I2M Systems Inc.

I2-Strip

Electronic Flight Strips System

I2M-ATC
Systems Inc.
Intelligence In Motion

DESCRIPTION

Flight progress strips play a central role in air-traffic control. **I2-Strip** is I2M Systems Inc. electronic flight progress strip system which may be integrated with other tower and airport systems. It is user-friendly and highly configurable and can be customized to fit airports of any size.

Traditional paper strips have several limitations: they are time-consuming to print and update, the information on the strips stays with the controller, and the possibilities for integration with safety nets are very cumbersome.

I2-Strip provides what controllers need most: immediate access to key information and critical functions. The system provides instant access to flight, airport and gate data tailored to each assigned role or position, reducing voice communications and minimizing heads-down time. Our advanced tower, terminal, airport and enroute coordination system offers controllers automated flight data management with easy-to-use touch-screen interaction.

I2-Strip allows the user to configure for a single bay the layout of the fields and lines, width to height aspect ratio, color of the strip and its frame (if desired), font for each text field, etc. This makes **I2-Strip** system one of the most flexible Electronic Flight Strips (EFS) system in the industry.

The System can also be configured to generate flow-management statistics, and supports data link clearance (DLC) through direct data exchange with the aircraft flight decks via ARINC or SITA services.

MAIN FEATURES

FLIGHT STRIP DATA PROCESSING AND MANIPULATION

Flight Strip data is received by the **I2-Strip** system in three ways:

- From an external source (e.g. FDIO, AFTN);
- From specially formatted data file (for demonstration and/or training purposes);
- Via local strip creation interface.

CREATING AND CONFIGURING STRIP BAYS

I2-Strip provides the user with a virtual presentation of a physical strip bay for holding strips.

The following types of strip bays are currently supported**:**

- **Regular Strips Bay -** representation of the strip bays for holding regular strips.
  In Figure 1 Strip bay with 40 strips below one can see a sample of a regular strips bay with 40 strips.

CLEARANCE DELIVERY at BNA									
N826EW	Taxi	7423	KBNA	KBNA DANLS1 DANLS SPKER LTOWN6 KMEM				
		P2150						
F2TH/Q								
231		230		TCAS EQUIPPED				
SWA3944	F	5644	A1238	IFR				
		VXV						
B737/Q								
428		SWFTT		KBNA				
SWA4013 1	F	4040	A1202	IFR				
		LOZ 268/064						
B737/Q								
696		PASLY		KBNA				
ASQ4522	F	3052	A1247	IFR				
		GROAT						
E145/Q								
831		PASLY		KBNA				
VRT51	Taxi	4305	KBNA	+SERVE KSRB+KBNA BORSE KSRB				
		P1220						
LJ45/Q								
240		110		-VRT1AVERITT				
LOF3521	Taxi	7407	KBNA	+CHADM1 SWAPP+ KBNA BNA J42 BKW GIBBZ2 KIAD				
		P2253						
E145/Q								
933		270						
N68AJ	Taxi	5676	KBNA	+VALER JKS343059 EOS+ KBNA EOS VINTA2 KTUL				
		P1200						
BE9L/R								
682		240						
Sort: At Bay								40 Strips	

