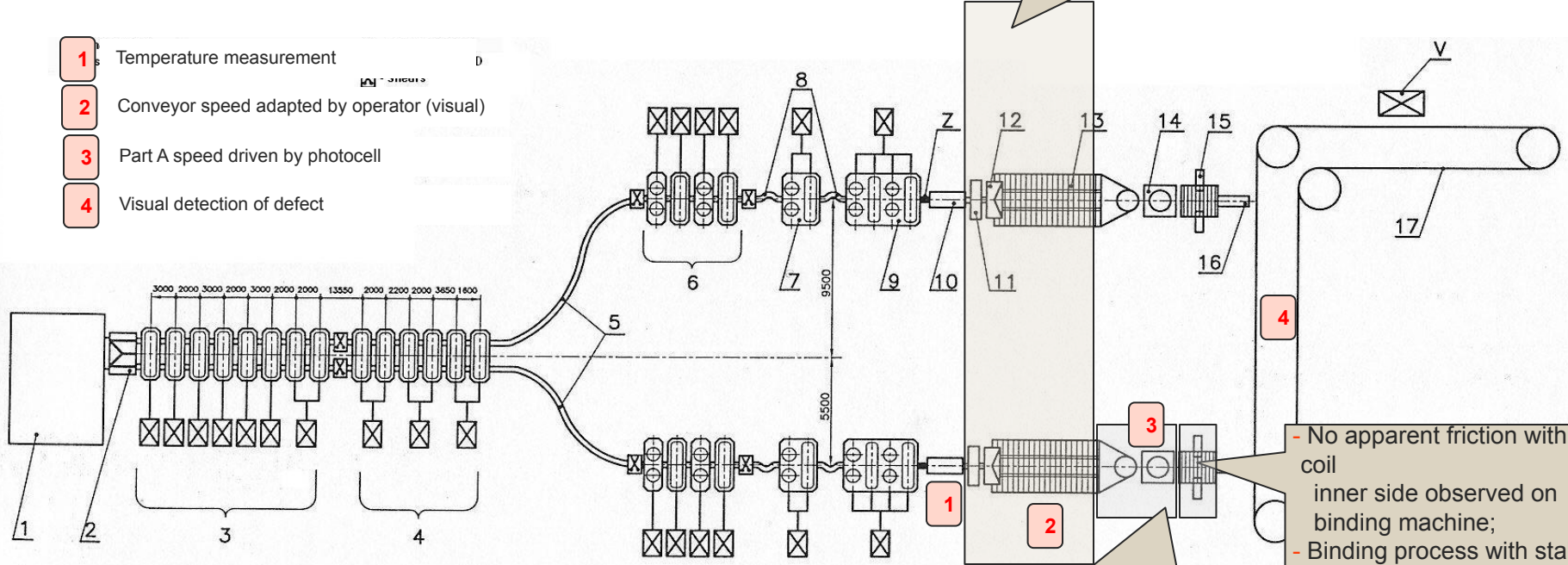
Design

Implementation



DIAGNOSE / Go & See

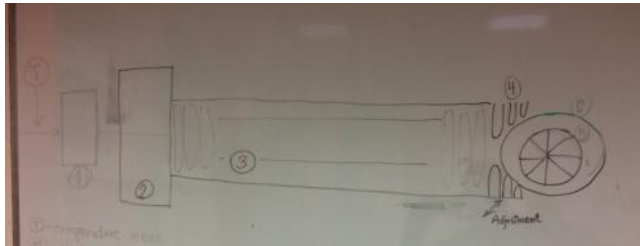
- 1 Temperature measurement
- 2 Conveyor speed adapted by operator (visual)
- 3 Part A speed driven by photocell
- 4 Visual detection of defect



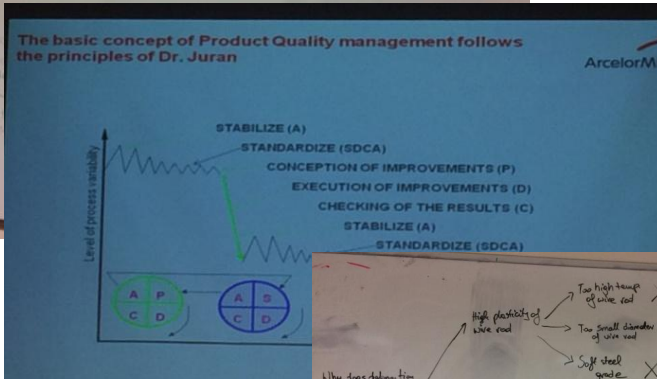
DIAGNOSE / WCM methodology and tools utilized



