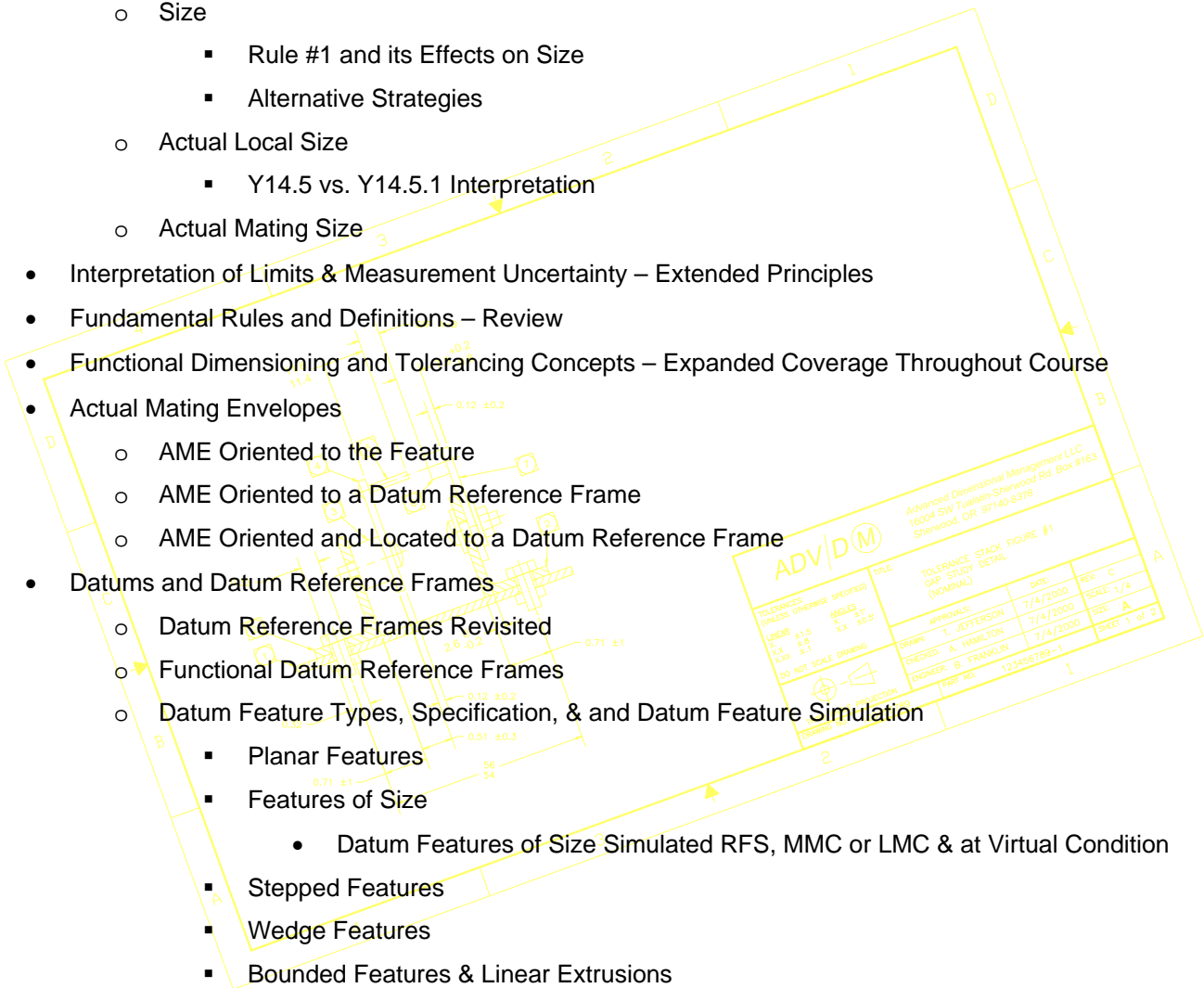
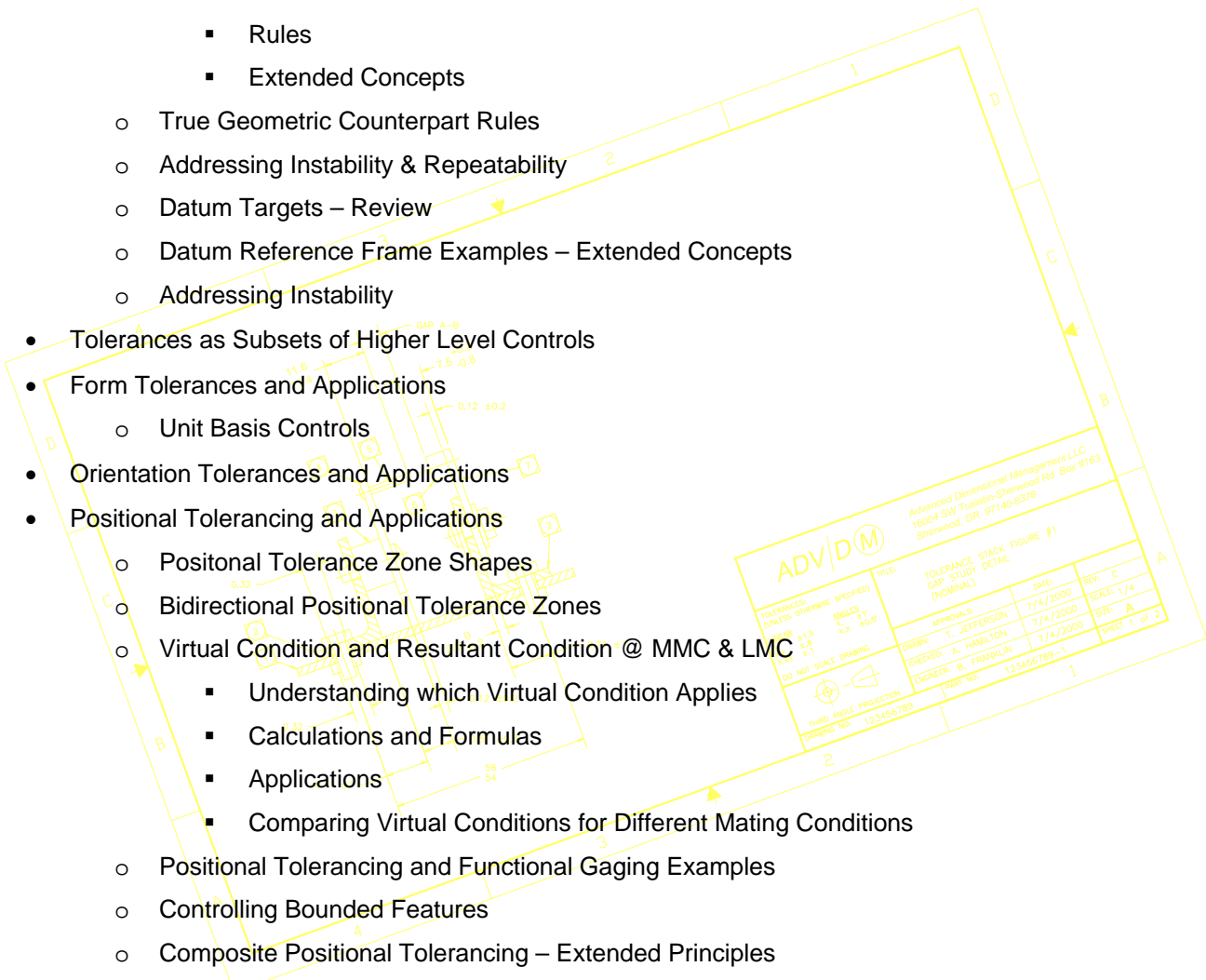


### Level 2 GD&T with Applications Course Outline

- Review
- Features of Size
  - Material Condition Modifiers – Applicability
    - MMC & LMC – What They Really Mean – Implications
  - Opposed Points – Revisited
  - Size
    - Rule #1 and its Effects on Size
    - Alternative Strategies
  - Actual Local Size
    - Y14.5 vs. Y14.5.1 Interpretation
  - Actual Mating Size
- Interpretation of Limits & Measurement Uncertainty – Extended Principles
- Fundamental Rules and Definitions – Review
- Functional Dimensioning and Tolerancing Concepts – Expanded Coverage Throughout Course
- Actual Mating Envelopes
  - AME Oriented to the Feature
  - AME Oriented to a Datum Reference Frame
  - AME Oriented and Located to a Datum Reference Frame
- Datums and Datum Reference Frames
  - Datum Reference Frames Revisited
  - Functional Datum Reference Frames
  - Datum Feature Types, Specification, & and Datum Feature Simulation
    - Planar Features
    - Features of Size
      - Datum Features of Size Simulated RFS, MMC or LMC & at Virtual Condition
    - Stepped Features
    - Wedge Features
    - Bounded Features & Linear Extrusions
    - Cones
    - Complex Features
