

DRYING ADHESIVES

STICKING TO THE BASICS


~ JASON ALLINGTON

VICE PRESIDENT/GENERAL MANAGER





INTRODUCTION

- DRYING SYSTEM VARIABLES
 - COATINGS (VOLATILE VS. AQUEOUS)
 - EVAPORATION RATES
 - DRYING EXAMPLES
 - CASE 1 (AIR FOIL DEVELOPMENT & BENEFITS)
 - CASE 2 (DUAL-PURPOSE BAR DEVELOPMENT & USES)
 - KNOW YOUR PROCESS
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VARIABLES

- SUPPLY TEMPERATURE
- SUPPLY VOLUME
- IMPINGEMENT VELOCITY
- WEB SPEED
- AIR SUPPLY METHOD
- SOLVENT CONCENTRATION IN ATMOSPHERE (EXHAUST/MAKE-UP AIR)

ADHESIVE COMPARISON

VOLATILE ADHESIVES

- BETTER ADHESION PROPERTIES
- MOISTURE RESISTANCE
- SUSPENDS CERTAIN ADHESIVES BETTER
- TYPICALLY ~30% SOLIDS COATING
- LESS ENERGY REQUIRED FOR DRYING
- MORE SENSITIVE TO HIGHER DRYING RATES
- REQUIRES GENTLE DRYING METHODS
 - CO/CTR FLOW, DUAL-PURPOSE, LOW IMPINGEMENT
 - SINGLE-SIDED FLOTATION (AIR FOILS)
- REQUIRE COATER ENCLOSURE WITH CLASS 1 DIV. 1 CONCERNS
- VOLATILE ATMOSPHERIC CONCERNS (LFL/LEL)
- VOLATILES IN EXHAUST MUST BE ACCOUNTED FOR (RTO)

AQUEOUS ADHESIVES

- ENVIRONMENTALLY FRIENDLY
- EASE OF USE
- TYPICALLY ~50% SOLIDS COATING
- HIGHER ENERGY REQUIRED FOR DRYING
- LOWER PROBABILITY FOR DEFECTS
- CAN HANDLE MORE AGGRESSIVE DRYING
 - DUAL-SIDED FLOTATION
 - SINGLE-SIDED FLOTATION (AIR FOILS) WITH OPPOSING NOZZLES
- IMPINGEMENT ON BOTH SIDES OF THE WEB IS EXTREMELY HELPFUL
- NO RTO NEEDED

EVAPORATION RATE STANDARDS

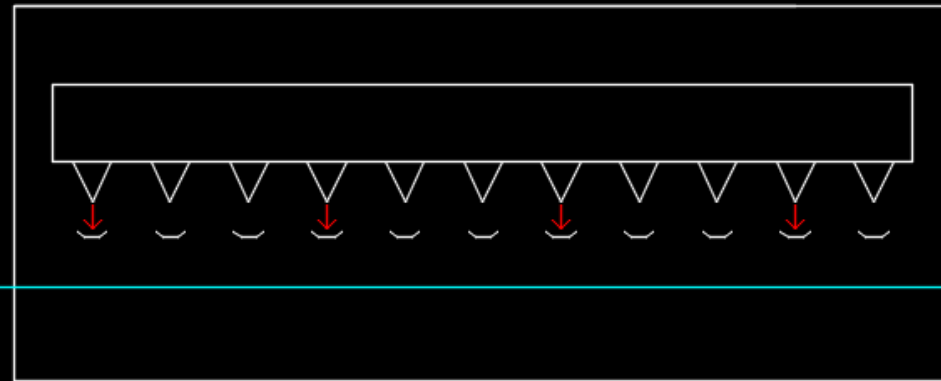
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DRYING EXAMPLES

- DIFFERENT COMMON DRYING TYPES
- EVAPORATION RANGES FOR THESE TYPES OF DRYERS
 - LISTED FROM LOWEST TO HIGHEST EVAPORATION RANGES
- RANGES GIVEN DO NOT ACCOUNT FOR THE ADJUSTMENT OF OTHER VARIABLES

