

Achieve uniform product coating

by synchronizing automatic reciprocating spray machine speeds with conveyor speeds in automatic spray gun applications

In many automatic spray applications, a flat line conveyor or overhead conveyor is utilized to move products through the spray zone. As the spray gun, mounted on a reciprocating machine, makes a pass over the product, a pattern referred to as "V" or "W" is produced with each successive pass.

In order to achieve uniform coating on the product sprayed, it is critical for automatic spray gun machine speeds to be synchronized with conveyor speed. This uniformity is achieved through what is referred to as "synchronous ratio". The analysis of the typical conveyor speed vs. reciprocators speed indicates that there are only four synchronous ratios which will allow for uniform spray coating applications on the product sprayed.

The most common synchronous ratios for reciprocators are:

■ *1/2 of 50% overlap
at mid stroke of machine*
(applies 2 uniform coats of paint)

■ *3/4 of 75% overlap
at mid stroke of machine*
(applies 4 uniform coats of paint)

Other ratios less commonly used are:

- *5/6 overlap and*
- *7/8 overlap*

It should be emphasized that use of any other percentage of overlap other than those mentioned will not produce uniform paint film build up.

The relationship between reciprocator speed and conveyor speed is expressed by the formula:
 $S = (12 \times V) / (W \times (1 - P/100))$

Where:

S = Reciprocator passes per minute (not speed in fpm).

V = Conveyor speed in feet per minute

W = Width of spray fan in inches (typically 8", 10", 12")

P = Percent overlay in the middle of spray stroke (50% or 75%)

Calculation Example:

V = 6 fpm conveyor speed

W = 12" Spray Fan pattern Width

P = 50% Overlap

(50% = 2 coats of material)

$S = (12 \times 6) / (12 \times (1 - 50/100))$

$S = 72 / 12 \times .50$

$S = 72 / 6$

S = 12 gun passes per minute

The figures at right show how the synchronous ratio affects spray coating overlap on the product.

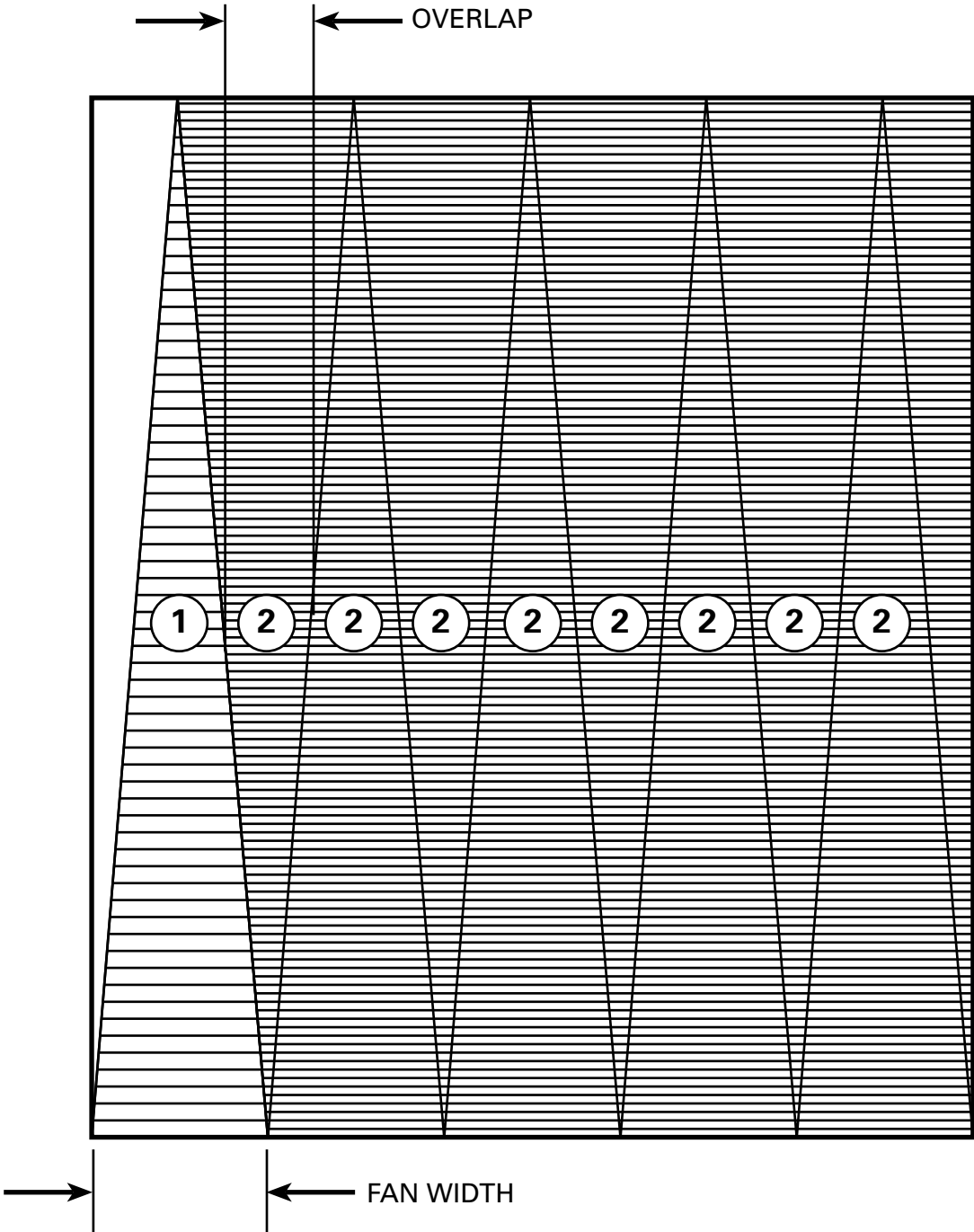
The use of multiple spray guns on the reciprocating spray machine over a single gun does not alter the above basic concept. The use of more than one gun enables application of more coating only. In addition, in multiple gun applications, gun spacing becomes important.

