Slitting, Recoiling & Coil Inspection Lines

METAL STRIPS | SHEET CUTTING LINES | TUBE MILLS
FIMI SLITTING PHILOSOPHY

Since FIMI was established in 1963, we have been having opportunities to explore the Slitting field in any direction ranging from NON-ferrous Metal Strip to Heavy Gauge Steel.

Nowadays FIMI Slitting Lines are designed to guarantee perfect strip surface quality and the highest production capacity: these goals are achieved by a large number of machines & devices originally designed by FIMI.

» Surface quality is for instance paid particular attention when choosing the Slits Tensioning System among the many designs available ranging from Vacuum Roll, best suiting the most delicate Aluminium, to Felt Press for Heavy Gauge Steel and the Patented “NFTS” system; yet for instance, the complete Change of Recoiler Mandrel is meant not to leave any mark on the inner coil laps when changing coil inside diameter; other countless details are paid attention not to affect the surface quality.

FIMI “NFTS” ©

NON- Friction Tensioning System for Slitting Lines

This is FIMI Patented System minded to achieve uniform tension among the slits as an outcome from coil Slitting process. At FIMI, Tensioning Systems are designed in a complete variety to mate with the most delicate surfaces, just to mention aluminium, stainless-steel, painted-steel and the most rugged heavy-gauge steel: FIMI “NFTS” is designed to mate with the former ones.

The Unit pictured below is featuring:
1. Motorized pre-Tensioning Roll, blue color, collecting the slits from looping-pit
2. Tension Pinch-Rolls, red color, providing uniform tension among the slits, this featuring:
   » Pulleys design
   » Pulley Braking System as a built-in Air Bags inflated in between roll-core and Pulleys, this in short named Self Adapting Multi-section Tension Roll
3. Deflecting Pulleys Idle Roll in blue color
SLITTING LINES

» **High Productivity** is first guaranteed by the ease of threading the strip from the Uncoiler to Slitting Shear and then for the slits to reach the Recoiler Mandrel, this latter function being performed by the Automatic Slits Threading Gripper. A number of Automatic set-up and Devices are provided to minimize the down-time due to frequent change of production program and the coils loading / off-loading operations.

FIMI Slitting Lines can be provided with additional devices like Slitting Tooling set-up Robot, Separator Disks set-up Robot, Slitting Tooling or Slitting Head Automatic Change, Thickness Measuring, Camera Inspection, Oiling Machine etc.

SLITTING, RECOILING AND COIL INSPECTION LINES

Thanks to its expertise developed over 50 years and the incorporation of the Company SA.MO., **FIMI** has nowadays the capability to offer a wide range of SL, Recoiling & Coil Inspection lines, that can be summarized as follows:

» **SL LINES FOR AUTOMOTIVE APPLICATIONS**
» **SL LINES FOR STAINLESS STEEL, ALUMINIUM, COPPER AND BRASS**
» **SL LINES FOR HOT ROLLED HEAVY GAUGE STEEL**
» **RECOILING & COIL INSPECTION LINES**

FIMI Slitting, Recoiling & Coil Inspection lines give to the final customer the advantages of high productivity with easy-to-use equipment and personnel reduction thanks to the high degree of automation.
SL Lines for automotive

SL lines for automotive applications are especially designed to fulfill the surface quality needs and cutting precision required by car manufacturers. The typical thickness range is 0.3–3 mm, but it goes up to 8 mm in the case of car structural steels with thickness variation throughout the coil length obtained by a special rolling process. The material processed is both steel and aluminium, even in High Tensile grade.
SL for Stainless Steel, Aliminium, Copper and Brass

These kind of Slitting Lines are featured with Machines, Technical Solutions and Devices which are due to mate with the nature and typical figures of these metals:

» Stainless steel up to **18 mm thickness**, for application in chemistry, nuclear plants, food industry, architecture.

» Aluminium, Copper and Brass down to **thickness 0,1 mm**, which imposes the Line has to run at a high-Speed of **800 m/min**.

» For all the applications, strip tension is applied with high accuracy downstream the Uncoiler.

» For all the applications, the Slitting Shear is featured either with **Automatic-change of Slitting Tooling Set-up** or **Automatic-change of the complete Slitting-head**.

» Special features like the **quick change of the recoiler mandrel** are implemented.
Slitting Shear cassette-type design. Slitting Shear features “blade-clearance-fine-tuning”; this feature, which is in addition to the standard Automatic blade-penetration, is performed with closed-loop Servo-motor to set to zero slitting burr.

A special Gripper is in charge of collecting the slits downstream Slitting Shear to carry out automatic feeding of the slit ends to Recoiler Mandrel’s gripper. Yellow beam with built-in Gripper traversing Tension Carriage.

