

# Vacuum Roll System for establishing a Clean Factory

[A plan to improve leakage of washing unit]

# ❖ Destacker Washing System

## ➤ Comparison between current washing unit and vacuum roll applied washing unit.

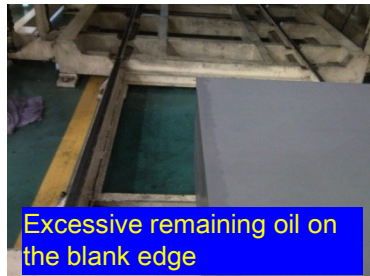
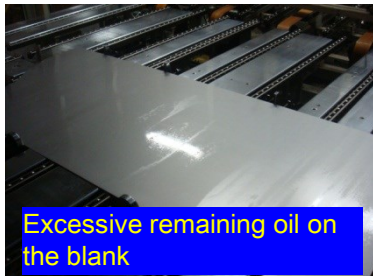
	Before Improvement	After Improvement
Service work	<ul style="list-style-type: none"> <li>● Equipment and floor contamination by Destacker cleaning oil</li> <li>-Oil remaining around blank edge and hole after passing the washing area</li> <li>-Increased oil usage due to large amount of residual oil</li> <li>▶ Contamination of floor and equipment hinders work environment and workers may fall.</li> </ul>	<ul style="list-style-type: none"> <li>● Apply a vacuum suction wringer roll</li> <li>- Apply a system that sucks oil on the coil or blank surface by connecting a vacuum system to a porous special wringer roll</li> <li>▶ Improve the work environment and prevent a safe accident.</li> </ul>

< Press Line >

< 4 Roll Set Washing Unit >

Background

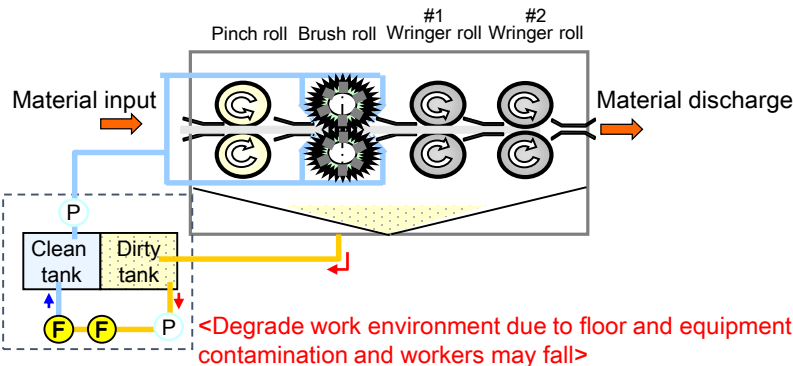
- Remaining oil on the surface of the coil (especially around the rim and holes) passing through the washing unit accumulates and scatters during the first forming process causes external oil contamination on the blanking line.
- Ringer roll transfers the cleaning oil back to the blank after a certain period to increase contamination and rejection rate.
- Introduced a vacuum roll system to improve working environment, prevent worker's fall and enhance the product quality → A system to suck the blank surface oil by forming a vacuum inside a porous special wringer roll



Improvement plan

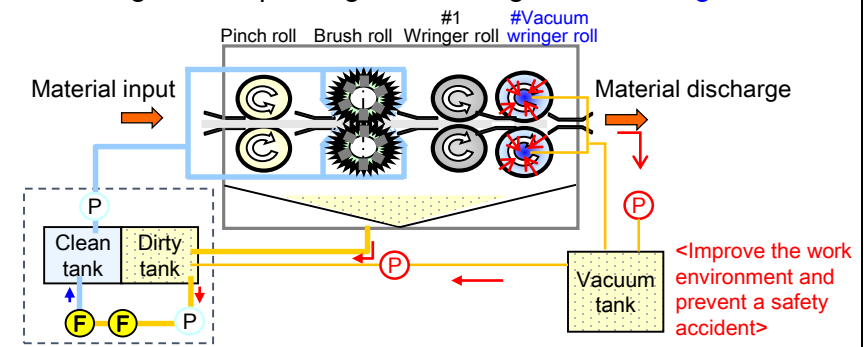
Before improvement

- Cut the cleaning oil by nonwoven fabric wringer roll
- Remaining oil after passing the washing unit : 5 ~ 10g/m<sup>2</sup>



After improvement

- Nonwoven fabric wringer roll cuts the cleaning oil + Superfine fiber wringer roll (suction)
- Remaining oil after passing the washing unit : 0.5 ~ 3g/m<sup>2</sup>