Figure 1 Strip bay with 40 strips

- **Special Strips Bay -** representation of strip bays for holding "Special" strips. "Special strips are represented by a set of colored watermarked "strips" (possibly with "chevrons") that the controllers currently use as memory joggers. Some of the "special" strips are shown in Figure 2 Special strips bay below, where the top two strips are displayed with chevrons. I2-Strip suports a pre-set (default) set of "Special" strips. This default set is read on start-up from the XML file.
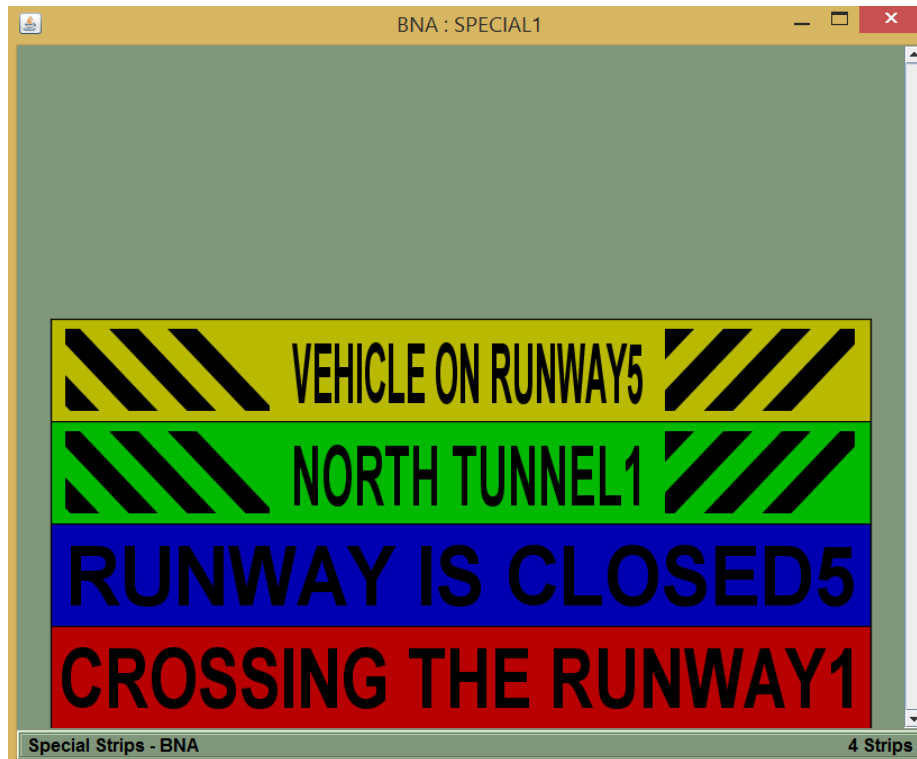

Figure 2 Special strips bay

If there is a need to create an "ad-hoc" special strip, then one can use a built-in "Special Strip Creation wizard" as shown in Figure 3 Special strip creation wizard
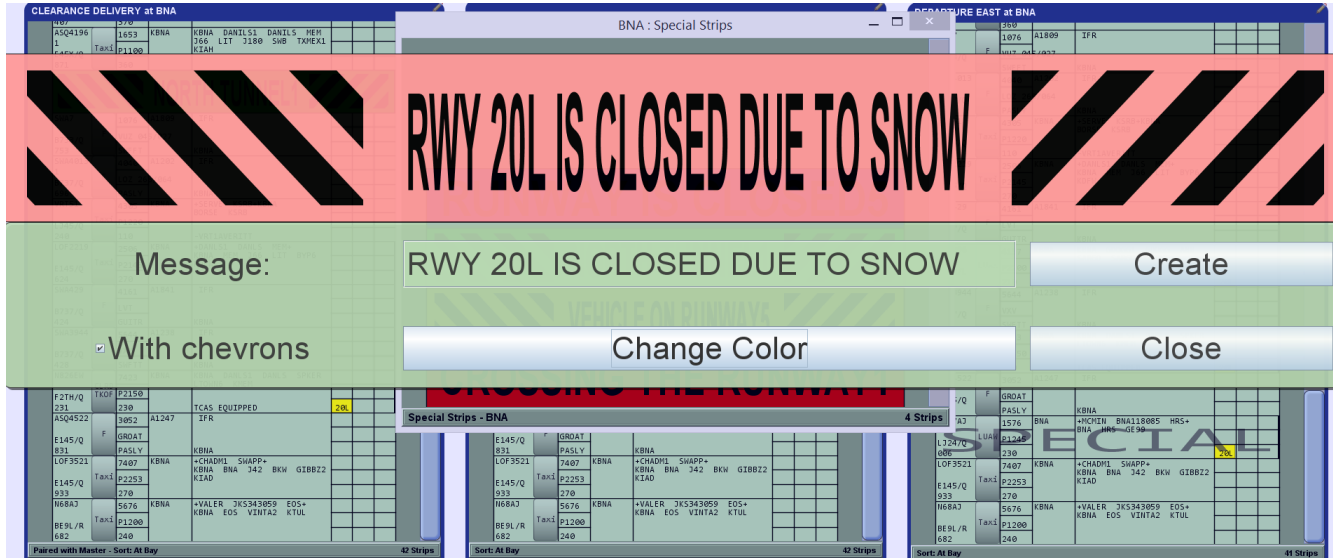
Figure 3 Special strip creation wizard

ACTION PERFORMED ON STRIPS WITHIN THE STRIP BAYS

Users of the **I2-Strip** will be able to perform the full set of actions on flight strips within a single bay or between multiple bays as they would on physical (paper based) strips:

1. Selecting a strip within a bay by single touch - the toggle action, i.e. de-selecting strips is done the same way. In Figure 4 Selecting strips one can see the strip bay with two strips selected.