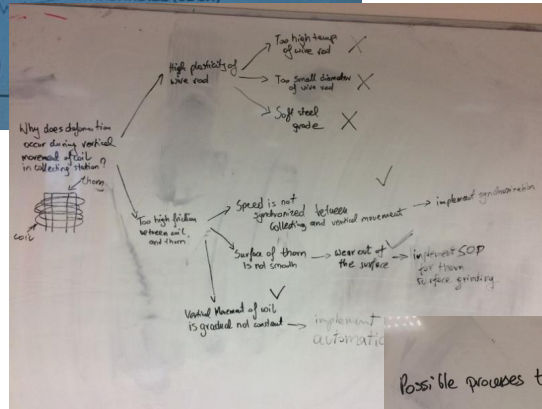
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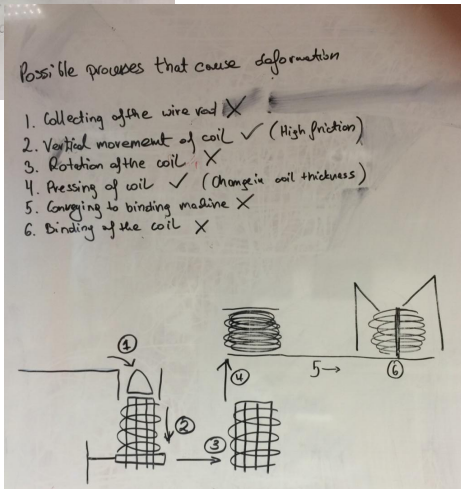
Process mapping;



PDCA cycle;



Why-why analysis;



Brainstorming;



4-phases diagram.

Agenda



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Design\Laying head.

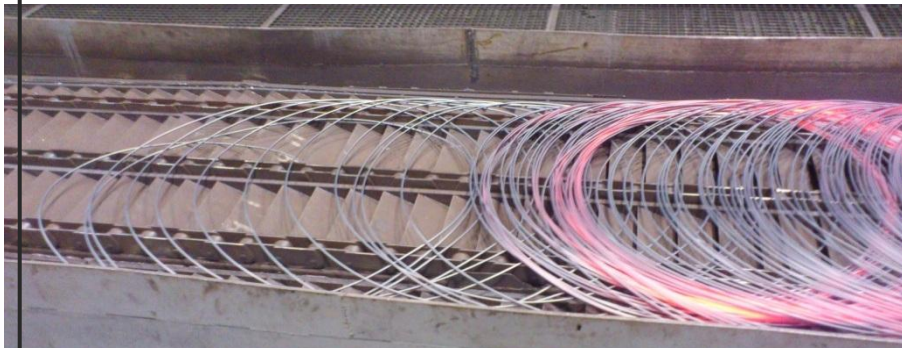


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Problem	Action
Laying head isn't tuned, relates to the diameters of wire.	Establish SOP (Standart operation procedures) for tuning of lying head, relates to the \emptyset of production wire, for avoiding of the separated coils.

Laying bed "B"



separated coils are formated in line "B".

Laying bed "A"

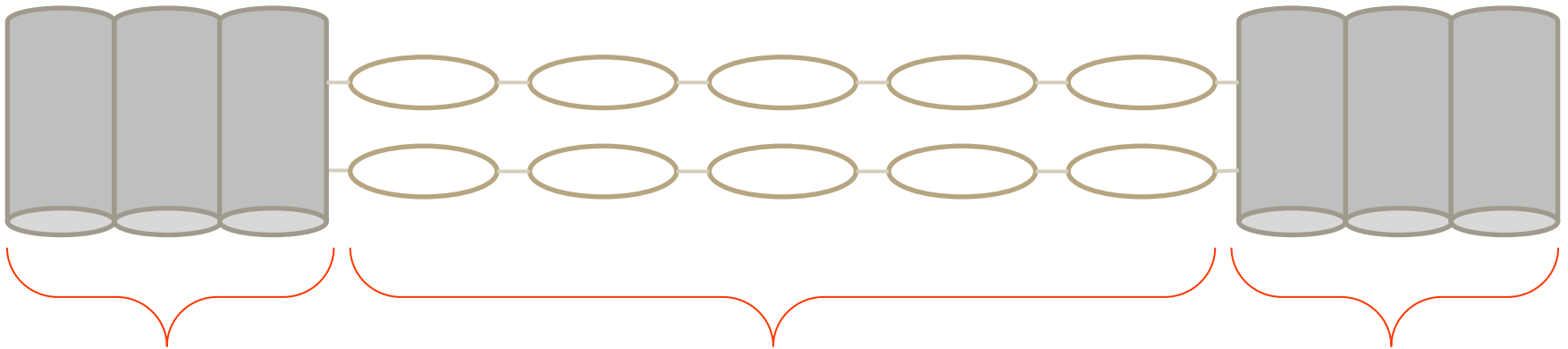


separated coils are not formated in line "A".