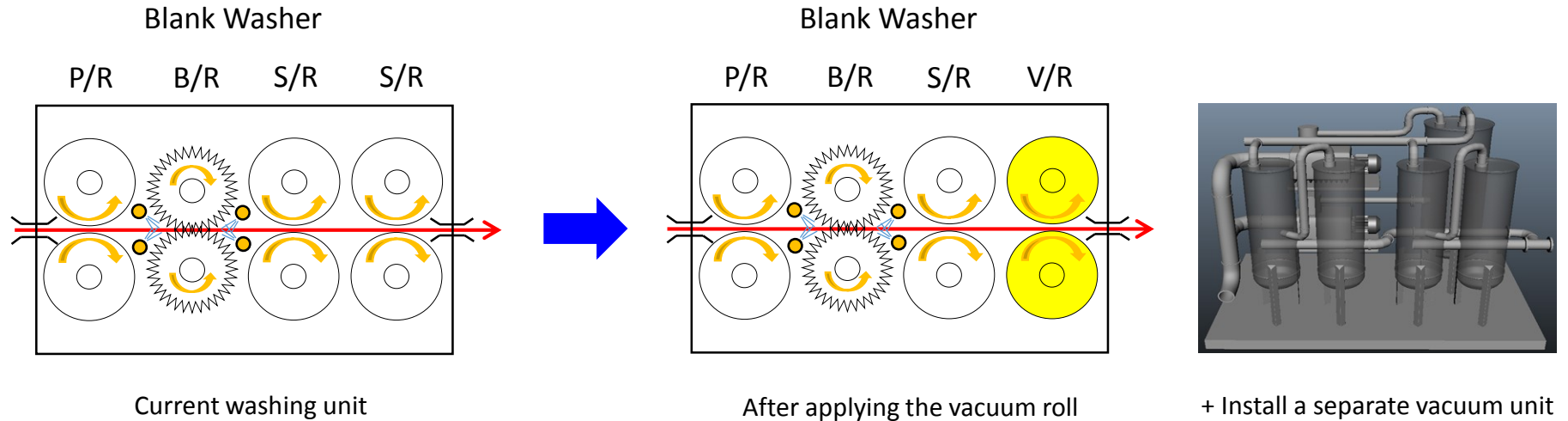


Other advantages

1. Save cleaning oil cost – Save oil due to significant reduction of remaining oil
2. Improve the work environment, prevent worker's fall (prevent a safe accident) and remove floor and equipment contamination

## ❖ How to apply the 4-row blank washing vacuum roll

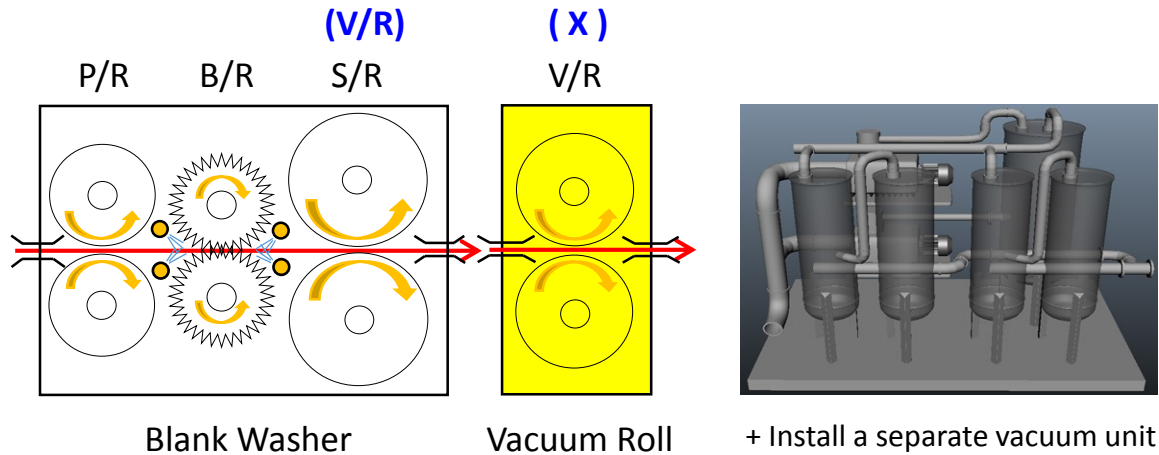
### ➤ Ex) HMMA (USA) 4-Row Washing Unit



- The vacuum roll absorbs the residual oil of the blank as it passes through the washing unit.
- A squeeze roll that cuts oil before the vacuum roll may maximize the effect
- The last wringer roll of the current washing unit is removed, and a vacuum roll is mounted in place.
- Since it is manufactured in the same size as the existing wringer roll, there is no difficulty in synchronization and compatibility is good.
- It requires no abrasive repairs during use and is used continuously for 24 months.
- The service life of the squeeze roll in front of the vacuum roll can be prolonged resulting in cost savings.
- The 5-row blank washer also needs to replace the last squeeze roll to a vacuum roll just like the 4-row washer.