Figure 4 Selecting strips

2. Dragging a strip or number of selected strips within a single bay or between bays. In Figure 5 Dragging strips below one can see the process of simultaneously dragging 4 strips within the bay.

CLEARANCE DELIVERY at BNA

N826EW		7423	KBNA	KBNA DANLS1 DANLS SPKER LTOWN6 KMEM			
F2TH/Q	Taxi	P2150					
231		230		TCAS EQUIPPED			
SWA4720		1513	KBNA	KBNA PARDN1 NAKIY CGI DLITE FATSS BOOSH BOOSH KSTL			
B737/Q	Taxi	P1210					
608		280					

SWA429   4161   A1841   IFR
EJA296   4157   KBNA   KBNA GDOGG1 GDOGG ABB
   B737/   SWA3944   5644   A1238   IFR
          LOF2219   2506   KBNA   +DANLS1   DANLS MEM+
TRS1748 F2TH/ B735776 KBNA Taxi KBNA KRSTA1 OLSIE ITU MZZ LIT BYPC
    266   E145/Q   PRDYKO3   KORD   KDFW
       Taxi P2157
           624
B712/Q   340   270
603

ELJ188		5710	A1833	IFR			
C56X/Q	F	TINGS					
910		HEHAW		KBNA -ELJ1 ELITE JET			
RPA3366		1563	KBNA	+CHADM1 SWAPP+ KBNA CHADM SWAPP J42 GVE PAATS2 KPHL			
E170/Q	Taxi	P1234					
606		350					
SWA100		0522	A1226	IFR			
B737/Q	F	VXV					
158		SWFFT		KBNA			

Sort: At Bay   37 Strips

Figure 5 Dragging strips

3. Angulating (sometimes referred as cocking or tilting) - shifting a strip to the left or to the right. In Figure 6 Angulating strips below one can see the result of three strips being angulated.

CLEARANCE DELIVERY at BNA

N826EW	Taxi	7423	KBNA	KBNA DANLS1 DANLS SPKER LTOWN6 KMEM	
F2TH/Q		P2150			
231		230		TCAS EQUIPPED	
SWA429	F	4161	A1841	IFR	
B737/Q		LVT			
424		GUITR		KBNA	
SWA3944	F	5644	A1238	IFR	
B737/Q		VXV			
428		SWFTT		KBNA	
EJA296	Taxi	4157	KBNA	KBNA GDOGG1 GDOGG ABB SARGO SARGO2 KCVG	
F2TH/L		P2200			
266		210			
LOF2219	Taxi	2506	KBNA	+DANLS1 DANLS MEM+ KBNA MEM J66 LIT BYP6 KDFW	
E145/Q		P2145			
624		270			
SWA4720	Taxi	1513	KBNA	KBNA PARDN1 NAKIY CGI DLITE FATSS BOOSH BOOSH KSTL	
B737/Q		P1210			
608		280			
TRS1748	Taxi	5776	KBNA	KBNA KRSTA1 OLSIE IIU MZZ ROYKO3 KORD	
B712/Q		P2157			
603		340			

Sort: At Bay   **40 Strips**

Figure 6 Angulating strips

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4. Flipping - virtualization of turning a physical strip face down. In Figure 7 Strip "flipping" one can see the result of "flipping" the strip for the call sign ASQ4522.

Figure 7 Strip "flipping"

5. Editing strips - modifying different fields of the strip. In Figure 8   Strip Editing below one can see the result of double touch on a strip within the strip bay - appearance of the "Strip Edit" dialog. Touching any field highlights it and its content is displayed within the edit text field (in the depicted scenario the Squawk field is being edited). It shall be noted that the field validation process is being used when editing any field (e.g. when editing the Squawk, the numbers 8 and 9 are not accessible).