Design\Cooling bed.

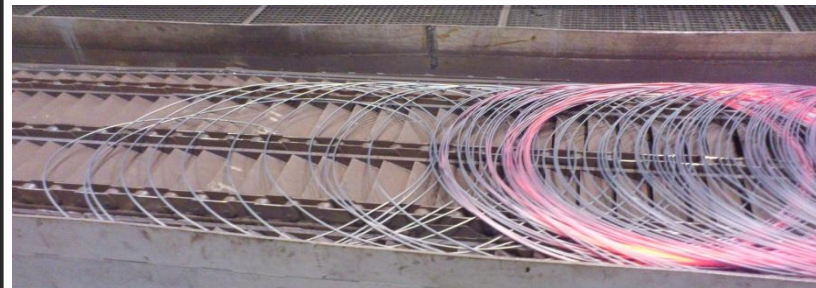


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Cooling bed consists of rollers (the first and the last sections) and chain (in the middle) section.

Problem




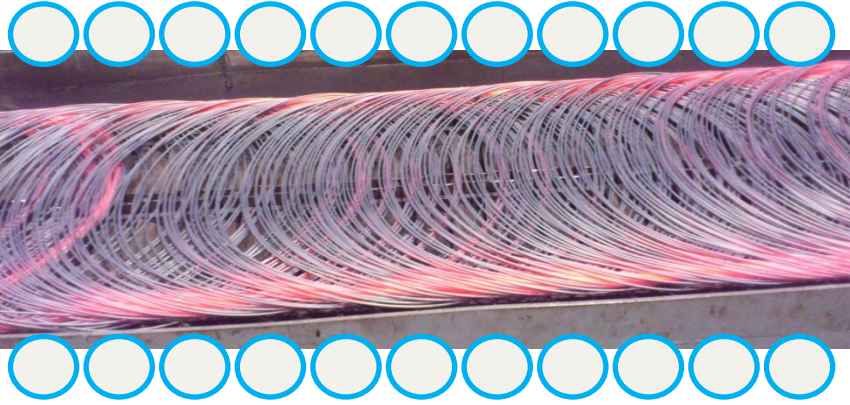
Speed of all f these parts aren't synchronized between each other, what can the problems with formation of separated coils.

Action



Speed of all f these parts must be synchronized between each other for eliminating of stretching or regaining speed of bunch.

Design\Cooling bed.

Problem	Action
	
<p>Along the cooling bed some coils go with differences on the edges.</p>	<p>Along the whole transporter coils must go without any differences on the edges. Our proposal to implement guides (rolls or stands).</p>

Design\Cooling bed-adjustable part.

Problem



Collecting of coils, isn't tuned due to diameters and do not going exactly to the centre of the thorn.