Separator Arbors can be featured with Robot for Automatic set-up of Separator Disks;

Aluminium delicate surface is paid more attention with appropriate Tensioning System: Vacuum Roll technology is properly applied upstream Recoiler to perform exact recoiling tension.

Different Recoiler Mandrel diameters can be changed semi or fully-Automatic.
SL lines for Hot Rolled Heavy Gauge Steel

SL lines for Hot Rolled Heavy Gauge Steel have been successfully developed to match the typical applications in structural engineering, cranes, lifting equipment in general, poles for wind turbines and for the pipes & tubes industry. The thickness range is typically 1-8 mm, but in some cases it can reach even 16-18 mm for pipes. These slitting lines require special solutions for the strip feeding process especially after the slitting shear, for scrap chopping and handling and for strip recoiling and discharge.
**RECOILING & COIL INSPECTION LINES**

Recoiling & Coil Inspection Lines are required mainly in the Automotive Industry to check the quality of the material surfaces, but find application also in the Rolling Mills to reduce the size of rolled coils, divide the coils in length, check the surfaces.

**Recoiling Lines**

These lines running at high speed (typically up to 400 m/min) are designed for very high productivity (about 400’000 ton/year) and are equipped with special devices such as:

- Thickness measurement;
- Inspection cabins with lights, mirrors and surface quality inspection devices;
- High speed rotary shear for discarding damaged portions of coils thanks to a Level 2 connection between the line and the recordings from the Rolling Mill;
- Side trimming and center cut with scrap chopper;
- Laser welding of coils;
- Surface oiling and oil thickness measurement;
- Belt wrapper to avoid strip clamping in the mandrel;
- Automatic coil strapping, weighing and labeling.

![Coil inspection automotive carbon steel 0.34 - 3.5 x 2050 mm](image)
Coil Inspection Lines

» The design of these Lines is focused to carry out top and bottom surface inspection of metal strips: a typical case is represented by the automotive carbon steel.
» Specific areas of the Line are designed to carry out several checks of the strip to identify possible defects among which the minors can be rectified on the spot thanks to a properly designed dedicated area.
» The recording of no. 45 different kinds of defects is possible: data are stored into our design LEVEL 2 System for their later elaboration.
» The Line typically features an Edge Trimming Machine complete with a Scrap Baller or Scrap Cutter.
» Center line slitting is an option available: to guarantee coils are tightly wound, Tensioning Systems are fitted onto a Tension Carriage same as in a Slitting Line.
» Both top and bottom recoiling of the strip are possible and assisted by a Belt Wrapper.
Our Slitting Shears are featured in a variety of designs. Different design is not only with regard to the size but also to the type: this is because different grades and gauges of metal strips demand peculiar solutions to answer specific matters.

The Automatic Change of the Slitting Tooling Set-up is a feature common to all our Slitting Shears while the exceptions are represented by special applications needed with some grades of metal strips like for instance the grain oriented magnetic steel: in this case, the Slitting Line features no. 2 Slitting Shears as one is fitted in Line and the other is located side to the Line with the aim to allow slit trials as the way to guarantee the best setting of the slitting tooling for a burr free slitting.
Scrap Balling & Scrap Cutting Of Scrap Edges in SL

- Every Slitting Shear is complete with a Scrap Baller or a Scrap Cutter: these are to recover as a ball or to chop to pieces the scrap edges outer from the other strands coming from the slitting of the metal strip.
- Scrap Ballers and Scrap Cutters are designed in a variety of types and sizes having in focus to guarantee ease of in Line access to carry out checks and maintenance with the highest degree of safety for the operators.
- Our Scrap Cutters are designed to be moved as a complete unit side to the Line ranging among different solutions depending upon our Customers’ needs.
» **Tensioning** of the slit strands is a peculiar function of a Slitting Line: tension is set onto the slit strands to generate perfect built up of tightly wound coils on Recoiler.

» Tensioning is featured ranging among a variety of systems engineered and designed depending upon to the quality surface of the strip and its gauge: the extreme limits in this regard are represented respectively by **aluminium** and **stainless steel BA** quality, and **carbon steel** gauging 18 mm. Tensioning Systems are ranged among two families as:
  - **friction** Systems, applied for **carbon steel**, and
  - **non-friction** Systems, applied for **stainless steel BA** quality and every other delicate surface.

» Tensioning Systems are fitted onto the so called Tension Carriage that is an actual moving carriage traveling from the Slitting Shear to the Recoiler.