Figure 8   Strip Editing

6. Sorting bays (automatic and manual sort) - ability to sort strip bays based on any of the configured criteria. In Figure 9 Sorting Strip bays below one can see the Sort UI toolbar with "At bay time" sorting criteria selected. Regardless of currently set sorting criteria for a bay, the user may manually change the location of any strip within the bay by manually dragging it within the bay or from another bay. After the drop operation is performed, the system will save the position of the dropped strip and it will remain at that position with the special indicator that the strip was moved manually (in Figure 7 Strip "flipping" one can notice a thick black line at the right corner of the first two strips, indicating these strips were moved manually). It should be noted that modifying the sorting criteria for the bay removes manual indications for all strips within the bay.

Figure 9 Sorting Strip bays

7. Filtering bays - ability to filter strip bays based on a specific text string]. One can set filter string for a bay by selecting "Filter" tag form the bay's tool bar - see Figure 10   Filtering Strip bays below.
It should be noted that strips bay fills from the bottom up, just as a real flight strip bay does.
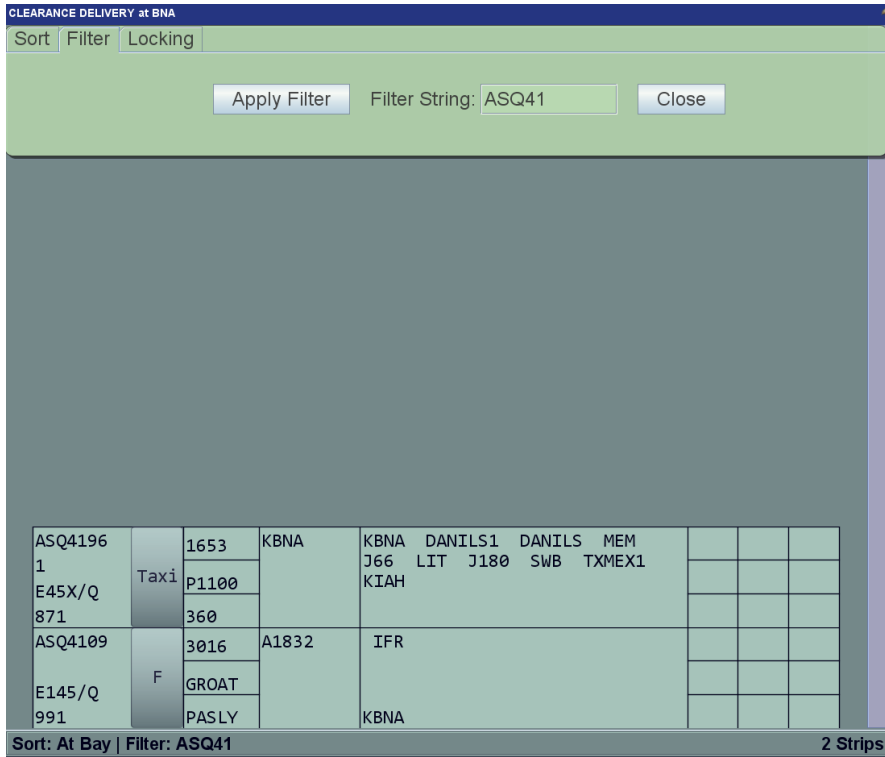
Figure 10   Filtering Strip bays