Action

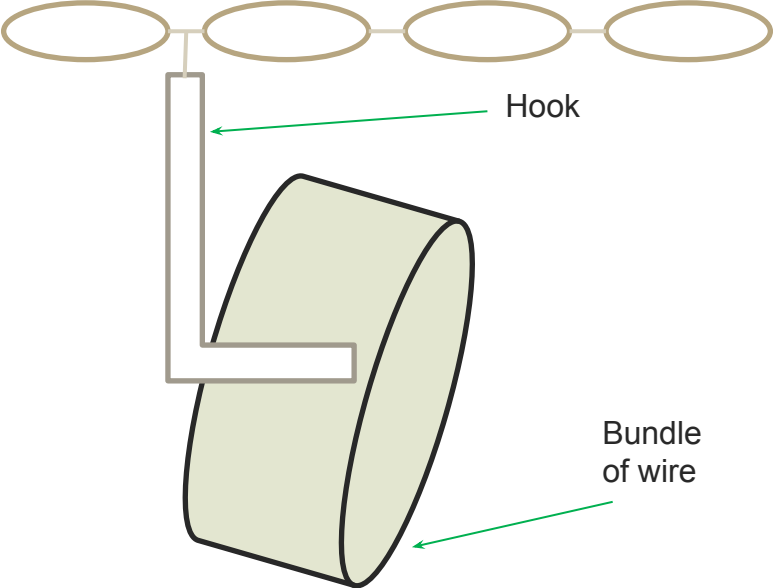
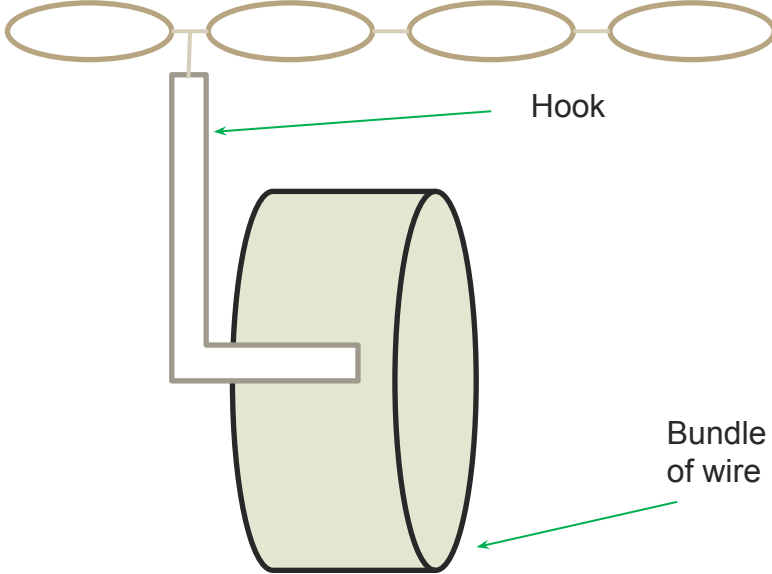


Establish SOP (***Standart operation procedures***) for collecting and going of coils, exactly to the centre of the thorn.

Design\Cooling bed-adjustable part.



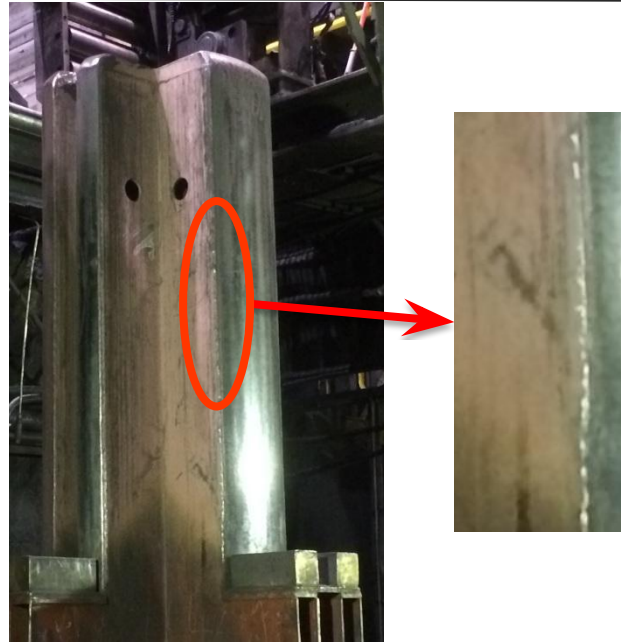
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Problem	Action
 <p>The diagram shows a horizontal chain of four ovals representing a hook. A vertical line descends from the first oval, then turns 90 degrees to the right to form a horizontal arm. A green arrow points from the label 'Hook' to this vertical line. Below the horizontal arm, a green arrow points from the label 'Bundle of wire' to a cylindrical bundle of wire. The bundle is tilted at an angle relative to the horizontal arm.</p>	 <p>The diagram shows a horizontal chain of four ovals representing a hook. A vertical line descends from the first oval, then turns 90 degrees to the right to form a horizontal arm. A green arrow points from the label 'Hook' to this vertical line. Below the horizontal arm, a green arrow points from the label 'Bundle of wire' to a cylindrical bundle of wire. The bundle is positioned directly below the horizontal arm, forming a straight line.</p>
<p>Bundle of wire is transported to the hook under some angle.</p>	<p>Bundle of wire must be transported under the straight angle, for avoiding its movements.</p>



Design\Cooling bed-adjustable part.

Problem\Action



Surface of thorn contact point with inside of the coil is the rough.

Establish SOP (***Standart operation procedures***) for thorn grinding frequency.

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Implementation / Prioritization of actions

N°	Corrective Measure	Priority
1	SOP for tuning of laying head.	1
2	Synchronization of cooling bed speed.	1
3	Implement guides (rolls or stands).	2
4	SOP for adjustable part of cooling bed.	1
5	Automation of vertical movement speed control.	3
6	SOP for grinding of the thorn	1
7	Provide transportation of bundle to the hook in the straight angle.	1



Thank you