» The Tension Carriage provides as the base for other devices to accomplish functions like for instance:
  - **Carrying over** the slit strands from Slitting Shear to the Recoiler
  - Keeping the slit strands separate and well aligned
  - **Deflecting** the slit strands to the Recoiler
  - **Sizing** of the slit coils on Recoiler
  - **Scrapping** of the tails of the slit strands

---

**Tension carriage for light gauge stainless steel**  
**Tension carriage for light gauge automotive carbon steel**

**Tension carriage for heavy gauge steel**  
**Tension carriage with disk separators arbors set up by robot**
Recoiling

- Our Recoilers are featured an impressive variety of designs to accomplish recoiling of metal strips in an extensive range from non-ferrous to heavy gauge steel.
- Recoiler Mandrels are designed to generate perfect round diameters when expanded; along with the most recurrent diameters as 508 mm and 610 mm, our Mandrels cover a wide range of diameters among the minimum 300 mm and the maximum 850 mm.
- The design of the Mandrel Gripper holds topic importance to guarantee that the leading edge of the slit strands are safely and secure clamped in the full range of the gauges processed.
- The smart design of our Grippers ensure that a minimum “tongue” is left inside the coil bore with great advantage for trouble-free coil handling onto the downstream Slit Coil Packing Line.
- Recoilers are complete with devices like for instance the Push Off Plate and the Hold Down Pressure Arm to ensure the slit coils are kept tightly wound and trouble-free unloaded from the Mandrel.
- Recoiling area is critical from the safety point of view and as such nothing is left to the case: a number of functions are provided by devices designed to guarantee safe operations.

Unloading of Slit Coils From Recoiler

- Unloading of slit coils from Recoiler Mandrel is performed by Unloading Coil Cars featured in a variety of designs divided in two main families as the under floor lever, and floor level.
- At FIMI safety is ranked on top position and as such Coil Cars are equipped with devices like for instance the Hold Down Arm with Piano Fingers to ensure the slit coils are never left to tilt or the laps get loose.
Stocking & Strapping Facilities of Slit Coils

- The slit coils stocking & strapping carried out via a Four Arms Turnstile fitted with a Strapping Arm is a typical design of these functions located at the exit of a Slitting Line.
- Stocking & strapping facilities are designed having in focus safety of Operators.
- As the Four Arms Turnstile is fed with slit coils by the Unloading Coil Car, the facilities are laid-out to set free quickly the Unloading Coil Car from the slit coils so that a new batch of slit coils can be unloaded from the Recoiler: this way is to avoid that the stocking & strapping facilities become the “bottleneck” to the production outcome from the Slitting Line.
COMPLEMENTARY DEVICES

Slitting Tooling Set Up by Robot

Slitting Tooling Set up carried out by ROBOT is today available on the market made to comply with the high quality standard proper to our Company.

The ROBOT is completely covered and enclosed into a cabin to guarantee safety of operations and cleaning of the Slitting Tooling.

Separator Arbors Disks Set up by Robot

This is a tiny yet significant example of what we are able to engineer when typical manual operations are wanted fully automatic: the Separator Disks are position along the arbor by a robot via the input on Control Desk of the Slitting Program.

Belt Wrapper

The Belt Wrapper is used in place of the Gripper of the Recoiler Mandrel when a single strip or a maximum of no. 3 slit strands are recoiled.

Automatic Paper Application Device at Recoiler

With the automation of the Paper Application the operator’s hands are free from touching the paper as the Device is fully controlled from Control Desk; when the Line is completely covered and enclosed such that the Paper Application Device is out of the manual reach, the automation might be regarded as a real need.
Recoiler Mandrel Automatic Change in Slitting Lines

When processing delicate materials ranging from non-ferrous to magnetic-steel, the need to produce perfect-round-slit-coils-bore is achieved by complete changing the Recoiler Mandrel. This function is being carried out semi or fully-Automatic: up to 4 Mandrels can be fitted, one at a time, into the same Recoiler-housing.

Slits Threading Gripper from Slitting Shear to Recoiler Mandrel

For trouble-free threading of narrow slits downstream Slitting Shear, we have designed and successfully deliver to more Customers a special Gripper.

Slits are collected by the Gripper just downstream Slitting Shear and then threaded up to Recoiler Mandrel by the Gripper itself threaded through specially designed wide open machines in between Slitting Shear and Recoiler.

Automatic Change of Slitting Shear Head

The complete change of the Slitting Shear Head is a well proven solution among our designs: it is broadly experienced either in thin & thick gauge material.

Slitting Tooling set-up is arranged on spare Slitting Shear Head while the Line is running; the important advantage of this situation is the opportunity for slitting trial on the spare Slitting Shear before setting in Line for real production.