8.   Marking - putting a symbol in any configured field on the strip. This action is a virtualization of controllers' writing special symbols on a strip. In Figure 11   Strip Marking below one can see the result of selecting marking symbols for different strip fields.
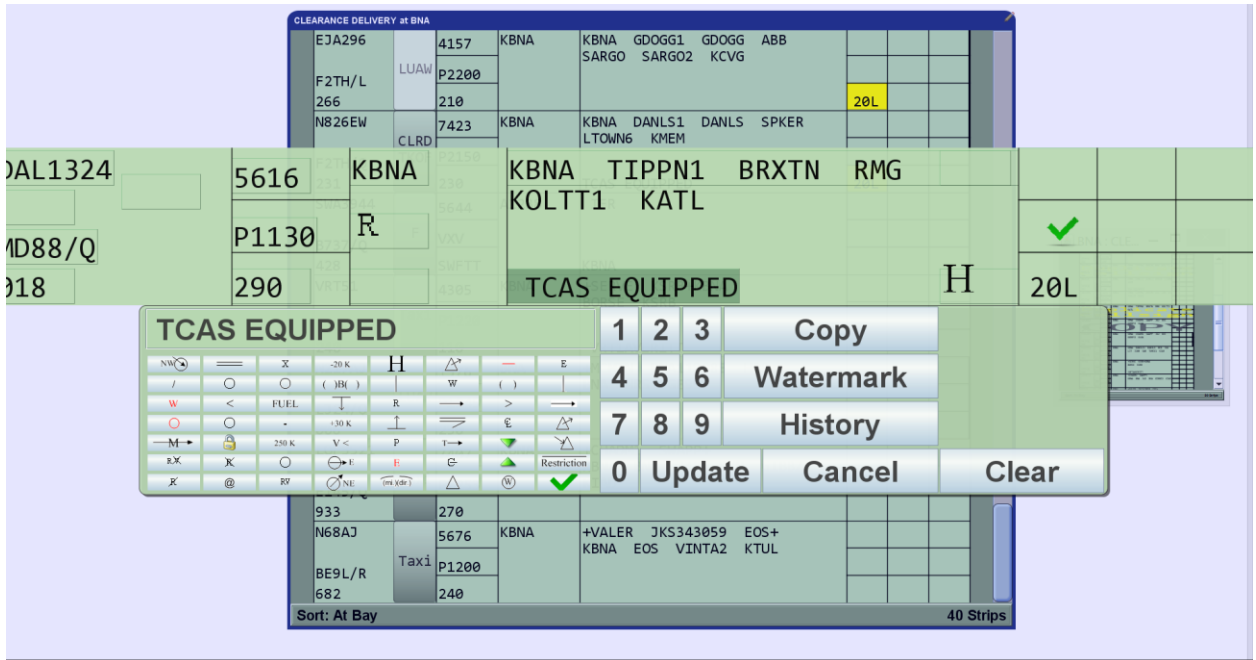

Figure 11   Strip Marking

9. Bay Pairing - creating a "copy" of the bay that will mimic the original bay in terms of the strip content and the strip list order. This feature is useful when a user that do not have a control over the bay needs to view its content within his/her display.

The "pairing" status of the bay will be reflected in its status bar as seen in Figure 12 Paired bay status notification below.

Figure 12 Paired bay status notification

10. Locking strips - restricting the capability to manipulate (move or edit) a strip or set of strips to a particular bay (user). All strip located below the lock line will be locked and the graphic indicator depicting the lock symbol will be displayed on each of the locked strips. These strips will be "locked" throughout the system and only the user who created the lock line will be able to manipulate these strips (move, edit, etc.). The lock line in the original bay will be displayed in green color. If the original bay happened to be the "Master" among the set of "paired" bays, then its "slave" bays will also display the lock line, but it will be displayed in red color as can be seen in Figure 13 Lock lines on paired bays below.

Figure 13 Lock lines on paired bays

11. Watermarking - ability to add a "watermark" to the.

In Figure 14 Adding Watermark to the strip below one can see the result of this action applied to the flight strip with the callsign N217AJ.

CLEARANCE DELIVERY at BNA							
EJA296 F2TH/L 266	LUAW	4157 P2200 210	KBNA	KBNA GDOGG1 GDOGG ABB SARGO SARGO2 KCVG		20L	
N826EW F2TH/Q 231	CLRD TKOF	7423 P2150 230	KBNA	KBNA DANLS1 DANLS SPKER LTOWN6 KMEM TCAS EQUIPPED		20L	
SWA3944 B737/Q 428	F	5644 VXV SWFTT	A1238	IFR KBNA			
VRT51 LJ45/Q 240	Taxi	4305 P1220 110	KBNA	+SERVE KSRB+KBNA BORSE KSRB -VRT1AVERITT			
N217AJ LJ24/Q 006	LUAW	1576 P1245 230	BNA	+MCMIN BNA118085 HRS+ BNA HRS GE99		20L	
LOF3521 E145/Q 933	Taxi	7407 P2253 270	KBNA	+CHADM1 SWAPP+ KBNA BNA J42 BKW GIBBZ2 KIAD			
N68AJ BE9L/R 682	Taxi	5676 P1200 240	KBNA	+VALER JKS343059 EOS+ KBNA EOS VINTA2 KTUL			
Sort: At Bay							**40 Strips**