QUIET ZONES

DWELL



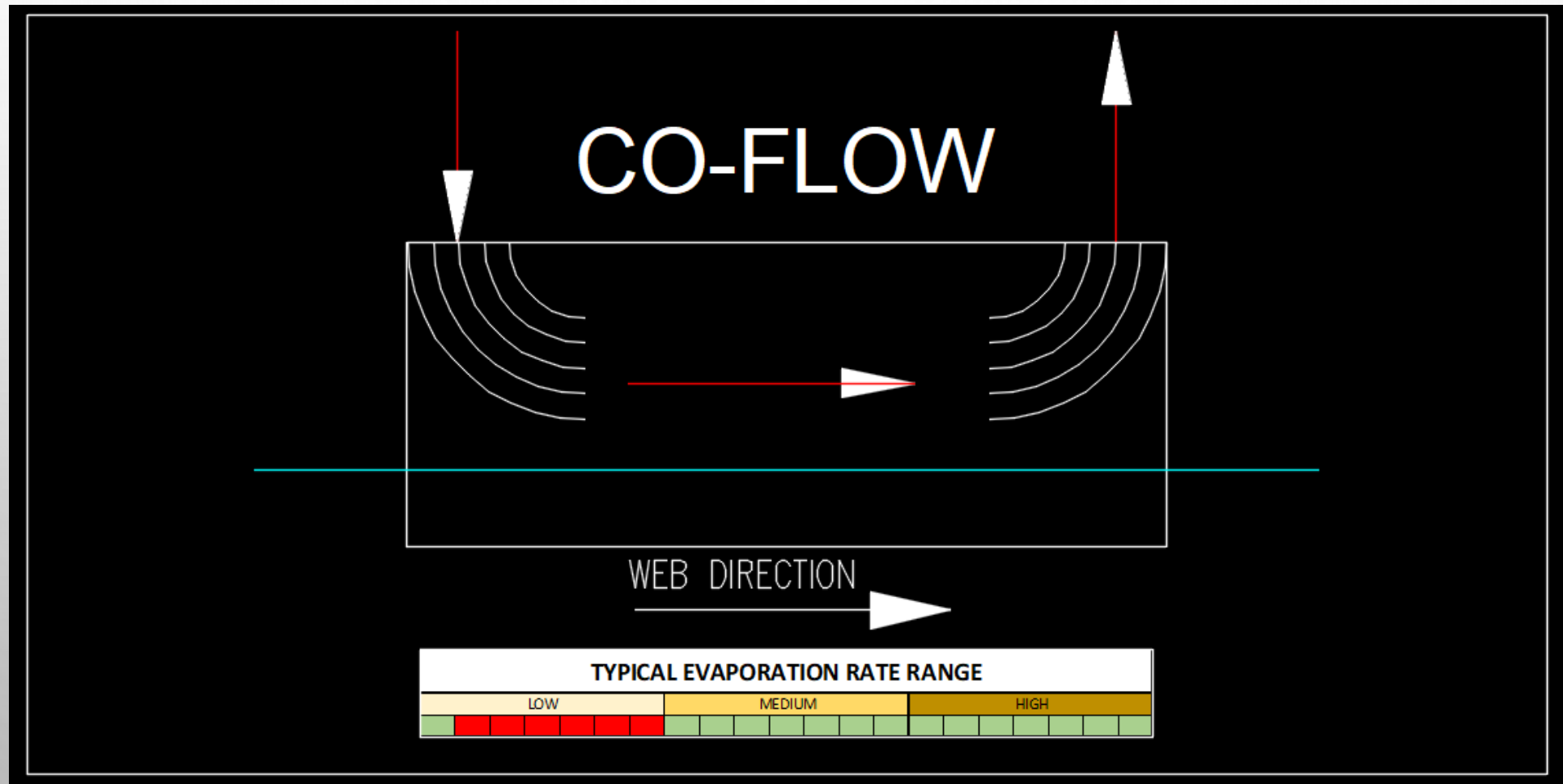
WEB DIRECTION



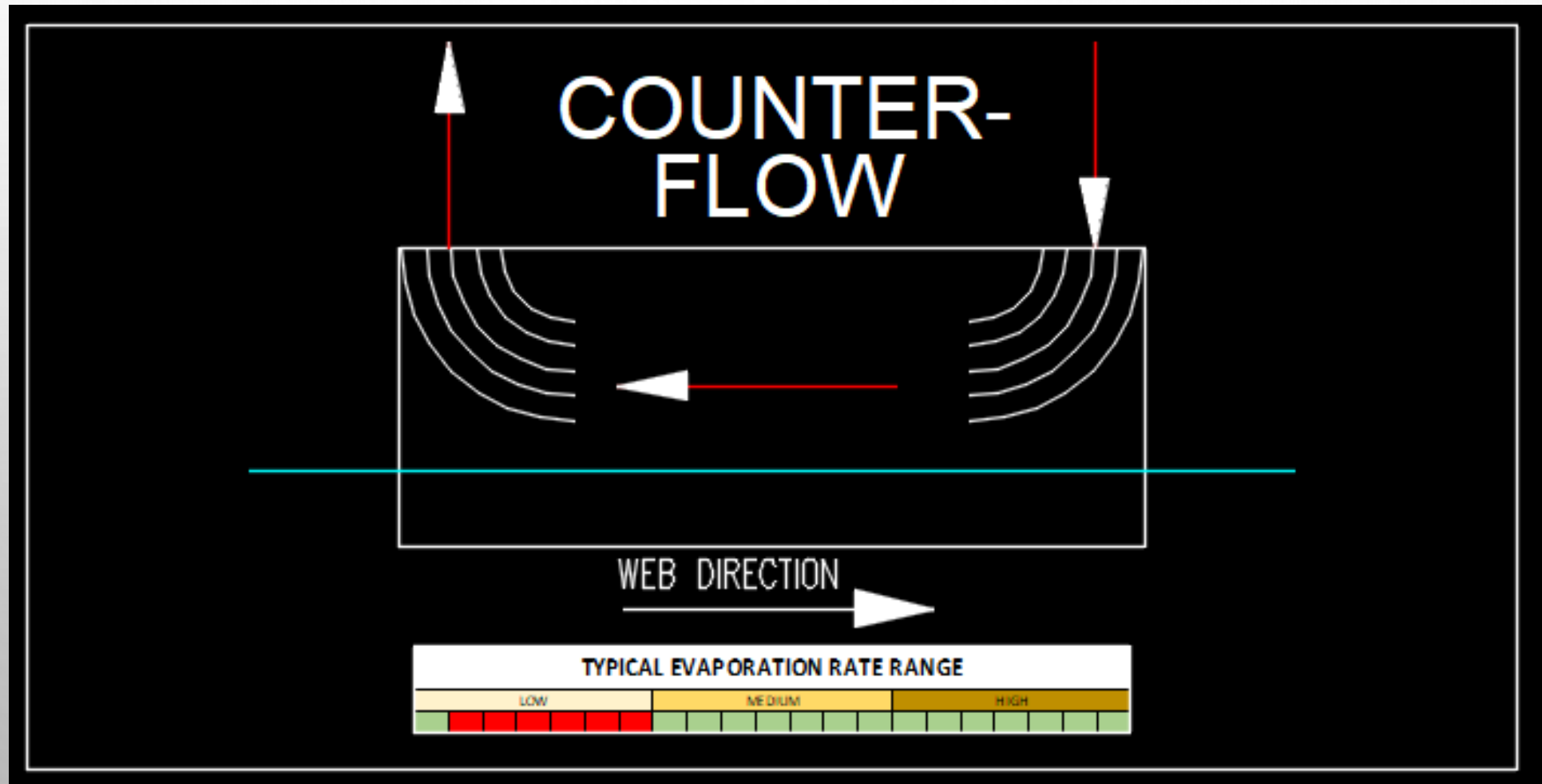
TYPICAL EVAPORATION RATE RANGE

LOW					MEDIUM					HIGH				

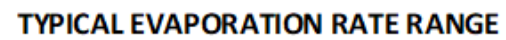
QUIET ZONES



QUIET ZONES

