What is claimed is:

1. A system comprising:

a slot die, wherein the slot die includes:

an applicator slot extending about a width of the slot die, wherein the applicator slot is in fluid communication with a fluid flow path through the slot die, and

a plurality of actuators spaced about the width of the slot die, wherein each actuator in the plurality of actuators is operable to adjust a cross-directional thickness of the fluid flow path at its respective location to provide a local adjustment of fluid flow through the applicator slot; and

a controller configured to set the position of each actuator according to one of a plurality of discrete settings for operation of the slot die,

wherein the controller is further configured to predict a set of discrete settings from the plurality of discrete settings corresponding to a preselected cross-web profile for an extrudate based on a known correlation between the set of discrete settings and the cross-web profile of the extrudate,

wherein predicting the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises using fluid dynamics and a digital model of the die incorporating parameters of die dimensions and fluid rheology, to predict the set of discrete settings from the plurality of discrete settings; and

wherein using fluid dynamics and the digital model of the die to predict the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises:

separately modeling fluid flow at each actuator and determining position adjustments for each actuator based on the modeled fluid flow associated with that actuator.

~~2. The system of claim 1, wherein predicting the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises using fluid dynamics and the digital model of the die to predict the set of discrete settings from the plurality of discrete settings.~~

~~3. The system of claim 2, wherein using fluid dynamics and the digital model of the die to~~

~~predict the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises:~~

~~separately modeling fluid flow at each actuator and determining position adjustments for each actuator based on the modeled fluid flow associated with that actuator.~~

42. The system of ~~any of claims 1—3~~claim 1, wherein predicting the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises using a flow sensitivity matrix in a profile control strategy for controlling the coating thickness profile to its desired state.

~~53~~. The system of claim 42, wherein the profile control strategy includes a Gauss-Newton strategy.

~~64~~. The system of any of claims ~~4—52~~-3, wherein the flow sensitivity matrix represents flow sensitivity across the width of the die slot versus actuator position adjustment for each of the plurality of actuators.

~~75~~. The system of any of claim 1 – ~~64~~, wherein the known correlation between the set of discrete settings and the cross-web profile of the extrudate is based on a known correlation between a profile of the applicator slot and the set of discrete settings and a known correlation between the profile of the applicator slot and the cross-web profile of the extrudate.

~~86~~. The system of any of claims 1 – ~~75~~, wherein the controller is further configured to present the predicted set of discrete settings to a user via a user interface.

~~97~~. The system of any of claims 1 – ~~86~~, wherein the controller is further configured to set each of the plurality of actuators according to the predicted set of discrete settings during operation of the slot die.

~~108~~. The system of any of claims 1 – ~~97~~, wherein the controller is further configured to:

evaluate the cross-web profile of the extrudate after it exits the applicator slot;

based on the evaluation of the cross-web profile, determine whether adjustments to the predicted set of discrete settings may provide a cross-web profile of the extrudate after it exits the applicator slot that more closely matches the preselected cross-web profile;

after determining adjustments to the predicted set of discrete settings may provide a cross-web profile of the extrudate after it exits the applicator slot that more closely matches the preselected cross-web profile, predict an improved set of discrete setting from the plurality of discrete settings corresponding to the preselected cross-web

with the controller; and

reposition the actuators according to the improved predicted set of discrete settings during the continued operation of the slot die by passing the extrudate through the fluid flow path and out the applicator slot.

~~11~~9. The system of any of claims 1 – ~~10~~8, wherein the controller is further configured to retrieve the preselected cross-web profile from a non-transitory computer readable medium.

~~12~~10. The system of any of claims 1 – ~~11~~9, wherein the controller is further configured to receive the the preselected cross-web profile from a user input.

~~13~~11. The system of any of claims 1 – ~~12~~10, further comprising a plurality of measurement instruments, wherein each measurement instrument is configured to provide a local measurement of the slot die, the local measurement corresponding to the cross-directional thickness of the fluid flow path at the location of the respective measurement instrument,

wherein the controller is further configured to, when positioning each of the actuators with the controller according to the set of discrete settings includes monitoring, monitor the local measurements from the measurement instruments in the plurality of measurement instruments and, for each of the actuators, adjust the relative position of the actuator until the actuator provides the absolute cross-directional thickness of the fluid flow path at the respective location of the actuator defined by the set of discrete settings.