Figure 14 Adding Watermark to the strip

12. Copy - creating a new strip which is a copy of an existing strip. In Figure 15 Copying strips below one can see the result of this action applied to the flight strip with the call sign EGF3667 and re-sorting the bay by Callsign criteria. The copy strips have a special watermark "COPY" automatically applied to it.

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BNA : CLEARANCE DELIVERY

GJ36203		1503	KBNA	KBNA CHADM1 SWAPP J42 GVE KORRY3 KLGA			
CRJ7/Q 299	Taxi	P1203 350					
EJA296		4157	KBNA	KBNA GDOGG1 GDOGG ABB SARGO SARGO2 KCVG			
F2TH/L 266	LUAW	P2200 210			20L		
EGF3667		5607	KBNA	KBNA CHADM1 SWAPP J42 GVE KORRY3 KLGA			
CRJ7/Q 407		P1120 370					
EGF3667		5607	KBNA	KBNA CHADM1 SWAPP J42 GVE KORRY3 KLGA			
CRJ7/Q 407	Taxi	P1120 370					

Sort: Callsign — 20 Strips

Figure 15 Copying strips

13. ATIS code - displaying the current ATIS code in the strip.
When the controller touched the strip filed corresponding to the ATIS code value the current value of the ATIS code is displayed in that field, depending on the strip type. In case the displayed ATIS code is not current, the corresponding strip field will be highlighted in yellow color as seen in Figure 16 ATIS code display below. The controller can update the highlighted ATIS field by touching it again.

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B712/Q		₣2137					
603		340					
RPA3366		1563	KBNA	+CHADM1 SWAPP+			
	GC			KBNA CHADM SWAPP J42 GVE			
E170/Q		P1234		PAATS2 KPHL			
606		350					
ASQ4565		1536	KBNA	KBNA DANLS1 DANLS MEM J66	D		
	GC			LIT J180 SWB TXMEX1 KIAH			
E145/Q		P1223					
892		360					
GJS6203		1503	KBNA	KBNA CHADM1 SWAPP J42 GVE			
	GC			KORRY3 KLGA			
CRJ7/Q		P1203					
299		350					
EGF3667		5607	KBNA	KBNA CHADM1 SWAPP J42 GVE	C		
	GC			KORRY3 KLGA			
CRJ7/Q		P1120					
407		370					
AWE2096		5613	KBNA	KBNA TAZMO1 BURME VXV	D		
	GC			JOHNS3 KCLT			
A319/Q		P2200					
266		290					

Sort: At Bay   **16 Strips**

Figure 16 ATIS code display

14. Strip History - accessing and displaying the complete history of a strip. To access and display a history for the strip, one should click the Strip Edit Dialog's "History" button in the Strip Edit Dialog's text field for this strip. As the result, the complete history for the strip is displayed as shown in Figure 17 Strip History below. It should be noted that any action on the strip is presented as a separate entry in the strip's history list, including angulations, flipping, fields' highlighting, etc.

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Figure 17 Strip History

15. Undo - ability to reverse any action performed on a strip.
    The "Undo" feature is available for a strip while in "History" mode (viewing the strip's history). By double-clicking on the history list element located below the last step that need to be undone, the "Undo" dialog appears as shown in Figure 18 Strip Undo action below. By selecting "Undo" button, any actions on the strip corresponding to callsign AWE2096, which occur after 17:44:50 will be undone (reversed).