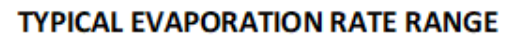


IMPINGEMENT



LOW				MEDIUM				HIGH			

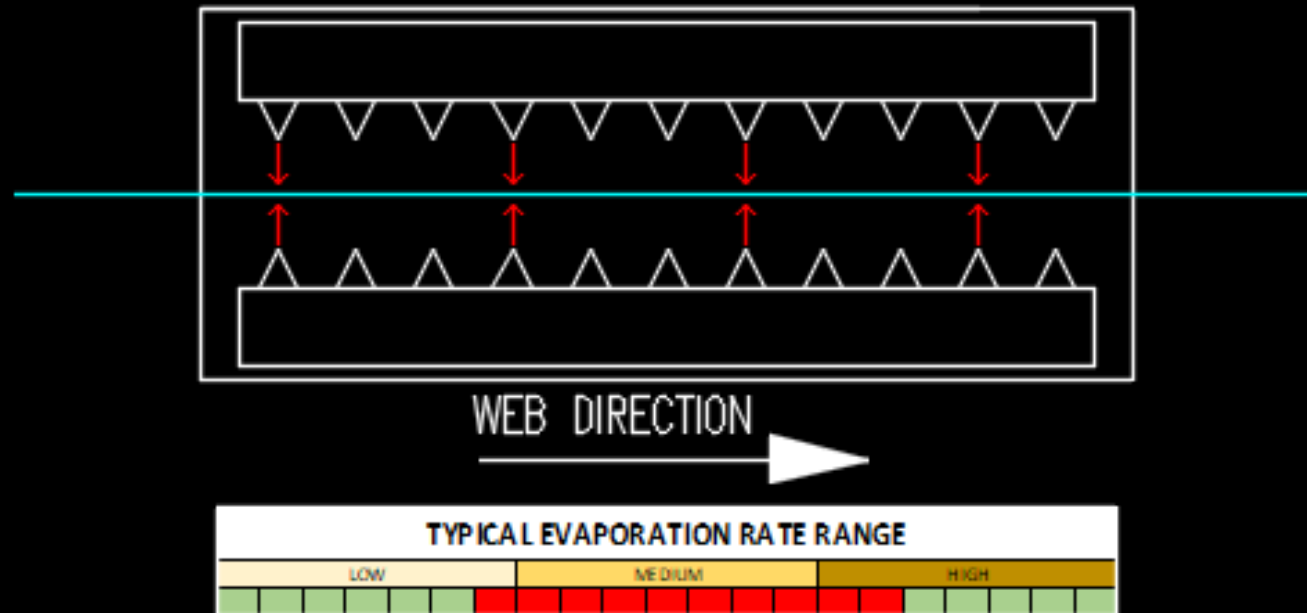
SINGLE-SIDE FLOTATION



LOW				MEDIUM				HIGH			

HIGH INTENSITY DRYING

FLOTATION



CASE 1

DEVELOPMENT OF THE AIR FOIL AND SUBSEQUENT USES

USES FOR AIR FOILS

- DEVELOPED FOR THE NON-CONTACT TRANSPORT OF THE WEB
- LOW ENERGY INPUT ON THE BACK OF THE WEB
- ALLOWS DIFFERENT BARS TO BE USED ON THE COATING SIDE OF THE WEB
- ALLOWS FLOTATION OF VOLATILE COATINGS
- CAN BE MOUNTED BOTH ABOVE OR BELOW THE WEB