## ❖ How to apply the 3-row blank washing vacuum roll

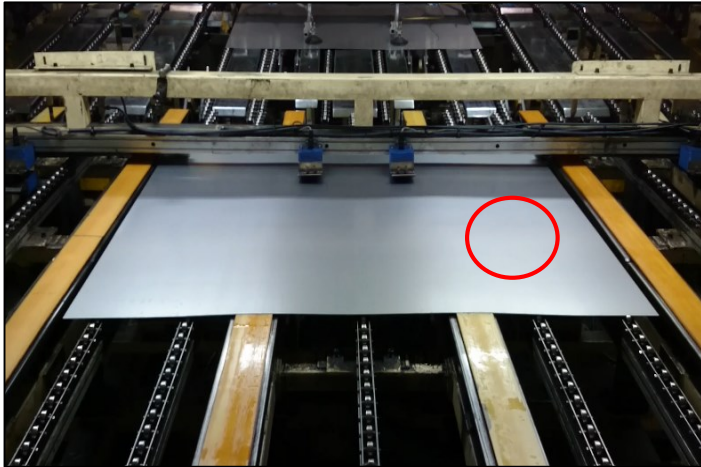
### ➤ Ex) 3-row washing unit of Ford Motors in Chongqing, China



- The 3-row blank washer is popular in Europe.
- It has a large squeeze roll  $\varnothing$  to give more residual oil cut area.
- If a vacuum roll is installed directly behind the brush roll, the damage and contamination rate will increase rapidly, and the efficiency will be significantly reduced.
- Install a separate vacuum roll washing key case while maintaining the current 3-row washing unit.
- Maximize the effect by configuring in a manner that does not interfere with the current line but compatible with the current line.

# ❖ Washing System

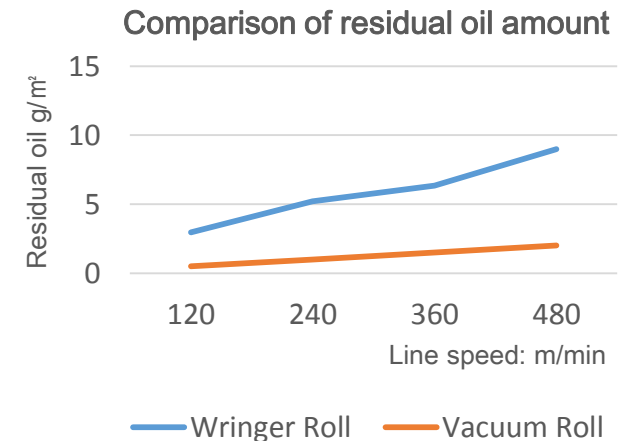
## ➤ Effect of Vacuum Roll System.



< Residual oil amount on the material after cleaning >

Classification	General wringer roll	Vacuum wringer roll
Comparison of residual oil images		
Unit	g/m <sup>2</sup>	g/m <sup>2</sup>
Amount measured of residual oil	Approx. 5.0 g/m <sup>2</sup>	Approx. 1.0 g/m <sup>2</sup>

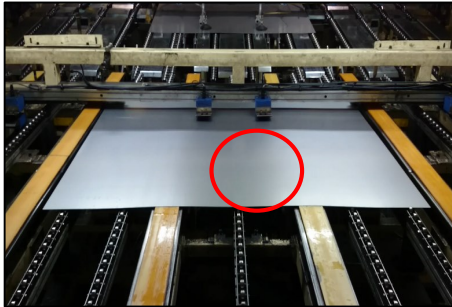
- Vacuum roll system has effects of oil suction by porous fiber material and forced absorption by vacuum pump.
- Can use the cleaning oil injection to its maximum, which was limited due to the remaining oil.
- To use the cleaning oil injection to its maximum may improve the quality of blank surface.
- Oil consumption is reduced by absorbing the blank residual oil and sending it back to the refiner.
- The service life of squeeze roll in front of the vacuum roll will increase. Current 1 year ▶ 2 years.
- To use the vacuum roll without wear and tear makes no problem for synchronization.