Figure 18 Strip Undo action

16. "Ad-hoc" strip creation - ability to create new strip.
    The new strip is created with the use of the "New strip creation" dialog as shown in Figure 19 New strip creation dialog below.
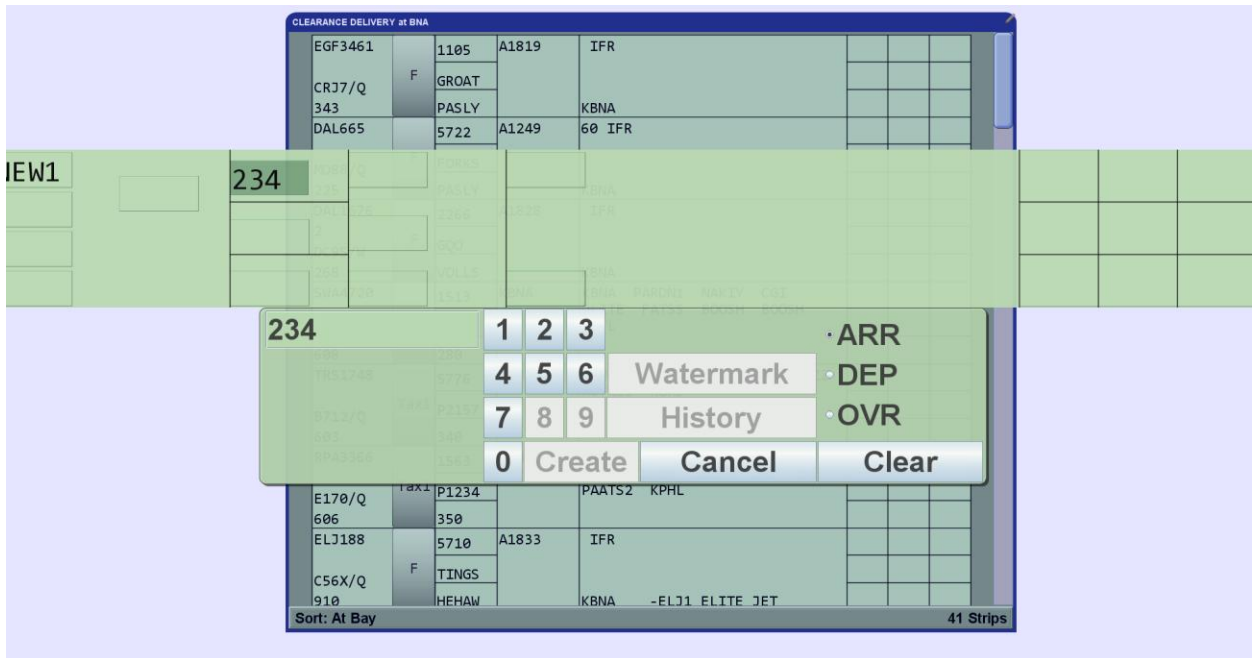
Figure 19 New strip creation dialog

FLIGHT QUEUE COMPONENT

I2-Strip provides the user with the Flight Queue Component ("Time line").

The tags along the timeline can be described as follows (see Figure 20 Flight Queue Component below):

- Callsigns for all flights departing via the runways specified are displayed to the right of the time line. The corresponding slots display the time in the future till the flight takeoff time;
- Callsigns for all flights arrivig via the runways specified are displayed to the left of the time line. The corresponding slots display the time in the future till the flight's touchdown time.
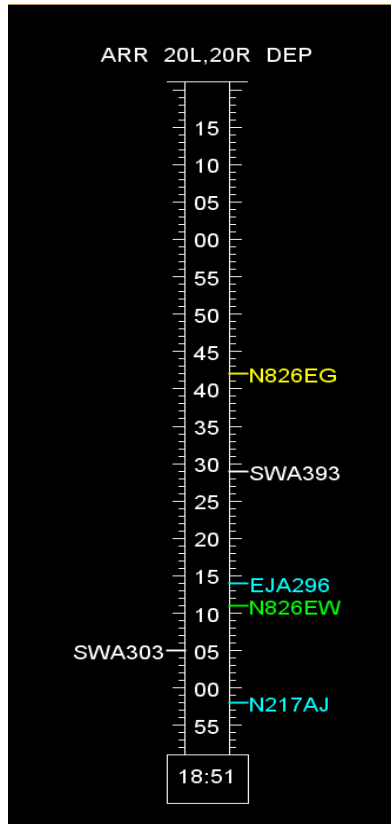
Figure 20 Flight Queue Component

The tags along the time tine are color coded (with user-configurable colors) based on the corresponding strip status (current strip's workflow).