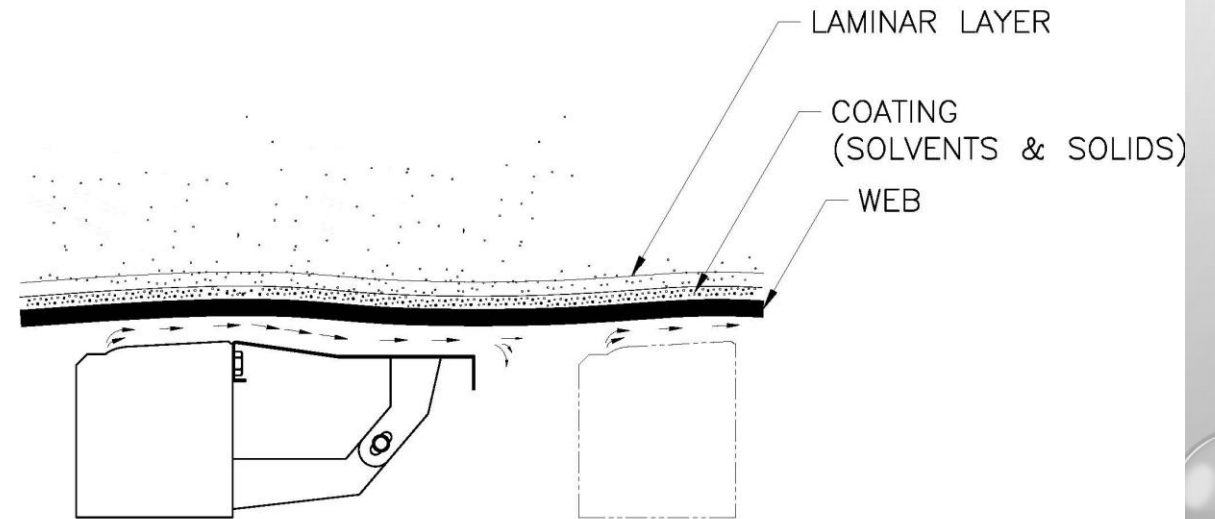


FIGURE 7E

CASE 2

DEVELOPMENT OF THE DUAL-PURPOSE BAR FOR BOTH VOLATILE & AQUEOUS COATINGS

AQUEOUS COATING BENEFITS

- AIR FOIL MAINTAINS LOW ENERGY INPUT ON THE BACK OF THE WEB
- HIGH VELOCITY DISTURBS THE LAMINAR BOUNDARY LAYER OF THE COATING
- HIGH VELOCITY ALLOWING HIGHER ENERGY INPUT INTO THE COATING AND WEB

