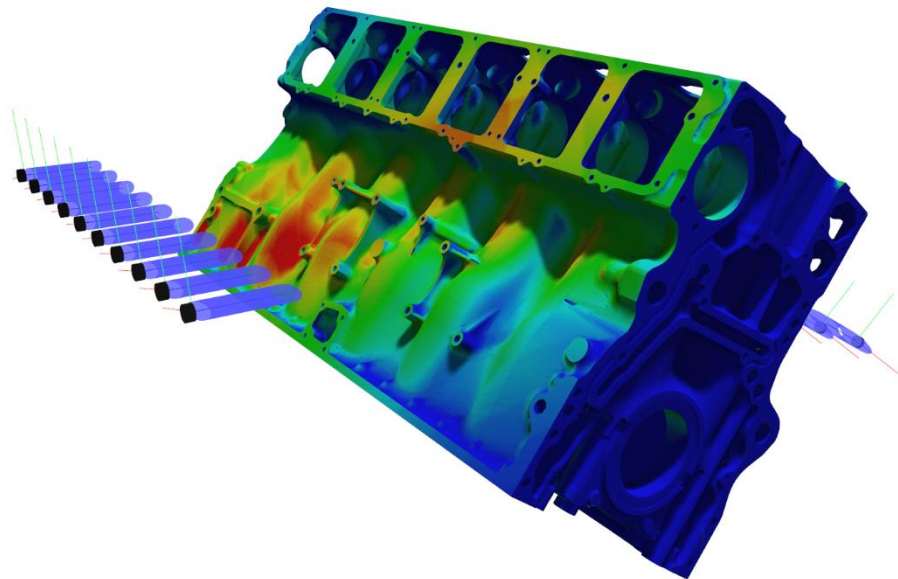


# IPS Projection Simulation

## Capability

- ➔ *Simulation of spray painting and thermal spraying applications for predicting resulting film thickness*
- ➔ *Simulation of high-pressure washing processes for improving purity and reducing cycle time*
- ➔ *Extremely fast algorithms and powerful analysis tools*



## Benefits

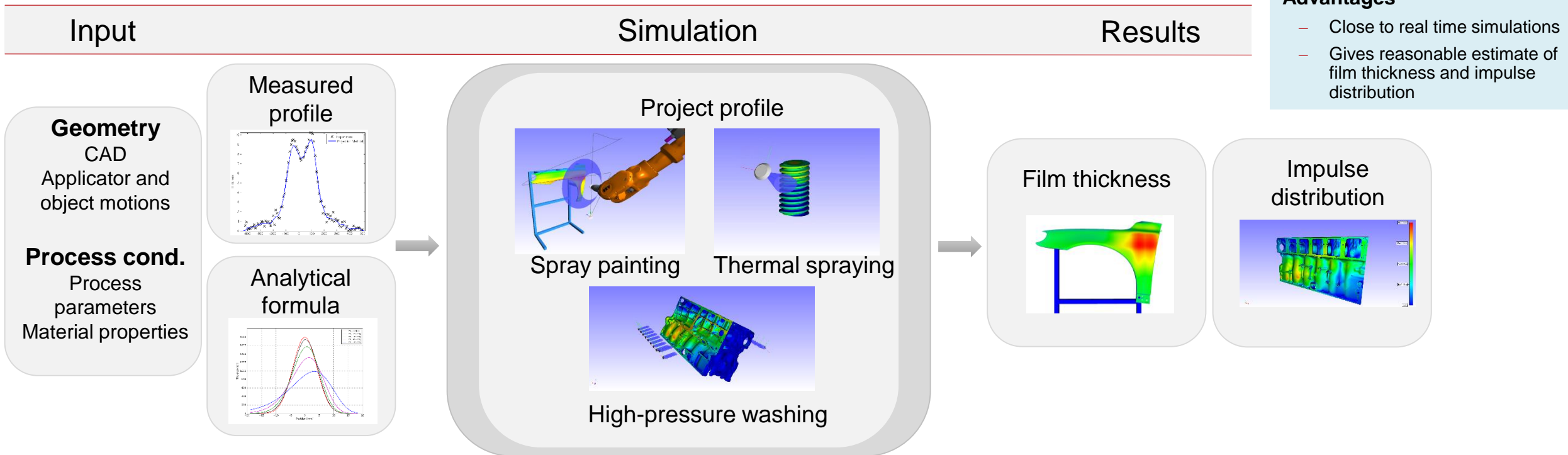
- ➔ *Power (virtual product preparation)*
- ➔ *Speed (close to real time simulations)*
- ➔ *Easy to use (one day crash course)*

## Results

- ➔ *Several successful validation campaigns*

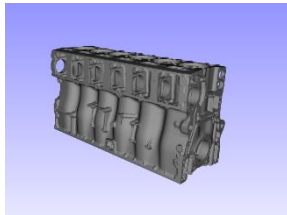
# IPS Projection Simulation

- Use analytical formula or measurements to generate projection profile
- Profile is projected onto surface using ray-tracing, taking object curvature, robot speed and nozzle to object distance into account