    - Patterns of Features of Size
    - Multiple Datum Features
      - Stepped
      - Coaxial



- Screw Threads, Splines and Gears as Datum Features
- Where the Datums are & Where the Datums can be
- Selecting Datum Features
  - Functional Considerations
    - Interfacial Considerations
  - Geometric Considerations
- Datum Feature Precedence
  - Rules
  - Extended Concepts
- True Geometric Counterpart Rules
- Addressing Instability & Repeatability
- Datum Targets – Review
- Datum Reference Frame Examples – Extended Concepts
- Addressing Instability
- Tolerances as Subsets of Higher Level Controls
- Form Tolerances and Applications
  - Unit Basis Controls
- Orientation Tolerances and Applications
- Positional Tolerancing and Applications
  - Positional Tolerance Zone Shapes
  - Bidirectional Positional Tolerance Zones
  - Virtual Condition and Resultant Condition @ MMC & LMC
    - Understanding which Virtual Condition Applies
    - Calculations and Formulas
    - Applications
    - Comparing Virtual Conditions for Different Mating Conditions
- Positional Tolerancing and Functional Gaging Examples
- Controlling Bounded Features
- Composite Positional Tolerancing – Extended Principles
- Composite vs. Multiple Single Segment
- Composite versus Position with Perpendicularity
- Material Condition Modifier Selection Criteria – Functional Considerations
- Projected Tolerance Zones – Extended Principles
  - Calculating Projection without Specifying a Projected Tolerance Zone
    - Effects and Proof: Position
    - Effects and Proof: Position with Perpendicularity



- Runout Tolerances and Applications
- Profile Tolerances and Applications
  - Composite Profile Examples
- Free State and Restrained Parts – Forces and Force Systems
  - Defaults in ASME Y14.5M-1994: Free State vs. Non-Rigid Parts
    - Definitions
  - Reasons for Restraint
    - Functional, Assembly and Installation Conditions
  - Defining Restraint Conditions
    - Restraint Variables
    - Restraint Notes
  - Part Geometry: Comparison of Free-State and Restraint – Implication on the Finished Part
  - Coordination with Inspection and Manufacturing
  - Datum Reference Frame Issues
  - Tolerance Zone Issues
  - Clamping vs. Manual Adjustment
  - Implications
- Default GD&T Systems
- Applications and Examples – Extended Principles (Extensive – More than half the class)
  - Functional Dimensioning and Tolerancing – Extended Principles
  - Dimensioning and Tolerancing Strategies for Mating Parts
  - Comparison of Alternate Approaches on Mating Parts
  - Etc.