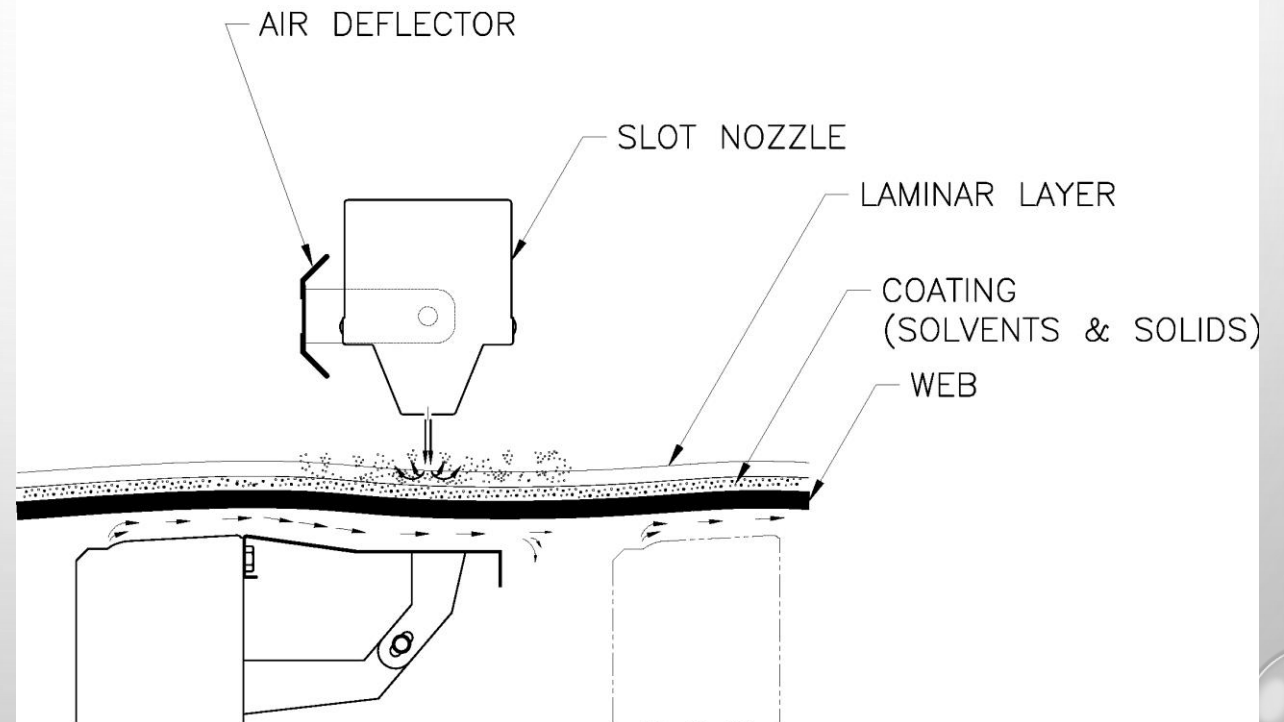


FIGURE 7D

CASE 2

DEVELOPMENT OF THE DUAL-PURPOSE BAR FOR BOTH VOLATILE & AQUEOUS COATINGS

VOLATILE COATING BENEFITS

- AIR FOIL MAINTAINS LOW ENERGY INPUT ON THE BACK OF THE WEB
- MINIMAL IMPINGEMENT (IF ANY)
- SLOW DRYING FROM THE BOTTOM UP
- DIFFUSION OF VOLATILES IN ATMOSPHERE TO SAFE AND CONTROLLABLE LEVELS

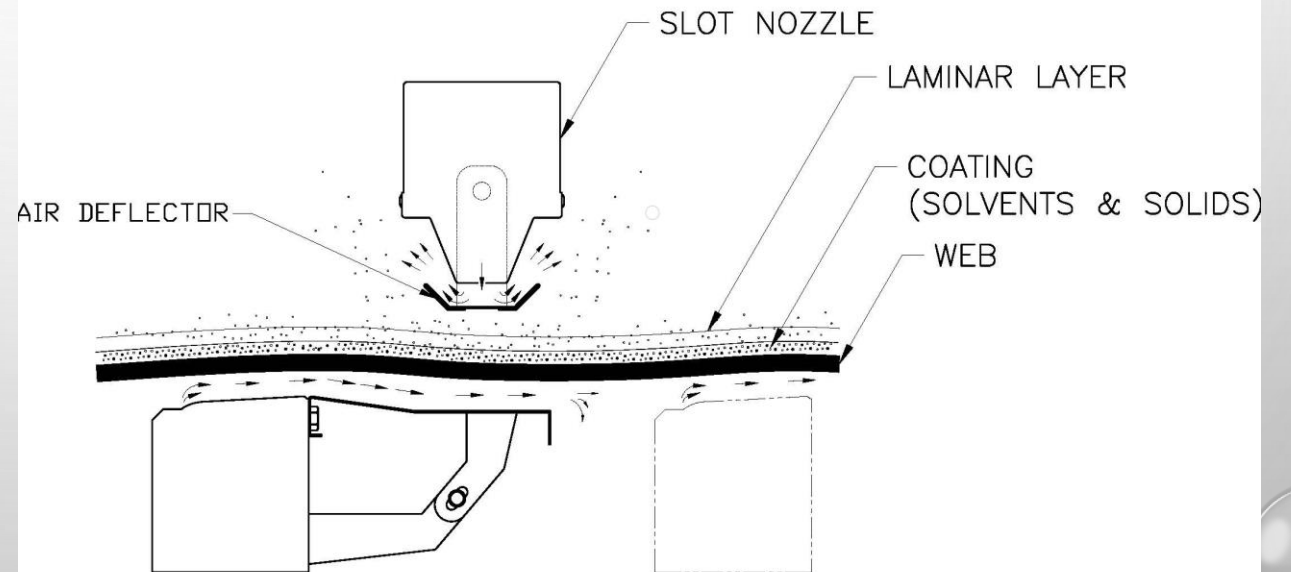



FIGURE 7E



KNOW YOUR PROCESS

- THE KEY TO A SUCCESSFUL PROCESS IS UNDERSTANDING WHAT MAKES YOUR SYSTEM UNIQUE AND HOW THAT IS AFFECTED BY THE DESIGN STANDARDS
 - A DRYING SYSTEM SHOULD HAVE CONTROL OVER ALL THE SYSTEM VARIABLES FOR THE PROPER CONTROL OF YOUR SYSTEM AND PROVIDE FLEXIBILITY FOR FUTURE NEEDS
 - BE AWARE OF THE VARIABLES YOU HAVE CONTROL OF
 - USE YOUR VARIABLES TO TUNE YOUR EXISTING SYSTEM
 - ALWAYS BE CONSCIOUS OF SAFETY PROTOCOLS, ESPECIALLY WHEN SWITCHING FROM AQUEOUS TO VOLATILE COATINGS
 - WHEN DESIGNING A NEW SYSTEM, BE REALISTIC IN THE PRODUCTS TO BE RUN SO THE RANGE OF FLEXIBILITY CAN BE ACCURATELY SET
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