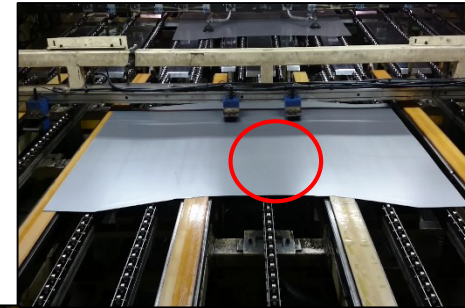
## ➤ Effects of Vacuum Roll System

### Blank Coil Types

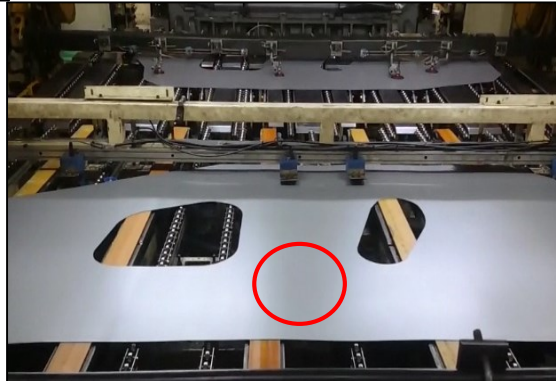
- Alloyed Galvanized Steel Sheet (GA Coil)
- Galvanized Steel Sheet (GI Coil)
- Cold rolled steel sheet (CR Coil)



<Roof out>

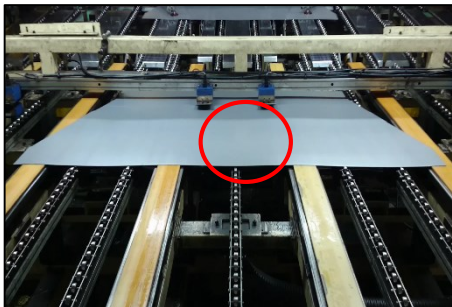


<Hood out>

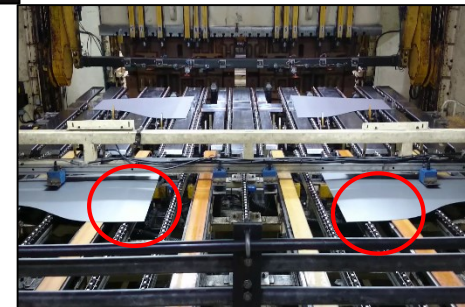


<Trunk out>

<Fender out>



<Side out>



## ➤ Clients Using Vacuum Roller System.

No.	Client	Place Installed	Date Installed	Roll Size
1	MS Autotech. Co., Ltd.	[Korea] Applied to C-1 Line in Gyeongju Factory	Jan. 2011	D250 X 2200L
2	Daepoong Industrial Co., Ltd.	[Korea] Applied to Ansan Factory	June 2011	D250 X 2200L
3	MSGI	[India] Applied to Factory of MS Autotech. Co., Ltd. / Daimler-Benz factory	Dec. 2011	D250 X 2300L
		- Conducted cleaning work in Daimler-Benz factory in India		
		- Conducted cleaning work in Nissan factory in India		
4	MS Autotech. Co., Ltd.	[Korea] Applied to B-1 line in Gyeongju Factory	Jan. 2015	D250 X 2300L
5	Hyundai Motor Company	[Ulsan] Applied to 5,400-ton Press S1 Line in Factory 3	Feb. 2015	D350 X 4500L
6	Hyundai Motor Company	[China] Applied to 5,400-ton Press S1 Line in Factory 4 of Changju	Oct. 2015	D350 X 4500L
7	Hyundai Motor Company	[Jeonju] Applied to 5,400-ton Press Line in Commercial Vehicle Factory	Dec. 2015	D350 X 4750L
8	Hyundai Motor Company	[China] Applied to 5,400-ton Press S1 Line in Factory 5 of Chongqing	Mar. 2016	D350 X 4500L
9	Hyundai Motor Company	[USA] Applied to 5,400-ton Press S2 Line in Montgomery Factory	Nov. 2016	D350 X 4750L
10	Hyundai Motor Company	[China] Applied to 5,400-ton Press S2 Line in Factory 4 of Changju	Feb. 2017	D350 X 4500L
11	Hyundai Motor Company	[China] Applied to 5,400-ton Press S2 Line in Factory 5 of Chongqing	Nov. 2017	D350 X 4500L
12	Hyundai Motor Company	[China] Applied to 5,400-ton Press S2 Line in Factory 2 of Beijing	Feb. 2018	D350 X 4500L
13	Hyundai Motor Company	[USA] Applied to 5,400-ton Press S1 Line in Montgomery Factory	Nov. 2018	D350 X 4750L
14	Ulsan Aluminum Ltd.	[Korea] Applied to TL#1 Solvent Line in Ulsan Factory	Mar. 2019	D254 X 1900L

## ❖ Washing System

### ➤ Clients Using Vacuum Roller System.

No.	Client	Place Installed	Date Installed	Roll Size
15	Hyundai Motor Company	[Jeonju] 1 <sup>st</sup> exchange of Commercial Vehicle Factory Vacuum rolls	Jun. 2019	D350 X 4750L
16	Hyundai Motor Company	[USA] Montgomery Factory S1 line for 1 <sup>st</sup> replacement Vacuum roll ship	Jul. 2019	D350 X 4750L
17				
18				
19				
20				
21				
22				
23				

**Thank you very much**