Typically multiple guns are spaced from 1-1/2 to 2 fan pattern width on reciprocator gun mounting bar to achieve uniform coating.

Other factors to consider when utilizing spray guns with reciprocators is to maintain the same fan pattern size and fluid flow rates to each gun.

See figures provided on following pages

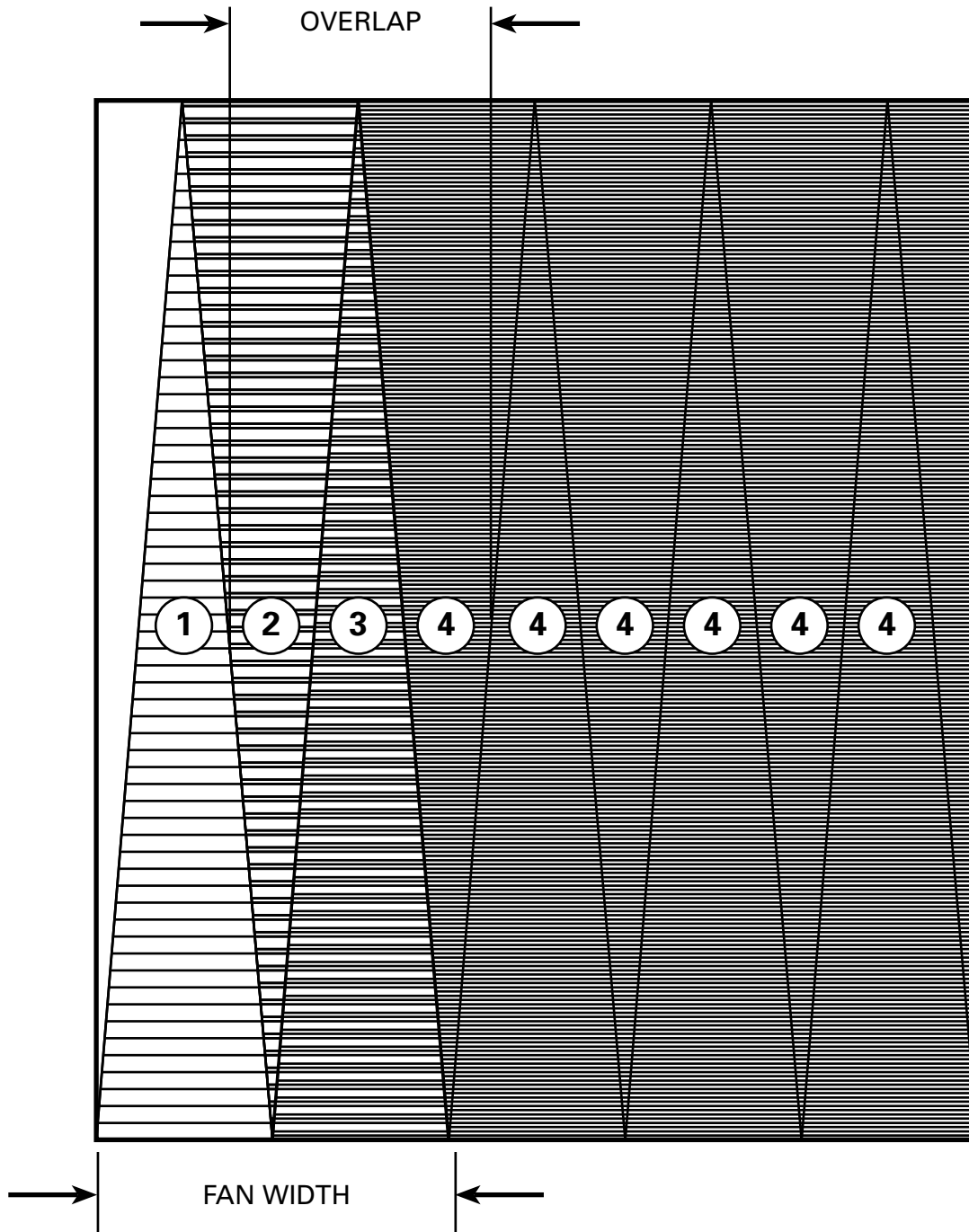
Figure 1



1/2 OVERLAP

UNIFORM FILM BUILD STARTING WITH 2ND PASS
 NUMBERS INDICATE PLYS OF PAINT
 PART MOVING FROM RIGHT TO LEFT
 START OF SPRAY AT BOTTOM

Figure 2



3/4 OVERLAP

UNIFORM FILM BUILD STARTING WITH 4TH PASS
NUMBERS INDICATE PLIES OF PAINT
PART MOVING FROM RIGHT TO LEFT
START OF SPRAY AT BOTTOM

Figure 3

SPRAY MACHINE SPEED VS. BODY CONVEYOR SPEED 10" WIDE FAN