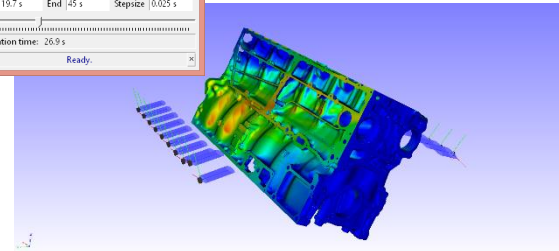
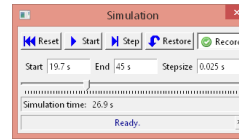


# IPS Projection Simulation

## Simulation Procedure



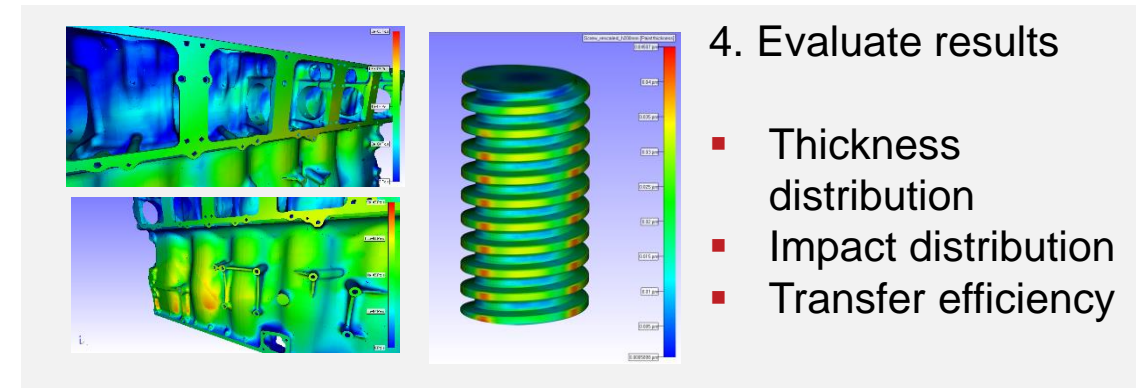
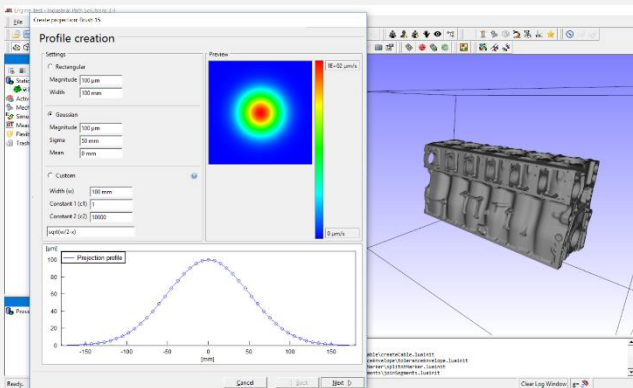
1. Import geometry
  - CAD description



3. Perform simulation
  - Results in real time

## 2. Process conditions:

- Nozzle definition
  - Create or import profile
- Applicator motion
- Object motion



## 4. Evaluate results

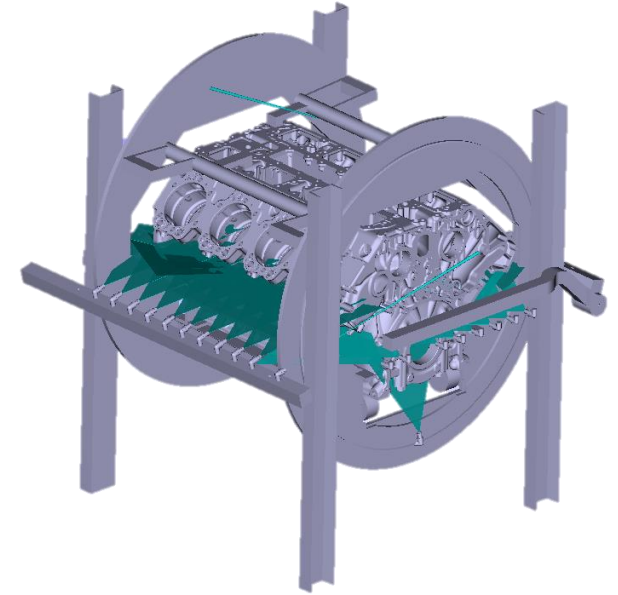
- Thickness distribution
- Impact distribution
- Transfer efficiency

# IPS Projection Simulation

## Validation campaign

### Washing a Scania truck engine block

- Difficult to perform measurements and observe ongoing process
  - Contribution from individual nozzles impossible to analyze
  - Design changes are time consuming and expensive
- Complete washing program, including motions, engine and fixture setup in IPS
- High-pressure nozzles
  - 41 flat stream and solid stream nozzles
  - Pressure 16 bar
- Surrounding fixture is included for shadowing effects
- Results of projection simulation in a few minutes



# IPS Projection Simulation

## Validation campaign

### Washing a Scania truck engine block

- Pointwise particle measurements of dust and particle concentration
- Simulations accurately predicted areas with high and low concentration
- Simulations in IPS provide operators with valuable insight of the black-box process
- IPS Projection Simulation can be used for improving the washing program by predicting the effects of changes in motions and nozzle placements