~~14~~12. The system of claim ~~13~~11,

wherein the slot die further includes a choker bar,

wherein the plurality of actuators are attached to the choker bar about a width of the choker bar, and

wherein each of the actuators is operable to control the thickness of the fluid flow path at its location by providing a local adjustment of the position of the choker bar within the fluid flow path.

~~15~~13. The system of claim ~~13~~11, wherein each actuator in the plurality of actuators is operable to adjust a cross-directional thickness of the applicator slot at its respective location to provide the local adjustment of fluid flow through the applicator slot.

~~16~~14. The system of claim ~~15~~13,

wherein the slot die further includes a rotary rod and a die lip that opposes the rotary rod,

wherein the applicator slot is between the rotary rod and the die lip, and

wherein the plurality of actuators is operable to control the cross-directional thickness of the applicator slot by moving the rotary rod relative to the die lip.

~~17~~15. The system of claim ~~15~~13,

wherein the slot die further includes a flexible die lip on one side of the applicator slot, and

wherein the plurality of actuators is operable to control the cross-directional thickness of the applicator slot by moving the flexible die lip.

~~18~~16. The system of any of claims 1 – ~~17~~15, wherein the slot die is selected from a group consisting of:

a film slot die;

a multi-layer slot die;

a hot melt extrusion coating die;

a drop die;

a rotary rod die;

an adhesive slot die;

a solvent coating slot die;

a water-based coating die; and

a slot fed knife die.

~~19~~17. A non-transitory computer readable medium storing executable instructions configured to cause a programmable controller to operate a slot die,

wherein the slot die includes:

an applicator slot extending about a width of the slot die, wherein the applicator slot is in fluid communication with a fluid flow path through the slot die, and

a plurality of actuators spaced about the width of the slot die, wherein each actuator in the plurality of actuators is operable to adjust a cross-directional thickness of the fluid flow path at its respective location to provide a local adjustment of fluid flow through the applicator slot,

wherein the executable instructions are configured to cause the programmable controller to:

predict a set of discrete settings from a plurality of discrete settings corresponding to a preselected cross-web profile for an extrudate based on a known correlation between the set of discrete settings and the cross-web profile of the extrudate; and

set the position of each actuator according to the predicted set of discrete settings for operation of the slot die,

wherein predicting the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises using fluid dynamics and a digital model of the die incorporating parameters of die dimensions and fluid rheology, to predict the set of discrete settings from the plurality of discrete settings; and

wherein using fluid dynamics and the digital model of the die to predict the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises:

separately modeling fluid flow at each actuator and determining position adjustments for each actuator based on the modeled fluid flow associated with that actuator.

~~20~~18. A method of operating a slot die,

wherein the slot die includes:

an applicator slot extending about a width of the slot die, wherein the applicator slot is in fluid communication with a fluid flow path through the slot die, and

a plurality of actuators spaced about the width of the slot die, wherein each actuator in the plurality of actuators is operable to adjust a cross-directional thickness of the fluid flow path at its respective location to provide a local adjustment of fluid flow through the

applicator slot; and

the method comprising:

predicting, with a controller, a set of discrete settings from a plurality of discrete settings corresponding to a preselected cross-web profile for an extrudate based on a known correlation between the set of discrete settings and the cross-web profile of the extrudate; and

setting the position of each actuator according to the predicted set of discrete settings for operation of the slot die

wherein predicting the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises using fluid dynamics and a digital model of the die incorporating parameters of die dimensions and fluid rheology, to predict the set of discrete settings from the plurality of discrete settings; and

wherein using fluid dynamics and the digital model of the die to predict the set of discrete settings from the plurality of discrete settings corresponding to the preselected cross-web profile for the extrudate comprises:

separately modeling fluid flow at each actuator and determining position adjustments for each actuator based on the modeled fluid flow associated with that actuator.